Dated: November 18, 2022.

José E. Díaz,

Captain, U.S. Coast Guard, Captain of the Port San Juan.

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FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 2 and 25

[IB Docket Nos. 20–330; FCC 22–63; FR ID 107242]

Amendment to Enable GSO Fixed-Satellite Service (Space-to-Earth) Operations in the 17.3–17.8 GHz Band, To Modernize Certain Rules Applicable to 17/24 GHz BSS Space Stations, and To Establish Off-Axis Uplink Power Limits for Extended Ka-Band FSS Operations

AGENCY: Federal Communications Commission.

ACTION: Final rule.

SUMMARY: In this document, the Federal Communications Commission (FCC) adopts amendments to its rules toenable geostationary satellite orbit (GSO) space stations in the fixed-satellite service (FSS) to operate downlinks (space-to-Earth) in the 17.3–17.8 GHz frequency band, subject to certain limitations, and adopts related technical updates to its rules governing the FSS and the Broadcasting-Satellite Service to prevent harmful interference.

DATES: The amendments are effective December 27, 2022, except for the amendments to §§ 25.114 (amendatory instruction 5), 25.115 (amendatory instruction 6), 25.117 (amendatory instruction 7), 25.140 (amendatory instruction 8), 25.203 (amendatory instruction 10), and 25.264 (amendatory instruction 18), which are delayed. The Commission will publish a document in the **Federal Register** announcing the effective date for those amendments.

FOR FURTHER INFORMATION CONTACT: Sean O'More, International Bureau, Satellite Division, 202–418–2453, *sean.omore@fcc.gov.*

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's Report and Order, FCC 22–63, adopted August 3, 2022, and released August 3, 2022. The full text of the Report and Order is available at *https://www.fcc.gov/edocs/search-results?t=quick&fccdaNo=22-63.* To request materials in accessible formats for people with disabilities, send an email to *FCC504@fcc.gov* or call the Consumer & Governmental Affairs Bureau at 202–418–0530 (voice), 202–418–0432 (TTY).

Final Regulatory Flexibility Analysis. As required by the Regulatory Flexibility Act of 1980, as amended (RFA), the Commission prepared a Final Regulatory Flexibility Analysis (FRFA) of the possible significant economic impact on small entities of the policies and rules adopted in the Order, which was incorporated in the Report and Order.

Congressional Review Act

The Commission will send a copy of the Report and Order in a report to be sent to Congress ad the Government Accountability Office pursuant to the Congressional Review Act (CRA), see 5 U.S.C. 801(a)(1)(A).

Paperwork Reduction Act

This document contains new or modified 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, we note that pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107–198, see 44 U.S.C. 3506(c)(4), we previously sought specific comment on how the Commission might further reduce the information collection burden for small business concerns with fewer than 25 employees.

Synopsis

I. Introduction

In this final rule, the Commission permits use of the 17.3–17.7 GHz band by geostationary satellite orbit (GSO) space stations in the fixed-satellite service (FSS) in the space-to-Earth direction on a co-primary basis with incumbent services. We also permit limited GSO FSS (space-to-Earth) use of the 17.7–17.8 GHz band on an unprotected basis with respect to fixed service operations. Permitting use of the 17.3- 17.8 GHz band to include FSS downlinks increases intensive and efficient use of the band and provides additional downlink capacity for high-throughput satellite communications. With appropriate technical safeguards established herein, including coordination requirements, this band can be shared in an efficient and effective manner without harmful interference while alleviating the growing need for additional Ka-band GSO FSS downlink spectrum to support communications to earth stations, and further streamline the licensing process of certain satellite systems. Permitting use of the 17.3–17.8 GHz band to include FSS downlinks will create a contiguous band for FSS (space-to-Earth) operations, enabling greater flexibility and efficiency for advanced satellite systems operations for the benefit of American consumer. In this final rule, we also define an extended Ka-band in our rules, *i.e.,* the 17.3- 18.3 GHz (space-to-Earth), 18.8–19.4 GHz (space-to-Earth), 19.6–19.7 GHz (space-to-Earth), 27.5–28.35 GHz (Earth-to-space) and 28.6–29.1 GHz (Earth-to-space) bands to streamline licensing of FSS earth stations in a closely harmonized regulatory framework for all similar FSS uplink transmissions in the conventional and extended Ka-bands.

II. Background

The Table of Frequency Allocations is comprised of the International Table and the United States Table of Frequency Allocations (U.S. Table). In the International Table, the 17.3–17.7 GHz band is allocated, in International Telecommunication Union (ITU) Region 2, to the fixed-satellite service (FSS) (Earth-to-space) and to the broadcasting-satellite service (BSS) on a co-primary basis, as well as to the radiolocation service on a secondary basis. In the U.S. Table, the 17.3–17.7 GHz band is allocated to the FSS (Earth-to-space) and to the BSS on a co-primary basis and to the radiolocation services on a secondary basis. The adjacent 17.7–17.8 GHz band is allocated internationally in ITU Region 2 to the fixed service, BSS, and FSS (in both the space-to-Earth and Earth-to-space directions) on a primary basis and to the mobile service on a secondary basis. The 17.7–17.8 GHz band is allocated to FSS (Earth-to-space) and to the fixed service on a co-primary basis in the U.S. Table. Historically, in the United States, the 17.3–17.8 GHz band has been used for FSS feeder uplinks that transmit programming to Direct Broadcast Satellite (DBS) service GSO space stations, in addition to terrestrial fixed service use of the 17.7–17.8 GHz band. DBS feeder link operations typically involve the use of large, high-gain antennas at a limited number of individually-licensed earth station locations. The DBS service satellites then downlink that video programming directly to consumers in the 12.2–12.7 GHz band.

In 2007, the Commission adopted rules for a new service that would use the 17.3–17.8 GHz band in the space-to-Earth direction to provide BSS. This service, known as the ''17/24 GHz BSS,''

provides service downlinks to customers in the same 17.3–17.8 GHz band that is used for feeder uplinks to DBS space stations, *i.e.,* reverse band operation. Although the 17/24 GHz BSS may use the entire 17.3–17.8 GHz band internationally, it may only provide service in the United States in the 17.3–17.7 GHz band. DBS feeder link uplinks, by contrast, operate in the entire 17.3–17.8 GHz band in the United States. When the Commission adopted rules for the 17/24 GHz BSS, it also sought comment on rules to avoid interference between DBS and 17/24 GHz BSS operations, both in-orbit (''space path'' interference) and on the ground (''ground path'' interference). The Commission adopted technical rules to address space path interference in 2011 that included a requirement that 17/24 GHz BSS space stations locate at least 0.2 degrees from a DBS space station. In 2017, the Commission adopted rules to address ground path interference.

On November 18, 2020, the Commission adopted a notice of proposed rulemaking (NPRM) (86 FR 7660 (Feb. 1, 2021)). In the *17 GHz FSS NPRM,* the Commission proposed to revise its rules and permit GSO FSS (space-to-Earth) communications in the 17.3–17.7 GHz on a co-primary basis. The Commission also proposed to permit GSO FSS (space-to-Earth) communications in the 17.7–17.8 GHz band on an unprotected basis with respect to terrestrial fixed service operations in the band. This would join with current spectrum allocations to produce a contiguous band for non-Federal Government space-to-Earth FSS operations in the United States, from 17.3–20.2 GHz.

The Commission also proposed a number of technical rules to prevent harmful interference between stations sharing the 17.3–17.8 GHz band. In order to facilitate sharing of the band between BSS and FSS, the Commission proposed satellite spacing requirements, power-flux density (PFD) limits for transmitting (downlinking) FSS space stations, polarization and frequency re-use requirements, and space station antenna cross-polarization requirements. In order to mitigate space path interference in the band,[1] the Commission proposed to extend the ''coordination trigger'' applicable to DBS and BSS space stations in the 17.3–17.8 GHz band to FSS space stations, to require PFD calculations in the band to consider aggregate PFD from all transmitting beams on the adjacent space station. The Commission also proposed a minimum orbital separation between FSS space stations of 0.5 degrees and amendment of the values for off-axis measurement angles, measurement frequency requirements, and a two-part process for submission of off-axis antenna gain data. In order to mitigate ground path interference,[2] the Commission proposed to maintain its current rules to ''grandfather'' upgrades and modifications to existing DBS earth station sites, modify the measurements and values used to establish DBS/FSS coordination zones in the 17.3–17.8 GHz band, and permit blanket-licensed FSS receiving earth stations in the 17.3–17.8 GHz band. The Commission also proposed certain conforming modifications to the rules in order to effectuate the proposed'' changes. Finally, the Commission proposed to define the term ''extended Ka-band'' to include all frequency bands in the Ka-band with allocations to the GSO FSS, apart from the currently-defined ''conventional Ka-band,'' and to apply the Commission's routine license application processing procedures to applications in the ''extended Ka-band.''

[1] Space path interference may occur when the off-axis downlinked signals from one space station are detected by the receiving antenna of a nearby co-frequency space station. The severity of space path interference will depend upon the transmitted signal power level; the off-axis gain discrimination characteristics of the transmitting and receiving antennas; and on the specific orientation of, and separation between, the transmitting and receiving antennas on both space stations. This latter factor in turn depends upon various inter-dependent parameters including longitudinal separation and the inclination and eccentricity of both space station orbits. Management of space path interference is typically more challenging when a receiving DBS space station is located within a few tenths of a degree in orbital longitude from a transmitting co-frequency space station.

[2] Ground path interference arises in reverse-band sharing scenarios when the off-axis uplinked signals transmitted by one earth station are detected by the receiving antenna of a nearby co-frequency earth station. It is analogous to space path interference which arising between co-frequency space stations as discussed above. As with space path interference, the severity of ground path interference will depend upon the transmitted signal power level, the off-axis gain discrimination characteristics of the transmitting and receiving antennas, and the specific orientation of, and separation between, the transmitting and receiving antennas on both earth stations. In addition, local geography can also influence ground path interference levels.

III. Discussion

A. GSO FSS Allocation in the 17.3–17.8 GHz Band

The Ka-band [3] is used extensively by FSS operators to provide satellite-based broadband access services using high-throughput satellites. In these high throughput systems, end user terminals uplink to space stations on one set of frequencies, and the space station downlinks traffic to earth station terminals (and back into the internet backbone) using a separate set of frequencies. The satellites in these systems typically use spot-beam technology and high-order frequency re-use to significantly increase capacity and spectral efficiency. In this final rule, we permit FSS downlinks from geostationary satellites to operate in the 17.3–17.7 GHz band on a co-primary (co-equal) basis [4] with other primary services in that band by revising footnote US402 in the U.S. Table, and adopting a new footnote NG58. In addition, as discussed below, we make certain other changes to the U.S. Table to permit GSO FSS space-to-Earth operations in the adjacent 17.7–17.8 GHz band. We revise the existing primary FSS allocation in the U.S. Table to permit GSO space-to-Earth operations. We also permit authorization of FSS receiving earth stations in the 17.7–17.8 GHz band on an unprotected basis with respect to fixed service operations; such FSS receiving earth stations would operate on a co-primary basis, however, vis-à-vis primary satellite operations in the band.

1. GSO FSS Transmissions in the 17.3–17.7 GHz Band

The 17.3–17.7 GHz band is allocated in the U.S. Table to FSS (Earth-to-space), limited to feeder links for the BSS (DBS), and to the BSS (17/24 GHz BSS), on a co-primary basis. In the *17 GHz FSS NPRM,* the Commission proposed to add a co-primary allocation in the 17.3–17.7 GHz band for FSS (space-to-Earth). Neither the International (Region 2) nor the U.S. Table of Frequency Allocations currently permit FSS (space-to-Earth) operations in this band. In the *17 GHz FSS NPRM,* the Commission proposed to modify the U.S. Table, revise footnote US402, and adopt a new footnote NG58 to permit co-primary operation of FSS downlink transmissions in the 17.3–17.7 GHz band, while limiting FSS downlink operations to GSO satellite networks. To streamline the applicable restrictions to the 17.3–17.8 GHz band

[3] The Ka-band is generally considered to be 17.3–20.2 GHz and 27.0–30.0 GHz. For the FSS, the conventional Ka-band is defined as 18.3–18.8 GHz (space-to-Earth), 19.7–20.2 GHz (space-to-Earth), 28.35–28.6 GHz (Earth-to-space), and 29.25–30.0 GHz (Earth-to-space) frequency bands, which the Commission has designated as primary for GSO FSS operation. 47 CFR 25.103. This final rule establishes an extended Ka-band for the FSS in the 17.3–18.3 GHz (space-to-Earth), 18.8–19.4 GHz (space-to-Earth), 19.6–19.7 GHz (space-to-Earth), 27.5–28.35 GHz (Earth-to-space) and 28.6–29.1 GHz (Earth-to-space) bands.

[4] A service designated as co-primary must share operations with other services designated as co-primary in the frequency band on a co-equal basis.

in the U.S. Table, the Commission further proposed to incorporate the use limits found in US271 and NG163 into the new footnote NG58 to remove footnotes US271 and NG163 from the Commission's rules. The Commission also proposed consequential modifications to the licensing information requirements contained in § 25.115(e).

A number of commenters support permitting FSS (space-to-Earth) operations in the 17.3–17.7 GHz band. These commenters argue that additional Ka-band FSS (space-to-Earth) spectrum is needed to expand the capacity to serve the public and to support faster, higher-capacity satellite broadband communications, in remote and underserved areas.

AT&T states that in order to protect the current operations and future expansion of BSS and DBS, the Commission must adopt technical rules to protect incumbents and make any new FSS (space-to-Earth) allocation secondary to BSS and DBS. CTIA-The Wireless Association (CTIA) notes that the Commission currently has a proceeding open to address allocations of spectrum in the 12.2–12.7 GHz band, which is a downlink band for DBS (Earth-to-space) uplinks in the 17.3–17.8 GHz band. CTIA suggests that the Commission should consider allocations in the 12.2–12.7 GHz band and the 17.3–17.8 GHz band in the same proceeding.

We find that it would serve the public interest to allocate the 17.3–17.7 GHz band to FSS (space-to-Earth). FSS downlinks in the 17 GHz band will be compatible with the incumbent services: feeder links for DBS networks and ''reverse band'' use for the downlink portion of 17/24 GHz BSS operations. The majority of commenters support the Commission's proposed changes to the U.S. Table. Hughes also notes that appropriate rules to prevent harmful interference have facilitated a convergence of BSS, FSS, and MSS in the 17/24 GHz band. Only CTIA opposes the allocation. AT&T states that the allocation should be conditioned to protect DBS and BSS services. We note that FSS (space-to-Earth) communications are technically similar to DBS/BSS communications, and we see no reason why the band, already successfully shared between DBS, BSS, and FSS (Earth-to-space), cannot be successfully shared with FSS (space-to-Earth) with the technical standards adopted herein to prevent harmful interference. We find that permitting use of the 17.3–17.8 GHz band to include FSS downlinks would increase intensive and efficient use of the band and provide additional downlink capacity for high-throughput satellite communications. Increasing space launch activity in the United States and decreasing satellite size and weight make more satellite-based communications feasible, and the record in this proceeding demonstrates a need to provide additional spectrum for FSS (space-to-Earth) capacity. In addition to providing greater bandwidth to FSS customers, this allocation will help to provide increased communications capability to unserved and underserved areas of the United States, assist in closing the digital divide, and ensure that this spectrum band is used and shared in the most efficient and effective manner.

For any new GSO FSS allocation in the 17 GHz Band, AT&T encourages the Commission to amend the U.S. Table ''to reflect the secondary status of GSO FSS downlinks vis-à-vis the incumbent coprimary services.'' Toward this end, AT&T proposes that we expressly require ''GSO FSS downlinks to protect incumbent 17/24 GHz BSS services, while not requiring future 17/24 GHz BSS to protect GSO FSS systems.'' We are not persuaded by these arguments. FSS (space-to-Earth) transmissions are similar to DBS/BSS transmissions, including the 17/24 GHz BSS downlinks to customers in the same band, and there is no evidence in the record of likely harmful interference among the services currently allocated in the 17.3–17.7 GHz band and FSS (space-to-Earth) if we were to add a primary FSS (space-to-Earth) allocation (GSO-only) in the band. We also are not persuaded that treating GSO FSS transmissions secondary to current and future 17/24 GHz BSS transmissions would be more appropriate here. In light of the technical rules adopted herein and the fact that GSO FSS (space-to-Earth) transmissions are similar to DBS/BSS transmissions, co-primary operations would ensure that all satellite services, including both current and future 17/24 GHz BSS, use scarce spectrum and orbital resources in the most efficient and effective manner, in the absence of any compelling harmful interference or undue burden concerns. Given the importance of FSS services and the need for additional FSS downlink spectrum, we find that it would serve the public interest to adopt a primary FSS downlink allocation in the band without AT&T's requested condition. Although there is not a Region 2 allocation specifying FSS in the downlink direction, we believe that the technical rules we adopt herein will prevent harmful interference and allow successful sharing of the band among all satellite operators, and to ensure that FSS (space-to-Earth) communications cause no more interference than, nor require more protection from interference than, BSS communications in the band.

We also reject CTIA's request to merge this proceeding with the *12 GHz NPRM* (86 FR 13266 (March 8, 2021)). We do not agree with CTIA that band sharing in the 17.3–17.8 GHz band in the space-to-Earth direction is affected by possible band sharing in the 12.2–12.7 GHz band. The technical and policy issues in these two proceedings are different, with varying complexities, and permitting GSO FSS (space-to-Earth) operations in the 17.3–17.8 GHz band will not affect the allocation or performance of services in the 12.2–12.7 GHz band. In addition, there are no efficiencies to be gained by merging these two separate proceedings. Rather such an action would create delays, procedural complexities, and administrative inefficiencies.

2. The 17.7–17.8 GHz Band

The 17.7–17.8 GHz band is allocated in ITU Region 2 to the fixed service, FSS in both directions, and BSS on a primary basis, and to the mobile service on a secondary basis. In the United States, the band is allocated for the non-Federal fixed service and FSS (Earth-to-space) on a primary basis. In the *17 GHz FSS NPRM,* the Commission proposed to add a space-to Earth direction (to the existing primary FSS allocation) in the U.S. Table, but also to add a footnote stipulating that earth stations receiving in the 17.7–17.8 GHz band are not entitled to protection from the fixed service. The Commission noted that allowing use of the 17.7–17.8 GHz band by the FSS (space-to-Earth) would provide a contiguous band for FSS downlink operations at 17.3–18.3 GHz, along with the existing FSS use in the 18.3–18.8 GHz band, which would facilitate operational efficiencies and flexibility to avoid interference and to use this contiguous spectrum in the most effective and efficient manner.

Commenters who support the allocation of the 17.3–17.7 GHz band to FSS (space-to-Earth) generally support allocating the 17.7–17.8 GHz band as well. AT&T expresses concerns and states that FSS (space-to-Earth) should be allocated secondary status in the 17.7–17.8 GHz band. CTIA opposes the allocation, stating that the allocation would hinder use of the band by future terrestrial services, and that SES did not request the use of the band for FSS (space-to-Earth) in its petition.

We find that adding a space-to Earth direction to the existing primary FSS allocation in the U.S. Table and a footnote stipulating that earth stations receiving in the 17.7–17.8 GHz band are not entitled to protection from the fixed service strikes the best balance between facilitating FSS (space-to-Earth) as well as continued operations of other users of the 17.7–17.8 GHz band. The co-primary allocation allows FSS to use the band for space-to-Earth communications, while the addition of footnote NG58 to the U.S. Table ensures that interference environment is not significantly changed for the existing operations of the incumbent fixed services in the 17.7–17.8 GHz band. We permit authorization of earth stations receiving transmissions from GSO FSS space stations in the 17.7–17.8 GHz band, strictly on an unprotected basis vis-a-vis the fixed service.[5] This approach is consistent with our goals to allocate increasingly scarce spectrum resources in the most efficient and effective manner possible. Allocating the 17.7–17.8 GHz band to the FSS (space-to-Earth) under the conditions adopted herein will provide a contiguous band for FSS downlink operations at 17.3–18.3 GHz, along with the existing FSS use in the 18.3–18.8 GHz band. This in turn would facilitate operational efficiencies and flexibility to avoid interference and to use this contiguous spectrum for next generation FSS services.

For these reasons, we adopt the proposed co-primary allocations for FSS (space-to-Earth) in the 17.3–17.8 GHz band, subject to conditions adopted herein. For the reasons stated below, we conclude that appropriate technical limitations on FSS (space-to-Earth) use of the band will allow for successful band sharing and preserve the utility of the band for incumbent services.

[5] In addition, the fixed service stations would be protected from harmful interference from GSO FSS downlink operations, given the existing power flux density (PFD) limits for GSO space stations in § 25.208(c) of the Commission rules. 47 CFR 25.208(c). These PFD limits comport with established international standards for preventing harmful interference to fixed service stations and are applicable in the entire 17.7–19.7 GHz band. See also infra at para. 29. We note that with respect to adjacent band operations, a fixed service operator in the 17.7–18.3 GHz band is required to comply with out of band emission limits contained in our rules. A fixed service operator in the 17.7–18.3 GHz band that complies with these limits would not otherwise be required to coordinate its operations with FSS receiving earth stations in the 17.3–17.7 GHz band. See also 47 CFR 74.637, 78.103, and 101.111. Fixed services in the 17.8–18.3 GHz band would likewise not be subject to a coordination requirement vis-à-vis FSS receiving earth stations operating in the 17.7–17.8 GHz band.

B. Technical Rules To Prevent Harmful Interference in the 17.3–17.8 GHz Band

In order to prevent harmful interference between services in the 17.3–17.8 GHz band, the Commission proposed a number of technical rules. These rules were designed to allow FSS (space-to-Earth) communications flexibility in the band, while preserving the ability to both use and grow in the band for other services.

1. Measures To Facilitate Space-to-Earth Operations of 17/24 GHz BSS and FSS

In the *17 GHz FSS NPRM,* the Commission proposed various requirements intended to facilitate both intra-service operations between 17.3–17.8 GHz FSS space stations and inter-service operations between FSS and 17/24 GHz BSS space stations operating in the space-to-Earth direction. Most of these requirements are already applicable to 17/24 GHz BSS space stations transmitting in the band, and the Commission generally proposed to extend them to 17.3–17.8 GHz FSS space stations either directly or with some targeted modifications.

Required Longitudinal Separation between Downlinking Satellites. The Commission proposed to adopt a two-degree orbital spacing requirement [6] between transmitting FSS space stations and a four-degree separation requirement between FSS and 17/24 GHz BSS space stations. The Commission proposed to require an FSS applicant to make a different coordination showing depending upon the services of its adjacent space stations. To implement this approach, the Commission proposed amending §§ 25.140(a), (b), and (d) and 25.262 of our rules to require GSO FSS and 17/24 GHz BSS applicants seeking to operate in the 17.3–17.8 GHz band to demonstrate compliance with rules applicable to their service's particular orbital spacing requirements, while simultaneously accommodating adjacent space stations in other services.[7] While the Commission believed that this approach would use the orbital arc and associated spectrum resources most efficiently, the Commission also sought comment on other possible orbital spacing options, including the four-degree spacing regimen which we currently apply to 17/24 GHz BSS stations.

Most commenters support our proposed orbital spacing approach. AT&T offers a different option, arguing that given the currently proposed power flux density (PFD) levels, we may require two degrees of separation between FSS space stations, but should require six degrees (vs. four) between FSS and 17/24 GHz BSS stations. AT&T bases this choice of distance on its argument that the proposed spacing would increase the aggregate adjacent satellite interference by approximately 1.3 dB, thereby exceeding the standard 6% delta T/T coordination trigger. In the alternative, AT&T asserts that should we adopt our orbital spacing proposal, then we must reduce our proposed PFD levels, particularly in the northeast and west regions, by 2.5 dB.

The Satellite Companies counter that requiring FSS satellites to either locate at least six degrees from a 17/24 GHz BSS space station or reduce their PFD levels is unnecessary, as there is no reason to suppose that the 17/24 GHz BSS system would be affected any differently by downlinking FSS transmissions than it would be from a neighboring 17/24 GHz BSS station in the current four-degree spacing environment. The Satellite Companies note, however, that AT&T's concerns may arise instead from concern about potential aggregate interference that might arise if multiple satellites were positioned within six degrees on either side of a current 17/24 GHz BSS location—a situation which they point out is currently not possible. For this reason, the Satellite Companies argue that AT&T proposes an overly-broad solution to address an unlikely, hypothetical scenario. The Satellite Companies propose as an alternative that the Commission adopt language permitting the proposed two-degree separation between FSS space stations, and four degrees between FSS and 17/24 GHz BSS stations, with the added proviso that an applicant for an additional FSS satellite proposing to operate within six degrees of a 17/24 GHz BSS satellite must demonstrate that

[6] The different satellite services operating in the 17.3–17.8 GHz band are subject to different orbital spacing requirements. Our rules require 17/24 GHz BSS space stations that transmit in the space-to-Earth direction in the 17.3–17.8 GHz band to be separated from each other by at least four degrees. In contrast, DBS stations are authorized to receive feeder uplink transmissions in the 17.3–17.8 GHz band in the opposite direction (*i.e.,* reverse-band operations), and are typically separated from each other by at least nine degrees. Transmitting 17/24 GHz BSS space stations must also maintain at least 0.2 degrees separation from DBS space stations to minimize space path interference. GSO FSS space stations however, have historically been subject to a two-degree spacing requirement. Compliance with the two-degree orbital separation requirements for FSS space stations is verified by the information certifications and technical showings required by 47 CFR 25.140(a) of our rules.

[7] Under this approach, GSO FSS space stations would adhere to a two-degree separation regimen between each other, and a four degree separation from neighboring 17/24 GHz BSS space stations.

interference to the incumbent 17/24 GHz BSS receiver will not increase over levels expected in the four-degree spacing environment. Hughes similarly argues that six degrees of separation between FSS and 17/24 GHz satellites is unnecessary, citing the technical analysis provided with the SES–17 application and the Commission's approval of that application. As a remedy to concerns of aggregate interference, Hughes proposes that only one FSS space station be permitted within six degrees of a 17/24 GHz BSS satellite.

We adopt a two-degree orbital separation requirement between transmitting FSS space stations, while simultaneously requiring that FSS space stations locate at least four degrees from adjacent 17/24 GHz BSS space stations. We do not believe that transmissions from FSS space stations at PFD levels that are either the same or reduced relative to those now required from 17/24 GHz BSS space stations in a four-degree environment will result in additional harmful interference to 17/24 GHz BSS receiving earth stations as there is no reason to suppose that the 17/24 GHz BSS system would be affected any differently by downlinking FSS transmissions than it would be from a neighboring 17/24 GHz BSS station in the current four-degree spacing environment. Accordingly, we believe that six degrees of separation between 17/24 GHz BSS and FSS satellites is unwarranted and would result in an inefficient use of scarce orbital resources.

We find, however, that there is some increased potential for aggregate interference into 17/24 GHz BSS systems if two transmitting FSS space stations were to locate within six degrees on either side of such an incumbent operator. Although relatively unlikely in the immediate operating environment, it remains a possibility, should future 17/24 GHz BSS space stations choose to locate at different orbital positions where two or more existing, or licensed but not yet launched, FSS space stations are within six degrees on either side of the 17/24 GHz BSS space station location. To address this concern, we will require that where an FSS satellite is located within four degrees of a previously authorized or proposed 17/24 GHz BSS satellite, and an applicant seeks to deploy another FSS satellite between four and eight degrees from the same 17/24 GHz BSS satellite in the same direction of separation as the existing FSS satellite, the applicant must either coordinate its operations with the affected incumbent 17/24 GHz BSS system or provide a showing in its application to demonstrate that aggregate interference into the 17/24 GHz BSS incumbent system will not exceed that which would be expected in a four-degree spacing environment. Hughes' proposal, as worded, would allow the second FSS satellite to locate just beyond six degrees away (*e.g.,* 6.05°), an orbital separation unlikely to remedy AT&T's aggregate interference concerns. We adopt eight degrees rather than the six degrees proposed by Hughes because we believe this orbital separation accurately represents the maximum separation that would be applicable for two transmitting satellites (FSS or 17/24 GHz BSS) in a four-degree spacing environment so that our decision is consistent with the current rules governing17/24 GHz BSS space stations proposing to locate at separations of less than four degrees from one another. To implement these rule changes, we will update §§ 25.140(a), (b), and (d) and 25.262.

Downlink Power Limits. The Commission has typically employed downlink PFD limits for space stations transmissions to facilitate both inter-service and intra-service sharing. Although the Commission's current rules include PFD limits for 17/24 GHz BSS systems transmitting in the 17.3–17.7 GHz band, the rules do not include PFD limits for FSS space stations in the 17.3–17.7 GHz band. To remedy this, the *17 GHz FSS NPRM* proposed to apply regional PFD limits to 17.3–17.8 GHz FSS space station transmissions, to harmonize them with those now applicable to the 17/24 GHz BSS. The Commission proposed adopting specific regional limits as follows:

(1) In the region of the contiguous United States, located east of 100° West Longitude and including Alaska and Hawaii: −118 dBW/m²/MHz; and

(2) In the region of the contiguous United States, located west of 100° West Longitude: −121 dBW/m²/MHz.

Because the PFD limits contained in section 25.208 are generally angle-dependent and largely intended to facilitate sharing between space and terrestrial services, rather than amend this section to include these new regional PFD requirements, the *17 GHz FSS NPRM* instead proposed to include them in § 25.140(a)(3), which contains rules to facilitate FSS intra-service operations in a two-degree orbital spacing environment. Further, to improve the organizational coherence of our part 25 rules, the *17GHz FSS NPRM* also proposed to likewise move the regional PFD limits for 17/24 GHz BSS space stations now contained in § 25.208(w) to § 25.140(b)(3). As a consequence of this move, the *17 GHz FSS NPRM* also proposed conforming updates to other paragraphs in § 25.140(b)(3) and to rule sections that currently refer to § 25.208(w) including §§ 25.114(d)(15)(i) and (ii), 25.140(b)(5), and 25.262(b)(1) and (2), (c), and (d).

Commenters generally support the Commission's proposals to apply regional PFD limits to transmitting FSS space stations. As discussed above, AT&T states that in conjunction with the proposed orbital spacing regimen, the proposed PFD limits would be too high in the northeast and west regions. As discussed herein, we are modifying the orbital spacing requirements, and these modifications should alleviate AT&T's concerns with respect to aggregate interference and the proposed regional PFD limits. Accordingly, we adopt the proposed modifications to § 25.140(a)(3) to include these regional PFD limits for transmitting FSS space stations to adequately facilitate both inter-service and intra-service sharing. In addition, no commenters object to the Commission's proposal to move the analogous regional PFD limits applicable to 17/24 GHz BSS systems in § 25.208(w) to § 25.140(b)(3) and we make this change to our rules along with the associated conforming modifications.

Some commenters question whether the PFD limits in the 17.7–17.8 GHz band are sufficient to protect incumbent fixed service operations, noting among other things that the (1) this PFD mask has not been studied by the Commission since 1983; (2) the internationally adopted PFD limits proposed herein assume that fixed service and FSS have equal status in the band, but the GSO FSS service in the 17 GHz band would be secondary to incumbent fixed operations (3) further detailed study is required to understand the full extent of the issue, but at minimum the Commission should take a similar protective measure to account for aggregate interference as it did in the C-band proceeding and reduce the PFD limit by 4 dB; and that (4) both the existing and proposed new § 25.140(b)(3) would permit a space station applicant to exceed the regional PFD to protect satellite operations, so long as the applicant coordinated with affected satellite operators, but without regard to the impact on terrestrial operations. As discussed above, with the modified orbital spacing requirements, the PFD limits we adopt herein should be sufficient to protect all incumbent services and alleviate aggregate interference concerns. We note that there is no evidence in the record that the current PFD mask

applicable to these services need to be revised, nor has any evidence been introduced that terrestrial services have experienced any interference issues in either the 17.7–17.8 GHz band or adjacent 17.8–18.3 GHz band, despite the fact that satellite and terrestrial services have co-existed in this spectrum for years, using these PFD limits. We note that although FSS allocation will be primary in the 17.3–17.8 GHz band and subject to the adopted PFD limits to protect fixed services from harmful interference, earth stations operating in the FSS (space-to-Earth) in the 17.7–17.8 GHz band shall not claim protection from stations in the fixed service that operate in that band. We also clarify that although we allow an FSS space station to exceed the PFD limits pursuant to § 25.140(b)(3) vis-à-vis other space stations, our adopted PFD limits will continue to apply vis-à-vis fixed services in the 17.7–17.8 GHz band or adjacent 17.8–18.3 GHz band.[8]

Polarization and Full Frequency Re-Use Requirements. The *17 GHz FSS NPRM* proposed to amend § 25.210(f) of our rules to include 17.3–17.8 GHz in the list of specified frequencies in which FSS operators are required to employ state-of-the-art full frequency reuse, either through the use of orthogonal polarizations within the same beam and/or the use of spatially independent beams. Commenters support this proposal with no objections. Accordingly, we adopt this proposal.

Cross-Polarization Isolation Requirements. The *17 GHz FSS NPRM* proposed not to extend the cross-polarization requirements contained in § 25.210(i) to FSS space station antennas transmitting in the 17.3–17.8 GHz band. The Commission sought comment on whether these requirements might be obsolete in the current digital transmission environment and could be eliminated for 17/24 GHz BSS space station transmissions as well. The Satellite Companies and Hughes agree that cross-polarization requirements are not necessary for downlinking FSS space stations, and further agree that these requirements could be eliminated for 17/24 GHz BSS transmissions as well, as they have become obsolete in today's digital transmission environment. We received no other comments on this issue. Accordingly, we will not extend these requirements to FSS space stations downlinking in the 17.3–17.8 GHz band, and we further eliminate the obsolete cross-polarization isolation requirement for 17/24 GHz space stations in § 25.210(i).

2. Measures To Mitigate Space Path Interference

In the 17.3–17.8 GHz reverse-band sharing environment, receiving DBS space stations are vulnerable to space path interference[9] from nearby co-frequency 17/24 GHz BSS space station transmissions.[10] To mitigate space path interference into DBS receivers, the *17 GHz FSS NPRM* proposed to apply to FSS space stations an approach similar to the one now applicable to 17/24 GHz BSS space stations. As discussed in detail below, we adopt these proposals. As discussed below, however, we are not increasing the minimum orbital separation distance between FSS and DBS space stations to 0.5 degrees. We also are not relaxing the angular measurement range over which FSS applicants are required to submit off-axis antenna gain data and associated PFD calculations. Rather, as discussed below, we extend the requirements contained in § 25.264(a) to FSS applicants. In addition, we amend § 25.264(a)(4) to require that measurements for both FSS and 17/24 GHz BSS transmitting antennas be made only at a single frequency in the middle of the band in which the applicant proposes to operate.

Off-Axis Power Flux Density Coordination Trigger. To avoid harmful levels of space path interference into DBS space station antennas from FSS transmissions, the *17 GHz FSS NPRM* proposed modifications to § 25.264(a) through (i) of our rules to extend the current PFD coordination trigger of –117 dBW/m^2/100 kHz to downlinking FSS space stations in the 17.3–17.8 GHz band. Recognizing that current space station design often employs multiple spot beams and may result in a cumulative interference level at the DBS receiver, the Commission also proposed to amend § 25.264(b)(1) and (2) and (e) to require that the PFD calculations at the DBS receiver from both 17/24 GHz BSS and FSS consider the *aggregate* power flux density from *all* 17.3–17.8 GHz transmitting beams on the adjacent space station.

All commenters supported our proposal to extend the current PFD coordination trigger to downlinking FSS space stations and felt that it was reasonable to require that the associated PFD calculations consider the aggregate power flux density value. We adopt these proposals and amend § 25.264(b)(1) and (2) accordingly.

Requirements for Antenna Off-Axis Gain, Angular Measurement Ranges, and Minimum Longitudinal Separation. The *17 GHz FSS NPRM* proposed to amend § 25.264(g) of our rules to apply 0.5 degrees as the minimum orbital longitude separation[11] that transmitting FSS space stations must maintain relative to DBS space stations, and to amend § 25.264(a) to reflect the corresponding off-axis measurement angles, *i.e.,* ±10 degrees in the X–Z plane and ±20 degrees in planes rotated about the Z axis. The Commission proposed to retain the current requirements for orbital inclination and eccentricity and proposed to amend § 25.264(h) to extend these values to FSS space stations. Further, the Commission tentatively concluded that this same change in the required minimum orbital separation value and corresponding antenna measurement angles could be extended to 17/24 GHz BSS space stations transmitting in the 17.3–17.8 GHz band and proposed to similarly amend § 25.264(a) and (g) with respect to 17/24 GHz BSS space stations.

The majority of commenters oppose our proposal to increase the minimum orbital separation distance between FSS and DBS space stations to 0.5 degrees. The Satellite Companies urge us to adopt the 0.2 degree minimum orbital separation requirement now applicable between 17/24 GHz BSS and DBS space stations, arguing that a reduction in the angular range over which measurements would be required does not justify blocking significant portions of the

[8] See, *e.g.,* 47 CFR 25.208(c). The fixed service stations would be protected from harmful interference from GSO FSS downlink operations, given the existing PFD limits for GSO space stations in § 25.208(c) of the Commission rules. 47 CFR 25.208(c). These PFD limits comport with established international standards for preventing harmful interference to fixed service stations and are applicable in the entire 17.7–19.7 GHz band.

[9] This type of interference may occur when the off-axis downlinked signals from one space station are detected by the receiving antenna of a nearby co-frequency space station. The severity of space path interference will depend upon the transmitted signal power level; the off-axis gain discrimination characteristics of the transmitting and receiving antennas; and on the specific orientation of, and separation between, the transmitting and receiving antennas on both space stations. This latter factor in turn depends upon various inter-dependent parameters including longitudinal separation and the inclination and eccentricity of both space station orbits. Management of space path interference is typically more challenging when a receiving DBS space station is located within a few tenths of a degree in orbital longitude from a transmitting co-frequency space station.

[10] Analogously, ground path interference arises between earth stations when the off-axis transmissions in the Earth-to-space direction of one service are received by a nearby co-frequency receiving earth station in another service.

[11] The angular separation, in conjunction with limits on certain orbital parameters of space stations in both the DBS and FSS services, bounds the range over which FSS applicants or licensees must provide off-axis angular gain and PFD data.

orbital arc near DBS locations, thereby impeding efficient use of orbital resources. They argue further that while waivers of these measurement angles may have proven problematic in the past, there is no evidence that these difficulties persist today. The Satellite Companies further state that allowing simulated measurement data would serve to alleviate obstacles associated with providing data responsive to § 25.264. Hughes argues that the 0.5 degree separation is overly restrictive, placing too great a burden on an already crowded orbital arc. Rather, Hughes proposes that to ensure the most efficient use of the orbital arc we should adopt a minimum orbital separation of 0.2 degrees between downlinking FSS space stations and the nearest DBS satellite. In contrast, AT&T supports our proposal to increase the minimum separation distance to 0.5 degrees. It notes that although our current rules permit separations as small as 0.2 degrees between 17/24 GHz BSS and DBS spacecraft, that no operator has sought to provide service from such proximity. AT&T further argues that the marginal increase in orbital separation distance will both reduce that angular measurement range over which data is required but will also improve overall on-orbit mission safety, including space path interference risks.

We will not adopt the proposal to require a minimum orbital separation of 0.5 degrees between downlinking FSS space stations and DBS satellites. The primary reason for the proposal of this value was to relieve FSS applicants from the angular range measurement requirements, which had proven problematic in the past for some applicants. In addition, the Commission believed it might enhance the acceptability of simulated data, thereby further relieving applicants from measured data requirements. The 0.2 degree value is the minimum longitudinal separation requirement currently applicable in our rules for 17/24 GHz BSS operators (who also downlink in the 17.3–17.7 GHz band) relative to DBS satellites. In adopting that requirement, the Commission determined that taking into account an east/west stationkeeping tolerance of 0.05 degrees, a minimum 0.2 degree spacing between the assigned locations of 17/24 GHz BSS and DBS space stations was required to maintain a longitudinal separation of 0.1 degrees between 17/24 GHz BSS and DBS space stations at all times. No space stations in the DBS and BSS services have been placed so near each other, and FSS operators, for whose benefit the Commission proposed the 0.5 degree separation requirement in this proceeding, clearly prefer the flexibility associated with the narrower orbital spacing requirement of 0.2 degrees. Thus, we consider it to be sufficient to protect DBS receivers from space path interference when combined with the appropriate PFD coordination trigger, orbital constraints, and angular range measurement requirements for off-axis antenna gain. For this reason, we are not relaxing the angular measurement range over which FSS applicants are required to submit off-axis antenna gain data and associated PFD calculations. Rather, we extend the requirements contained in § 25.264(a) for 17/24 GHz BSS operators to FSS applicants. Specifically, measurements must be made over a range of ±30° from the X axis in the X–Z plane, and over a range of ±60° in planes rotated about the Z axis. All commenters addressing the angular measurement range issue supported our proposal to extend our current requirements for orbital inclination and eccentricity to FSS space stations. We amend § 25.264(h) accordingly.

Measurement Frequencies. Our current rules require 17/24 GHz BSS applicants to make off-axis angular measurements at a minimum of three measurement frequencies determined with respect to the entire portion of the 17.3–17.8 GHz band over which the space station is designed to transmit. In the *17 GHz FSS NPRM,* the Commission sought comment on whether this requirement should be revised.

Both the Satellite Companies and Hughes assert that, to simplify the information to be provided by both GSO FSS and 17/24 GHz BSS operators, we should update § 25.264(a)(4) and (5) to require submission of gain data based only on a single mid-band frequency, because gain values do not vary materially across the 17.3–17.8 GHz band. No other commenters addressed this question. We agree that the antenna gain typically varies little across the 17.3–17.8 GHz band and that multiple measurement frequencies often result in large amounts of repetitive information. Accordingly, we amend § 25.264(a)(4) to require that measurements for both FSS and 17/24 GHz BSS transmitting antennas be made only at a single frequency in the middle of the band in which the applicant proposes to operate. Recognizing however, that instances may arise when additional measurement data may be warranted (*e.g.,* when the aggregate PFD is near the coordination trigger value), we will also include a requirement that applicants must be prepared to provide additional measurement information at 5 MHz above, and 5 MHz below the band edge, upon request.

Measured vs. Simulated Off-Axis Antenna Gain Data. The *17 GHz FSS NPRM* sought comment on whether the Commission should modify the two-part submission process to also accept simulated data in lieu of measured data to allow operators to demonstrate compliance with the requirements of § 25.264. Specifically, the Commission asked what requirements for simulated data would ensure accuracy of the required calculations. The *17 GHz FSS NPRM* sought comment on specific software programs that should be required, input assumptions, conditions or other parameters that we should specify, or information that we should require applicants to include with their showing. The *17 GHz FSS NPRM* also asked how the use of simulated data might affect the current two-part information submission process. The Commission recognized that accepting simulated gain and PFD data could obviate a need to reduce the angular ranges over which such measurements are made, while also recognizing that adoption of an increased orbital separation between space-to-Earth transmitting FSS or BSS and DBS space stations could alleviate concerns associated with relying upon simulated off-axis gain data.

Commenters offered differing opinions. Hughes encourages us to permit the use of simulated data, arguing that simulated antenna pattern data is routinely used in on-board satellite antenna design and testing. It explains that predicted patterns are compared with measured patterns in compact antenna test ranges with agreement well beyond 30 dB sidelobes, and that simulated patterns are often preferred over measured data when the test range accuracy is in question as is often the case with high frequency and large antennas. The Satellite Companies similarly advocate for the use of simulated data, asserting that permitting its use will address prior difficulties in supplying the information mandated by this rule while still providing the Commission and interested parties with the information needed to assess compliance with relevant requirements.

In contrast, AT&T encourages us to continue to require operators to submit actual, measured data and associated PFD calculations in satisfaction of § 25.264, and to extend these requirements to any new GSO FSS service in the 17 GHz band. It argues that measured data is invaluable in guarding against inaccuracies resulting from errors in software simulations, and that relying only on simulations may

risk infidelities in the analysis or modelling to account for scattering effects or other interactions between the antenna and spacecraft structures. AT&T asserts that validation of first-stage results through submission of actual measured data will increase operator confidence in the predicted on-orbit performance. AT&T further argues that there is no evidence to support the GSO FSS operators' assertions that simulated data can provide ''the information needed to assess compliance with relevant requirements.''

We modify *our* rules to require 17/24 GHz BSS and GSO FSS operators to submit measured off-axis antenna gain data as part of the information submission process, with certain exceptions allowing for simulated data. Specifically, we will permit the use of simulated data *only* in those instances where the 17/24 GHz BSS operator or GSO FSS operator's space station will be located at an orbital separation of at least one degree from a prior-filed or licensed U.S. DBS operator's space station. Apart from providing increased flexibility for all operators, a primary consideration in permitting GSO FSS use of the band is to ensure that incumbent systems are adequately protected from harmful interference. While permitting simulated data submission will certainly provide greater flexibility to 17/24 GHz BSS and GSO FSS applicants, the potential victim, (*i.e.,* the DBS operator) is not fully confident in its reliability. We believe however, that at orbital separations greater than one degree from a DBS space station, the potential for space path interference is negligible because of the attenuation of potentially interfering off-axis emissions. Thus, over the remaining portions of the orbital arc, we will permit applicants the option to rely upon simulated off-axis antenna gain rather than measured data to satisfy the requirements of § 25.264.

In addition, we sought comment on the use of simulated data while simultaneously proposing to require a minimum orbital separation of 0.5 degrees between DBS and transmitting GSO FSS space stations—a scenario in which the potential for space path interference would be greatly diminished. These rule changes were considered as a means to relieve applicants of some of the measurement requirements which in the past had proved difficult for 17/24 GHz operators. GSO FSS commenters, however, assert that there is no evidence that these difficulties exist today, and cite as an example the recently SES–17 application which included off-axis gain measurements made over the full required range. Accordingly, we believe that under this approach GSO FSS and 17/24 GHz BSS operators will be able to make the full range of necessary measurements when required by our rules but will have the added option to rely upon simulated data in some instances. Moreover, by first allowing use of simulated data in finite portions of the orbital arc, we may better assess and develop confidence in its reliability in a relatively low-risk scenario. We believe this approach represents the best compromise between our competing goals of providing operator flexibility and protecting incumbent services from harmful interference, and we amend § 25.264(c) accordingly.

Two-Part Data Submission Process. In the *17 GHz FSS NPRM,* the Commission proposed to amend § 25.264(a) through (e) of our rules to extend the two-part data submission process requirements [12] to FSS applicants proposing space-to-Earth transmissions in the 17.3–17.8 GHz band. The Commission also sought comment on whether we should retain, update, or modify any part of the process for 17/24 GHz BSS applicants. Finally, to correct an existing uncertainty regarding the timing of the PFD information submission, the Commission proposed to replace the phrase ''within 60 days after completion of critical design review'' in § 25.264(a)(6) and (b)(4) with a requirement to submit information ''within two years after license grant'' in these rule sections.

Commenters generally support the proposal to extend the two-part data submission process to FSS systems in the 17.3–17.8 GHz band and agree that redefining the deadline for first-phase (predicted) information to be provided ''within two years after license grant'' instead of linking it to the critical design review is appropriate. AT&T also supports extending the two-part data submission process to GSO FSS applicants but recommends that the deadline for the second (measured) data submission be moved forward from the current two months prior to launch, to six months prior to launch. It argues that this extension would afford DBS operators sufficient time to review the information and seek remediation when necessary without disrupting critical launch schedules.

We modify § 25.264(a) through (e) to extend the two-part data submission process to GSO FSS applicants in the 17.3–17.8 GHz band. As part of this modification, we replace the phrase ''within 60 days after completion of critical design review in § 25.264(a)(6) and (b)(4) with a phrase requiring submission of predicted data ''within two years after license grant.'' We are not adopting AT&T's recommendation that we move the deadline for submission for the second phase information from two to six months prior to launch because, based on our experience, we are not convinced that a full six months is required to evaluate the data presented at this stage. Moreover, operators who are concerned about delays to their launch schedules may always submit the measured data in advance of the two-month deadline. The two-month deadline was adopted by amending § 25.264(c) and (d) in the *Part 25 Second Report and Order (R&O)* (81 FR 55316 (Aug. 18, 2016)), moving it closer to the launch date to allow licensees to measure an antenna's off-axis gain after it has been integrated with the satellite bus. There is no supporting evidence in the record that this previously adopted timeline is no longer appropriate. Accordingly, we decline to modify the existing timeline and find that keeping the two-month prior to launch deadline for the second phase information submission would continue to serve the public interest.

3. Measures To Mitigate Ground Path Interference and Earth Station Operations

To protect 17.3–17.8 GHz band receiving FSS earth stations from ground path interference arising from the Earth-to-space transmissions from nearby co-frequency DBS feeder link earth stations, the Commission proposed in the *17 GHz FSS NPRM* to apply generally to receiving FSS earth stations the same coordination approach the Commission uses to facilitate operations between DBS and 17/24 GHz BSS earth stations. Specifically, the Commission proposed to amend § 25.203 of our rules to apply the coordination approach contained in paragraph (m) to FSS earth stations in the entire 17.3–17.8 GHz band, although in the 17.7–17.8 GHz band such earth stations would not be entitled to protection from fixed service stations. The Commission sought comment on modifications to the parameters used with the ITU Radio Regulations Appendix 7 coordination methodology

[12] The two-part submission process for antenna off-axis gain data and associated PFD calculations demonstrates conformance with the off-axis PFD coordination trigger. Under this approach at an early stage in the process, operators submit predicted antenna off-axis gain data and associated PFD calculations at any identified victim (DBS) space station receiver. No later than two months prior to launch this predicted data is confirmed by submission of measured data and associated PFD calculations.

to account for differences between the receiving antennas employed in the two services.

Commenters supported our proposal to apply generally the same coordination approach contained in § 25.203(m) of our rules, and used to facilitate operations between DBS and 17/24 GHz BSS earth stations, to coordination with receiving FSS earth stations. Accordingly, we modify this rule section to extend this approach to FSS earth station coordination, as discussed further below.

Upgrades and Modifications to Grandfathered DBS Facilities. The Commission proposed in the *17 GHz FSS NPRM* proposed to retain the grandfathered status for existing DBS feeder link earth stations relative to FSS receiving earth stations, and to apply relative to the FSS the same criteria for permitting DBS operators to modify or add antennas to their existing networks that apply with respect to 17/24 GHz BSS. Commenters who addressed this issue all agreed with the proposed approach, although Hughes stresses that grandfathered status should apply only to existing and specific modifications to DBS earth stations. Hughes' comments are consistent with the Commission's proposal. Based on the record we adopt the Commission's proposal and retain the grandfathered status for existing DBS feeder link earth stations relative to FSS receiving earth stations, and apply relative to the FSS the same criteria for permitting DBS operators to modify or add antennas to their existing networks.

Coordination between DBS and FSS Receiving Earth Stations. The Commission's rules include a coordination methodology to permit licensing of new DBS feeder link earth stations in the 17.3–17.8 GHz band while protecting co-frequency receiving 17/24 GHz BSS earth stations in the 17.3–17.7 GHz band. This rule requires a DBS operator with a new or modified earth station to complete frequency coordination with existing and planned 17/24 GHz BSS receive earth stations within an established coordination zone around its proposed site using the methodology outlined in Appendix 7 of the ITU Radio Regulations. Recognizing that the specific parameter values to be used in determining this coordination zone were based upon some characteristics specific to BSS receiving earth stations, the Commission proposed in the *17 GHz FSS NPRM* to modify § 25.203(m)(1) to include new values for use in determining the coordination zone for DBS feeder link earth stations relative to FSS earth stations. The Commission sought comment on this decision and, in particular, on what these values should be.

Commenters generally agree that the existing coordination methodology specified in § 25.203(m)(1) of our rules to facilitate coordination between DBS feeder uplink stations and 17/24 GHz BSS earth stations should be extended to FSS earth stations. FSS satellite operators also agree that some parameters in the table in this section need to be modified for use in calculating the coordination zone for use with FSS earth stations, as the current parameters are specific to 17/24 GHz BSS receiving earth stations. To update § 25.203(m)(1), satellite operators also provide proposed FSS-specific parameters, which they state were calculated using ITU reference documents, although they are not specific as to which documents or methodology were used to derive these parameters.

In contrast, AT&T advocates that ''to reduce the burden on incumbents'' § 25.203(m) should be modified using the same parameters applicable to coordination with 17/24 GHz earth stations.

We adopt the proposal to extend the ITU Radio Regulations Appendix 7 coordination methodology currently in our rules to FSS earth stations, but with amended parameters. We do not agree with AT&T's assertion that performing this calculation with different parameters will be significantly burdensome to DBS operators. As noted in the *17 GHz FSS NPRM,* the current parameters used in the coordination zone calculation were derived specifically with BSS receiving earth stations in mind and are not appropriate for coordination with FSS earth stations because of differences between FSS and BSS receiving earth stations, including in the abilities of the respective earth station antennas to reject unwanted or interfering signals. In fact, some parameters applicable to BSS receiving earth stations in the existing table have no function in calculations involving FSS receiving earth stations. AT&T's objection may rest with the need to make a different calculation depending upon the type of earth station with which coordination may be required, rather than with the actual proposed FSS-specific parameters themselves. We determine, however, that in order to yield an effective coordination outcome, to facilitate the most efficient and effective use of the spectrum, the receiving earth station interference parameters used in the underlying calculations must also be specific to FSS. Accordingly, we adopt the modified parameters specified above, filed in the record as FSS-specific parameters.

Section 25.203(m)(2) identifies specific information that DBS applicants proposing new feeder link earth station must provide to a third-party coordinator prior to licensing to resolve any potential interference issues with affected receiving earth stations. The Commission proposed in the *17 GHz FSS NPRM* to apply this rule to coordination with FSS earth stations with no additional changes to the requested information. Commenters addressing this issue all support this approach, and we extend these information requirements to coordination with FSS receiving earth stations without changes.

Because receive-only earth stations are not required to apply for licenses nor to be registered with the Commission, the *17 GHz FSS NPRM* sought comment on how to facilitate coordination with DBS operators and to ensure protection from DBS feeder link earth station ground path interference. The Commission proposed that interference protection be afforded to individual FSS receiving earth stations from DBS feeder link transmissions only if they have been licensed with the Commission, and to amend § 25.203(m)(3) of our rules to reflect this requirement. We further proposed, however, to allow blanket-licensed FSS earth stations on an unprotected basis in the 17.3–17.8 GHz band and proposed to amend § 25.115(e) to reflect this.

Commenters expressed differing opinions regarding the types of FSS earth stations that should be permitted to operate in the band, and the extent of protection that they should be afforded. Viasat urges the Commission to protect blanket-licensed earth stations in the band consistent with § 25.209(c), arguing that there is no reason to treat individually or blanket-licensed earth stations differently. Viasat argues that protecting such earth stations would pose no threat to incumbent services, would ''facilitate the ability of operators to utilize the 17.3–17.8 GHz band to support user terminals,'' and would encourage intensive use of the band. The Satellite Companies support our proposal to afford interference protection only to licensed FSS receiving earth stations, asserting that this approach will ensure that DBS feeder link operators have access to the information regarding the FSS earth station sites that require protection.

We adopt the proposals to extend interference protection only to individually-licensed FSS receiving earth stations in the 17.3–17.8 GHz band. We disagree with Viasat's

assertion that we should extend interference protection to blanket-licensed earth stations. By definition, a blanket earth station license can encompass multiple stations that may be operated anywhere within a geographic area, and as such are not amenable to the reverse-band coordination process outlined in § 25.203(m) of our rules. While we agree with Viasat that blanket-licensed receive-only earth stations may pose no interference threat to incumbent operators, the lack of precise location coordinates precludes the ability to protect them from ground path interference from DBS feeder link earth stations through the coordination process. Although we are limiting interference protection to individually licensed earth stations, consistent with our approach in other frequency bands we will not further restrict such licenses by function (*e.g.,* gateways or feeder links).

Blanket-Licensed Earth Stations and Earth Stations in Motion (ESIMs). As mentioned above, the Commission also proposed to amend § 25.115(e) of the rules to facilitate blanket-licensed FSS earth stations other than ESIMs to operate on an unprotected basis in the 17.3–17.8 GHz band. In addition, the Commission sought comment on whether operation of ESIMs in the 17.3–17.8 GHz band could increase FSS operators' flexibility to use the band more efficiently and what modifications to our rules might be required to permit operation of ESIMs while protecting incumbent services.

Commenters expressed differing opinions on these issues. AT&T believes that FSS downlink operations should be limited to individually-licensed, gateway-type earth stations, whose precise locations are known and whose typically large-diameter antennas facilitate coordination. AT&T does not support allowing blanket-licensed earth stations prior to the completion of ITU WRC–23 studies. AT&T argues that permitting a service that could receive interference on a regular basis could result in substandard service, contrary to the public interest. CTIA focuses its objections on the 17.7–17.8 GHz band, where it opposes allowing FSS receiving earth stations generally, and more specifically opposes blanket-licensed earth stations, arguing that it would unnecessarily hamper future increased terrestrial use. Specifically, CTIA asserts that it is difficult to get accurate information on the location of blanket-licensed earth stations, which could make reallocation of spectrum difficult in the future. CTIA also argues that, should the Commission wish to make the 17 GHz band available for increased terrestrial use in the future, giving priority to the fixed service via footnote would not address any future mobile service operations.

In contrast, the Satellite Companies support our proposal to allow blanket-licensed earth stations to operate on an unprotected basis in the band, and refer to other commenter's objections as ''baseless'' because any interference would affect only FSS providers. The Satellite Companies refute CTIA's argument that the Commission should restrict use of the 17.7–17.8 GHz band segment today in case there is a future desire to introduce terrestrial mobile service in the band, claiming it directly conflicts with the Commission's commitments to meeting demand for additional satellite spectrum and promoting efficient use of the 17 GHz band. Hughes supports permitting GSO FSS downlink operations to earth stations, including blanket-licensed earth stations and ESIMs, provided they do not cause interference to incumbent services. Viasat claims that CTIA's objections are based upon ill-defined concerns that future mobile operations would be impeded, noting that no part of the 17.3–17.8 GHz band is allocated to the mobile service in the United States, nor has the Commission proposed such an allocation.

Commenters also express very differing opinions on operations of ESIMs in the 17.3–17.8 GHz band. AT&T and CTIA oppose permitting ESIMs in the band, consistent with their rationale for opposing blanket licensed earth stations more generally. CTIA further argues that ESIM operation presents a coexistence challenge different from fixed FSS earth stations, and that such operations would be incompatible with any future mobile operations in the 17.7–17.8 GHz band. It claims that comprehensive studies are needed to evaluate if spectrum could be shared without risking harmful interference to incumbent services, and it urges the Commission to prohibit ESIM operations in the band, both to protect critical incumbent uses and to preserve flexibility in the band for any future increased terrestrial use.

Hughes, The Satellite Companies, and Viasat all urge the Commission to permit ESIMs operations in the 17.3–17.8 GHz band. The Satellite Companies claim that there is no reason to limit FSS operators' flexibility, given that ESIMs pose no interference risk to incumbent services and place no constraints upon such services if they are not entitled to protection. Viasat similarly argues that permitting ESIM operations would pose no interference threat to incumbent services and would allow the band to be used more productively in the public interest. Hughes claims that ESIM receiving earth stations can be accommodated in the 17.3–17.8 GHz band without interference protections and argues that there is no need to limit FSS network flexibility in determining how to operate in the 17 GHz band, particularly as DBS site locations are well known and receiving ESIM stations pose no interference threat themselves to other users. Viasat rejects CTIA's assertion that ESIMs present a different coexistence challenge from other FSS receiving earth stations, or that they would further complicate an already complex sharing situation, as AT&T has argued. Viasat further argues that sharing studies are not needed as a prerequisite to allowing receiving ESIM operations. As with blanket-licensed earth stations generally, Viasat urges the Commission to extend full interference protection to ESIM earth stations.

We will adopt the proposals to facilitate authorization of blanket-licensed earth stations and ESIMs to operate in the 17.3–17.8 GHz band on an unprotected basis. As stated above, such (receiving) stations pose no interference threat to other services, nor will they place any undue coordination burden on incumbent operators if operating on an unprotected basis. AT&T states that a ''service that could potentially be interfered into on a regular basis, resulting in a substandard service, would be contrary to the public interest.'' Given the well-established locations of DBS feeder uplink and the ability to design satellite networks to avoid interfering signals and switch operations to other available frequencies, we believe that FSS earth station operators can avoid subjecting their operations to regular unwanted interference. Thus, we see no justification to prohibit blanket-licensed earth stations or ESIMs and limit FSS operators' flexibility in designing their networks, or a need to delay our decision as AT&T and CTIA suggest. We find that it would serve the public interest to allow blanket-licensed earth stations and ESIMs in the band, subject to conditions discussed herein, including that operations are on an unprotected basis, to increase FSS operators' flexibility to use the band more efficiently for provisioning of advanced satellite services for the benefit of American consumers.

We reject CTIA's concerns about future terrestrial use as speculative. There is no allocation of any part of the 17.3–17.8 GHz band to the mobile service in the United States, nor is there

currently any plan, a proceeding or proposal before us to make such an allocation. Based on the record, allowing blanket-licensed earth stations or ESIMs in the band would be consistent with sound spectrum policy principles increasing efficient and effective use of the spectrum without causing harmful interreference to incumbent users today. With respect to any potential for harmful interference from FSS (space-to-Earth) operations to fixed service operations, we find that the risk is minimal, and the technical standards adopted herein to prevent harmful interference to other services, including the fixed service, are sufficient to protect those services irrespective of whether or not we permit blanket-licensed earth stations or ESIMs in the band. Accordingly, we modify our rules to facilitate authorization of blanket-licensed receiving earth stations as well as FSS ESIMs in the 17.3–17.8 GHz band on an unprotected basis. There is nothing in the record to demonstrate that receiving ESIM earth stations could pose interference threat to incumbent users in the band. Accordingly, we do not believe that completion of ITU sharing and feasibility studies for receiving ESIMs are needed before we allow receiving ESIMs in the band on an unprotected basis, as AT&T appears to suggest. Moreover, because ESIMs will not be afforded interference protection, they should not increase the coordination burden on incumbent users in the band either. As with other types of blanket-licensed earth stations however, ESIMs operations will only be allowed on an unprotected basis with respect to DBS feeder link operations as well as terrestrial operations in the 17.7–17.8 GHz band. Accordingly, we amend § 25.202 and footnote NG527A to streamline authorization of receiving ESIM earth stations on an unprotected basis in the 17.3–17.8 GHz band.

4. Other Proposed Rule Changes

The Commission proposed various conforming modifications to our rules that are required as a result of the changes proposed above. Specifically, the Commission proposed to modify the definition of a two-degree compliant space station in § 25.103 to include FSS satellites transmitting in the 17.3–17.8 GHz band. In addition, the Commission proposed to modify § 25.114 to identify 17.3–17.8 GHz space-to-Earth FSS applicants alongside information requirements applicable to such applications, specifically in § 25.114(d)(7), (15), and (18). Similarly, the *17 GHz FSS NPRM* proposed to modify § 25.115(e) to identify the information required for receiving earth station applicants in this band. Finally, the Commission proposed to modify § 25.117(d)(2)(v) to permit 17.3–17.8 GHz FSS operators to modify certain restrictions that might be associated with their licenses according to the same procedures afforded to 17/24 GHz BSS operators. No commenters opposed these proposed conforming modifications, and we adopt them.

Radio Astronomy. The Commission sought comment on whether there was a need for any additional measures that the Commission should consider with respect to radio astronomy in the adjacent 17.2–17.3 GHz band. No commenter proposed any new rule or changes to our existing rules. The Satellite Companies stated that no new rules were necessary, noting that there were no concerns regarding adverse effects to radio astronomy from the 17/24 GHz downlink transmissions already using the band which are functionally equivalent to FSS downlinks. Accordingly, we find that no rule change is necessary with respect to Radio Astronomy.

C. Defining the Extended Ka-Band and Creating Rules for Routine License Application Processing in This Band

In the *17 GHz FSS NPRM,* the Commission proposed adding a definition for the extended Ka-band in section 25.103. Specifically, the *17 GHz FSS NPRM* proposed to define the extended Ka-band as 17.3–18.3 GHz (space-to-Earth), 18.8–19.4 GHz (space-to-Earth), 19.6–19.7 GHz (space-to-Earth), 27.5–28.35 GHz (Earth-to-space) and 28.6–29.1 GHz, (Earth-to-space). The Commission also proposed two approaches to facilitate routine licensing of extended Ka-band earth stations communicating with GSO FSS space stations to streamline and harmonize extended Ka-band earth station licensing with licensing in other FSS bands. The first proposal was to extend the routine license off-axis EIRP density limits for conventional Ka-band earth stations contained in § 25.218(i) to extended Ka-band earth stations. The second proposal was to extend an alternative approach to routine licensing now contained in § 25.212(e) to extended Ka-band earth stations. To implement this alternative approach the *17 GHz FSS NPRM* proposed modifying § 25.212(e) and (h) to permit such applicants to similarly demonstrate compliance with the off-axis gain requirements in § 25.209(a) and (b) combined with an input power density limit of 3.5 dBW/MHz. In the *17 GHz FSS NPRM,* the Commission also proposed modifications to § 25.209(a) and (b) to extend the Ka-band off-axis antenna gain requirements across the full 27.5–30 GHz band, and to reference these alternative routine license application processing requirements in §§ 25.115(g) and (k) and 25.220(a).

Most commenters supported these proposals, arguing that they would facilitate streamlined licensing of extended Ka-band FSS earth stations. We add a definition of extended Ka-band and adopt the rule changes proposed in the *17 GHz FSS NPRM* to facilitate streamlined earth station licensing in the extended Ka-band similar to licensing in other FSS bands. CTIA argues, however, that the proposed rules lack clarity, and because the Commission has not adequately considered the downstream consequences or explained any impact on affected stakeholders, we should provide further explanation and opportunity for comment before adopting them. CTIA questions in particular what filing requirements in lieu of § 25.220 would apply, or whether these earth stations might be newly eligible for autogrant under § 25.115(a)(3).

We note that the uplink power levels in question are defined at the geostationary orbit and are intended to obviate the need for coordination between co-frequency GSO FSS space station operations in a two-degree spacing environment. Lacking any extended Ka-band uplink off-axis power limits in our current rules with which to demonstrate conformance—and which our rules currently define for GSO earth station applicants in most other FSS bands—extended Ka-band earth station applicants have no choice but to make the more burdensome off-axis EIRP density showings relative to the geostationary arc, as defined in § 25.115(g)(1).

Under our current rules, extended Ka-band transmitting earth station applications in bands shared with terrestrial services (*i.e.,* 27.5–28.35 GHz) must be filed on FCC Form 312, Main Form, and Schedule B. Filing requirements include any relevant information required by paragraphs (a)(5) through (10) or paragraph (g) or (j) of § 25.115. Although we are not changing this, we adopt the Commission's proposals in the *17 GHz NPRM* to allow conforming extended Ka-band applicants to file in accordance with the requirements of § 25.115(g)(1), instead of paragraph (g)(2). CTIA erroneously suggests that extended Ka-band earth station applicants should comply with the requirements of § 25.220. This rule currently applies to the conventional Ka-band, but not the

extended Ka-band. We also adopt the proposals in the *17 GHz FSS NPRM,* to apply the process in § 25.220 if extended Ka-band applicants do not conform to the uplink off-axis power limits adopted herein. With regard to an autogrant procedure in § 25.115(a)(3), to be eligible, earth stations must meet the criteria specified in § 25.115(a)(2), which among other things list specific qualifying frequency bands. The extended Ka-band frequency ranges are not included in this list, nor has the Commission proposed any modification to add them. Accordingly, extended Ka-band applicants are not eligible for that procedure.

We believe that CTIA's concerns may stem from an erroneous assumption that the uplink power limits adopted herein and the associated routine processing would somehow permit FSS earth station applicants in the extended Ka-bands to bypass other existing Commission rules. In particular, in the 27.5–28.35 GHz extended Ka-band segment, transmitting FSS earth stations will be sharing the band with Upper Microwave Flexible Use Service (UMFUS) stations, and the requirements of § 25.136(a) for FSS earth stations seeking to operate in this band include a requirement to coordinate, when warranted, in accordance with the procedures of §§ 25.136(a) and 101.103(d).[13] We make clear that as defined in our rules, routine licensing requires qualifying applications to be consistent *with all Commission rules,* and will continue to include all requirements contained in § 25.136(a) for earth station applicants in the 27.5–28.35 GHz band. Accordingly, we can envision no adverse effect on terrestrial Ka-band stakeholders with these rule changes. These rule changes will streamline and harmonize extended Ka-band earth station licensing with licensing in other FSS bands. Accordingly, we find that it would serve the public interest to adopt the conforming and streamlining changes proposed in the *17 GHz FSS NPRM.*

[13] This latter section requires that coordination notifications include relevant technical details of the proposal. At minimum, this should include, as applicable, the following: Applicant's name and address; Transmitting station name; Transmitting station coordinates; Frequencies and polarizations to be added, changed or deleted; Transmitting equipment type, its stability, actual output power, emission designator, and type of modulation(s) (loading); An indication if modulations lower than the values listed in the table to § 101.141(a)(3) of the Commission's rules will be used; Transmitting antenna type(s), model, gain and, if required, a radiation pattern provided or certified by the manufacturer; Transmitting antenna center line height(s) above ground level and ground elevation above mean sea level; Receiving station name; Receiving station coordinates; Receiving antenna type(s), model, gain, and, if required, a radiation pattern provided or certified by the manufacturer; Receiving antenna center line height(s) above ground level and ground elevation above mean sea level; Path azimuth and distance; Estimated transmitter transmission line loss expressed in dB; Estimated receiver transmission line loss expressed in dB.

Procedural Matters

Final Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[14] an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in *Amendment of Parts 2 and 25 of the Commission's Rules to Enable GSO Fixed-Satellite Service (Space-to-Earth) Operations in the 17.3–17.8 GHz Band, to Modernize Certain Rules Applicable to 17/24 GHz BSS Space Stations, and to Establish Off-Axis Uplink Power Limits for Extended Ka-Band FSS Operations,* Notice of Proposed Rulemaking (86 FR 7660 (Feb. 1, 2021)). The Commission sought written public comment on the proposals in the NPRM, including comment on the IRFA. No comments were received on the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.[15]

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

This final rule creates a new allocation for the fixed-satellite service (FSS) (space-to-Earth) in the 17.3–17.8 GHz frequency band, adopts technical rules for the use of this band by GSO FSS satellites and for sharing the band between satellites of different satellite services and stations in the terrestrial fixed service, and defines the ''extended Ka-band'' and adopts rules to harmonize extended Ka-band licensing with licensing in other FSS bands.

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

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

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

Pursuant to the Small Business Jobs Act of 2010, which amended the RFA, the Commission is required to respond to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration (SBA), and to provide a detailed statement of any change made to the proposed rules as a result of those comments.[16] 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 Rules Will Apply

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.[17] The RFA generally defines the term ''small entity'' as having the same meaning as the terms ''small business,'' ''small organization,'' and ''small governmental jurisdiction.'' [18] In addition, the term ''small business'' has the same meaning as the term ''small business concern'' under the Small Business Act.[19] A ''small business concern'' is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[20] Below, we describe and estimate the number of small entities that may be affected by adoption of the final rules.

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.'' [21] Satellite telecommunications service providers include satellite and earth station operators. The SBA small business size standard for this industry classifies a business with $35 million or less in annual receipts as small.[22] U.S. Census Bureau data for 2017 show that 275 firms in this industry operated for the entire year.[23] Of this number, 242 firms

[14] *See* 5 U.S.C. 603. The RFA, *see* 5 U.S.C. 601–12, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996, Public Law 104–121, Title II, 110 Stat. 857 (1996).

[15] *See* 5 U.S.C. 604.

[16] 5 U.S.C. 604(a)(3).

[17] *Id.*

[18] 5 U.S.C. 601(6).

[19] 5 U.S.C. 601(3) (incorporating by reference the definition of ''small-business concern'' in the Small Business Act, 15 U.S.C. 632). Pursuant to 5 U.S.C. 601(3), the statutory definition of a small business applies ''unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the **Federal Register**.''

[20] 15 U.S.C. 632.

[21] *See* U.S. Census Bureau, *2017 NAICS Definition, ''517410 Satellite Telecommunications,'' https://www.census.gov/naics/?input=517410&year=2017&details=517410.*

[22] *See* 13 CFR 121.201, NAICS Code 517410.

[23] *See* U.S. Census Bureau, *2017 Economic Census of the United States, Selected Sectors: Sales,*

Continued

had revenue of less than $25 million.[24] Additionally, based on Commission data in the 2021 Universal Service Monitoring Report, as of December 31, 2020, there were 71 providers that reported they were engaged in the provision of satellite telecommunications services.[25] Of these providers, the Commission estimates that approximately 48 providers have 1,500 or fewer employees.[26] Consequently using the SBA's small business size standard, a little more than half of these providers can be considered small entities.

All Other Telecommunications. The ''All Other Telecommunications'' category is comprised of establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation.[27] 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.[28] Establishments providing internet services or voice over internet protocol (VoIP) services via client-supplied telecommunications connections are also included in this industry.[29] The SBA has developed a small business size standard for ''All Other Telecommunications'', which consists of all such firms with annual receipts of $35 million or less.[30] For this category, U.S. Census Bureau data for 2012 show that there were 1,442 firms that operated for the entire year.[31] Of those firms, a total of 1,400 had annual receipts less than $25 million and 15 firms had annual receipts of $25 million to $49,999,999.[32] Thus, the Commission estimates that the majority of ''All Other Telecommunications'' firms potentially affected by our action can be considered small.

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

This final rule adopts several rule changes that would affect compliance requirements for space station and earth station operators. For example, this final rule adopts rules for operations by space station FSS operators in the 17.3–17.8 GHz band, including revisions to some existing technical requirements that would now apply to these FSS operations. This final rule also adopts changes that would affect earth station operator licensing. The Commission adopts changes to harmonize extended Ka-band earth station licensing with licensing in other FSS bands. In total, the actions in this final rule are designed to achieve the Commission's mandate to regulate in the public interest while imposing the lowest necessary burden on all affected parties, including small entities.

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

The RFA requires an agency to describe any significant alternatives that it has considered in developing its approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.[33]

In this final rule, the Commission considered whether and how to apply various technical rules to enable GSO FSS operations to share the 17.3–17.8 GHz band with other services in an efficient and effective manner. This include consideration, for example, of power levels, orbital spacing, and other technical considerations, and what information the Commission may need to assess compliance with technical requirements, taking into consideration potential impact on the applicant or operator. As one example, the Commission declines to require submission of certain measured data six months before satellite launch, instead requiring the data submission only two months prior to launch. As another example, the Commission considered whether to streamline certain earth station application rules to enable more routine processing of applications for the extended Ka-band. Overall, the actions in this document will reduce burdens on the affected licensees, including small entities.

G. Report to Congress

The Commission will send a copy of the *Report and Order,* including the FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act.[34] In addition, the Commission will send a copy of the *Report and Order,* including the FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the *Report and Order* and FRFA (or summaries thereof) will also be published in the **Federal Register**.[35]

Ordering Clauses

Accordingly, *It is ordered* that, pursuant to Sections 4(i), 7(a), 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 157(a), 303(c), 303(f), 303(g), 303(r), the Report and Order *is hereby adopted.*

It is further ordered that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center will send a copy of the Report and Order, including the final and initial regulatory flexibility analyses, to the Chief Counsel for Advocacy of the Small Business Administration, in accordance with Section 603(a) of the Regulatory Flexibility Act, 5 U.S.C. 601 *et seq.*

List of Subjects

47 CFR Part 2

Radio, Table of Frequency Allocations.

47 CFR Part 25

Administrative practice and procedure, Earth stations, Satellites.

Value of Shipments, or Revenue Size of Firms for the U.S.: 2017, Table ID: EC1700SIZEREVFIRM, NAICS Code 517410, *https://data.census.gov/cedsci/table?y=2017&n=517410&tid=ECNSIZE2017.EC1700SIZEREVFIRM&hidePreview=false.*

[24] *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard. We also note that according to the U.S. Census Bureau glossary, the terms receipts and revenues are used interchangeably, *see https://www.census.gov/glossary/#term_ReceiptsRevenueServices.*

[25] Federal-State Joint Board on Universal Service, Universal Service Monitoring Report at 26, Table 1.12 (2021), *https://docs.fcc.gov/pubId.lic/attachments/DOC-379181A1.pdf.*

[26] *Id.*

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

[28] *Id.*

[29] *Id.*

[30] *See* 13 CFR 121.201, NAICS Code 517919.

[31] *See* U.S. Census Bureau, *2012 Economic Census of the United States,* Table ID: EC1251SSSZ4, *Information: Subject Series—Estab and Firm Size: Receipts Size of Firms for the U.S.: 2012,* NAICS Code 517919, *https://data.census.gov/cedsci/table?text=EC1251SSSZ4&n=517919&tid=ECNSIZE2012.EC1251SSSZ4&hidePreview=false.*

[32] *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard of annual receipts of $35 million or less.

[33] 5 U.S.C. 603(c)(1)–(4).

[34] 5 U.S.C. 801(a)(1)(A).

[35] *See* 5 U.S.C. 604(b).

Federal Communications Commission.

Marlene Dortch,

Secretary.

Final Rules

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 CFR parts 2 and 25 as follows:

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

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

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

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

■ a. Revise page 52;

■ b. In the list of United States (US) Footnotes, remove footnote US271 and revise footnote US402; and

■ c. In the list of Non-Federal Government (NG) Footnotes, add footnote NG58, remove footnote NG163, and revise footnote NG527A.

The additions and revisions read as follows:

§ 2.106 Table of Frequency Allocations.

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15.63-15.7 RADIOLOCATION 5.511E 5.511F AERONAUTICAL RADIONAVIGATION			15.63-15.7 RADIOLOCATION 5.511E 5.511F US511E AERONAUTICAL RADIONAVIGATION US260 US211	15.63-15.7 AERONAUTICAL RADIONAVIGATION US260 US211 US511E	Aviation (87)
15.7-16.6 RADIOLOCATION 5.512 5.513			15.7-16.6 RADIOLOCATION G59	15.7-17.2 Radiolocation	Private Land Mobile (90)
16.6-17.1 RADIOLOCATION Space research (deep space) (Earth-to-space) 5.512 5.513			16.6-17.1 RADIOLOCATION G59 Space research (deep space) (Earth-to-space)		
17.1-17.2 RADIOLOCATION 5.512 5.513			17.1-17.2 RADIOLOCATION G59		
17.2-17.3 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) 5.512 5.513 5.513A			17.2-17.3 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH (active)	17.2-17.3 Earth exploration-satellite (active) Radiolocation Space research (active)	
17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 (space-to-Earth) 5.516A 5.516B Radiolocation 5.514	17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 BROADCASTING-SATELLITE Radiolocation 5.514 5.515	17.3-17.7 FIXED-SATELLITE (Earth-to-space) 5.516 Radiolocation 5.514	17.3-17.7 Radiolocation US259 G59 US402 G117	17.3-17.7 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) NG527A BROADCASTING-SATELLITE US259 US402 NG58	Satellite Communications (25)
17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	17.7-17.8 FIXED FIXED-SATELLITE (space-to-Earth) 5.517 (Earth-to-space) 5.516 BROADCASTING-SATELLITE Mobile 5.515	17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	17.7-17.8 US334 G117	17.7-17.8 FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) NG527A US334 NG58	Satellite Communications (25) TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
	17.8-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE 5.519		17.8-18.3 FIXED-SATELLITE (space-to-Earth) US334 G117 US519	17.8-18.3 FIXED Fixed-satellite (space-to-Earth) NG527A US334 US519	
18.1-18.4 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B (Earth-to-space) 5.520 MOBILE 5.519 5.521			18.3-18.6 FIXED-SATELLITE (space-to-Earth) US334 G117	18.3-18.6 FIXED-SATELLITE (space-to-Earth) NG527A	Satellite Communications (25)
18.4-18.6 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B MOBILE			US139	US139 US334	

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United States (US) Footnotes

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US402 In the band 17.3–17.7 GHz, existing Federal satellites and associated earth stations in the fixed-satellite service (Earth-to-space) are authorized to operate on a primary basis in the frequency bands and areas listed below. Non-Federal receiving earth stations in the broadcasting-satellite and fixed-satellite services within the bands and areas listed below shall not claim protection from Federal earth stations in the fixed-satellite service.

(a) 17.600–17.700 GHz for stations within a 120 km radius of 38°49′ N latitude and 76°52′ W longitude.

(b) 17.375–17.475 GHz for stations within a 160 km radius of 39°42′ N latitude and 104°45′ W longitude.

* * * * *

Non-Federal Government (NG) Footnotes

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NG58 In the band 17.3–17.8 GHz, the following provisions shall apply to the broadcasting-satellite, fixed, and fixed-satellite services:

(a) The use of the band 17.3–17.8 GHz by the broadcasting-satellite and fixed-satellite (space-to-Earth) services is limited to geostationary satellites.

(b) The use of the band 17.3–17.8 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for broadcasting-satellite service.

(c) The use of the band 17.7–17.8 GHz by the broadcasting-satellite service is limited to receiving earth stations located outside of the United States and its insular areas.

(d) In the band 17.7–17.8 GHz, earth stations in the fixed-satellite service may be authorized for the reception of FSS emissions from geostationary satellites, subject to the condition that these earth stations shall not claim protection from transmissions of non-Federal stations in the fixed service that operate in that band.

* * * * *

NG527A Earth Stations in Motion (ESIMs), as regulated under 47 CFR part 25, are an application of the fixed-satellite service (FSS) and the following provisions shall apply:

(a) In the bands 10.7–11.7 GHz, 19.3–19.4 GHz, and 19.6–19.7 GHz, ESIMs may be authorized for the reception of FSS emissions from geostationary and non-geostationary satellites, subject to the conditions that these earth stations may not claim protection from transmissions of non-Federal stations in the fixed service and that non-geostationary-satellite systems not cause unacceptable interference to, or claim protection from, geostationary-satellite networks.

(b) In the bands 11.7–12.2 GHz (space-to-Earth), 14.0–14.5 GHz (Earth-to-space), 18.3–18.8 GHz (space-to-Earth), 19.7–20.2 GHz (space-to-Earth), 28.35–28.6 GHz (Earth-to-space), and 29.25–30.0 GHz (Earth-to-space), ESIMs may be authorized to communicate with geostationary satellites on a primary basis.

(c) In the bands 11.7–12.2 GHz (space-to-Earth), 14.0–14.5 GHz (Earth-to-space), 18.3–18.6 GHz (space-to-Earth), 19.7–20.2 GHz (space-to-Earth), 28.4–28.6 GHz (Earth-to-space), and 29.5–30.0 GHz (Earth-to-space), ESIMs may be authorized to communicate with non-geostationary satellites, subject to the condition that non-geostationary-satellite systems may not cause unacceptable interference to, or claim protection from, geostationary-satellite networks.

(d) In the band 17.8–18.3 GHz, ESIMs may be authorized for the reception of FSS emissions from geostationary and non-geostationary satellites on a secondary basis, subject to the condition that non-geostationary-satellite systems not cause unacceptable interference to, or claim protection from, geostationary-satellite networks.

(e) In the bands 18.8–19.3 GHz (space-to-Earth) and 28.6–29.1 GHz (Earth-to-space), ESIMs may be authorized to communicate with geostationary and non-geostationary satellites, subject to the condition that geostationary-satellite networks may not cause unacceptable interference to, or claim protection from, non-geostationary satellite systems in the fixed-satellite service.

(f) In the band 17.3–17.8 GHz, ESIMs may be authorized for the reception of FSS emissions from geostationary satellites on an unprotected basis.

* * * * *

PART 25—SATELLITE COMMUNICATIONS

■ 3. The authority citation for part 25 continues to read as follows:

Authority: 47 U.S.C. 154, 301, 302, 303, 307, 309, 310, 319, 332, 605, and 721, unless otherwise noted.

■ 4. Amend § 25.103 by adding a definition for ''Extended Ka-band'' in alphabetical order and revising the definition of ''Two-degree-compliant space station'' to read as follows:

§ 25.103 Definitions.

* * * * *

Extended Ka-band. The 17.3–18.3 GHz (space-to-Earth), 18.8–19.4 GHz (space-to-Earth), 19.6–19.7 GHz (space-to-Earth), 27.5–28.35 GHz (Earth-to-space), and 28.6–29.1 GHz (Earth-to-space) FSS frequency bands.

* * * * *

Two-degree-compliant space station. A GSO FSS space station operating in the conventional or extended C-bands, the conventional or extended Ku-bands, the 24.75–25.25 GHz band, or the conventional or extended Ka-bands within the limits on downlink equivalent isotropically radiated power (EIRP) density or PFD specified in § 25.140(a)(3) or (b)(3) and communicating only with earth stations operating in conformance with routine uplink parameters specified in § 25.211(d), § 25.212(c), (d), or (f), or § 25.218.

* * * * *

■ 5. Amend § 25.114 by revising paragraphs (d)(7), (15), and (18) to read as follows:

§ 25.114 Applications for space station authorizations.

* * * * *

(d) * * *

(7) Applicants for authorizations for space stations in the Fixed-Satellite Service, including applicants proposing feeder links for space stations operating in the 17/24 GHz Broadcasting-Satellite Service, must also include the information specified in § 25.140(a). Applicants for authorizations for space stations in the 17/24 GHz Broadcasting-Satellite Service or applicants seeking authorization for FSS space stations transmitting in the 17.3–17.8 GHz band (space-to-Earth), must also include the information specified in § 25.140(b);

* * * * *

(15) Each applicant for a space station license in the 17/24 GHz Broadcasting-Satellite Service or the FSS transmitting in the 17.3–17.8 GHz band, shall include the following information as an attachment to its application:

(i) If the applicant proposes to operate in the 17.3–17.8 GHz band, a demonstration that the proposed space station will comply with the applicable power flux density limits in § 25.140(a)(3)(iii) or (b)(3) unless the applicant provides a certification under paragraph (d)(15)(ii) of this section.

(ii) In cases where the proposed space station will not comply with the applicable power flux density limits set forth in § 25.140(a)(3)(iii) or (b)(3), the applicant will be required to provide a certification that all potentially affected parties acknowledge and do not object to the use of the applicant's higher power flux densities. The affected parties with whom the applicant must

coordinate are those GSO 17/24 GHz BSS satellite networks or FSS satellite networks with space stations transmitting in the 17.3–17.8 GHz band that are located up to ±6° away. Excesses of more than 3 dB above the applicable power flux density levels specified in § 25.140(a)(3)(iii) or (b)(3), must also be coordinated with 17/24 GHz BSS satellite networks located up to ±10° away.

(iii) Any information required by § 25.264(a)(6), (b)(4), or (d).

* * * * *

(18) For space stations in the Direct Broadcast Satellite service, the 17/24 GHz Broadcasting-Satellite Service, or FSS space stations transmitting in the 17.3–17.8 GHz band, maximum orbital eccentricity.

■ 6. Amend § 25.115 by revising paragraphs (e), (g) introductory text, and (k) to read as follows:

§ 25.115 Applications for earth station authorizations.

* * * * *

(e) *GSO FSS earth stations in 17.3–30 GHz.* (1) An application for a GSO FSS earth station license in the 17.3–19.4 GHz, 19.6–20.2 GHz, 27.5–29.1 GHz, or 29.25–30 GHz bands not filed on FCC Form 312EZ pursuant to paragraph (a)(2) of this section must be filed on FCC Form 312, Main Form and Schedule B, and must include any information required by paragraphs (a)(5) through (10) or paragraph (g) or (j) of this section.

(2) Individual or blanket license applications may be filed for operation in the 17.3–17.8 GHz band; however, blanket licensed earth stations shall operate on an unprotected basis with respect to DBS feeder link earth stations. All receiving FSS earth stations shall operate on an unprotected basis with respect to the Fixed Service in the 17.7–17.8 GHz band.

* * * * *

(g) *Additional requirements for certain GSO earth stations.* Applications for earth stations that will transmit to GSO space stations in any portion of the 5850–6725 MHz, 13.75–14.5 GHz, 24.75–25.25 GHz, 27.5–29.1 GHz, or 29.25–30.0 GHz bands must include, in addition to the particulars of operation identified on FCC Form 312 and associated Schedule B, the information specified in either paragraph (g)(1) or (2) of this section for each earth station antenna type.

* * * * *

(k) *Permitted Space Station List.* (1) Applicants for FSS earth stations that qualify for routine processing in the conventional or extended C-bands, the conventional or extended Ku-bands, the conventional or extended Ka-bands, or the 24.75–25.25 GHz band, including ESV applications filed pursuant to paragraph (m)(1) or (n)(1) of this section, VMES applications filed pursuant to paragraph (m)(1) or (n)(1) of this section, and ESAA applications filed pursuant to paragraph (m)(1) or (n)(1) of this section, may designate the Permitted Space Station List as a point of communication. Once such an application is granted, the earth station operator may communicate with any space station on the Permitted Space Station List, provided that the operation is consistent with the technical parameters and conditions in the earth station license and any limitations placed on the space station authorization or noted in the Permitted Space Station List.

(2) Notwithstanding paragraph (k)(1) of this section, an earth station that would receive signals in the 17.7–20.2 GHz band may not communicate with a space station on the Permitted Space Station List in that band until the space station operator has completed coordination under Footnote US334 to § 2.106 of this chapter.

* * * * *

■ 7. Amend § 25.117 by revising paragraph (d)(2)(v) to read as follows:

§ 25.117 Modification of station license.

* * * * *

(d) * * *

(2) * * *

(v) Any operator of a space station transmitting in the 17.3–17.8 GHz band, whose license is conditioned to operate at less than the power level otherwise permitted by § 25.140(a)(3)(iii) and/or (b)(3), and is conditioned to accept interference from a neighboring 17/24 GHz BSS space station, may file a modification application to remove those two conditions in the event that the license for that neighboring space station is cancelled or surrendered. In the event that two or more such modification applications are filed, and those applications are mutually exclusive, the modification applications will be considered on a first-come, first-served basis pursuant to the procedure set forth in § 25.158.

* * * * *

■ 8. Amend § 25.140 by revising paragraphs (a)(2), (a)(3)(iii), and (b)(3) through (5), adding paragraph (b)(6), and revising the introductory text of paragraph (d) to read as follows:

§ 25.140 Further requirements for license applications for GSO space station operation in the FSS and the 17/24 GHz BSS.

(a) * * *

(2) In addition to the information required by § 25.114, an applicant for GSO FSS space station operation, including applicants proposing feeder links for space stations operating in the 17/24 GHz BSS, that will be located at an orbital location less than two degrees from the assigned location of an authorized co-frequency GSO space station, must either certify that the proposed operation has been coordinated with the operator of the co-frequency space station or submit an interference analysis demonstrating the compatibility of the proposed system with the co-frequency space station. Such an analysis must include, for each type of radio frequency carrier, the link noise budget, modulation parameters, and overall link performance analysis. (See Appendices B and C to Licensing of Space Stations in the Domestic Fixed-Satellite Service, FCC 83–184, and the following public notices, copies of which are available in the Commission's EDOCS database, available at *https://www.fcc.gov/edocs:* DA 03–3863 and DA 04–1708.) The provisions in this paragraph (a)(2) do not apply to proposed analog video operation, which is subject to the requirement in paragraph (a)(1) of this section. Proposed GSO FSS space-to-Earth transmissions in the 17.3–17.8 GHz band are subject to the requirements of paragraphs (b)(4) through (6) of this section with respect to possible interference into 17/24 GHz BSS networks. Proposed GSO FSS space-to-Earth transmissions in the 17.3–17.8 GHz band are subject to the requirements of § 25.264 with respect to possible interference to the reception of DBS feeder link transmissions (Earth-to-space) in this band.

(3) * * *

(iii) With respect to proposed FSS operation in the conventional or extended Ka-bands, a certification that the proposed space station will not generate power flux density at the Earth's surface in excess of the limits in paragraphs (a)(3)(iii)(A) and (B) of this section, and that associated uplink operation will not exceed applicable EIRP density envelopes in § 25.218(i) unless the non-routine uplink and/or downlink operation is coordinated with operators of authorized co-frequency space stations at assigned locations within six degrees of the orbital location and except as provided in paragraph (d) of this section.

(A) −118 dBW/m²/MHz, except as provided in paragraph (a)(3)(iii)(B) of this section.

(B) For space-to-Earth FSS transmissions in the 17.3–18.8 GHz band in the region of the contiguous United States, located west of 100 West Longitude: −121 dBW/m²/MHz.

* * * * *

(b) * * *

(3) An applicant for a license to operate a 17/24 GHz BSS space station transmitting in the 17.3–17.8 GHz band must certify that the downlink power flux density on the Earth's surface will not exceed the regional power flux density limits given in paragraphs (b)(3)(i) through (iv) of this section, or must provide the certification specified in § 25.114(d)(15)(ii):

(i) In the region of the contiguous United States, located south of 38° North Latitude and east of 100° West Longitude: −115 dBW/m²/MHz.

(ii) In the region of the contiguous United States, located north of 38° North Latitude and east of 100° West Longitude: −118 dBW/m²/MHz.

(iii) In the region of the contiguous United States, located west of 100° West Longitude: −121 dBW/m²/MHz.

(iv) For all regions outside of the contiguous United States including Alaska and Hawaii: −115 dBW/m²/MHz.

(4) Except as described in paragraph (b)(5) of this section, the following applicants must either certify that their proposed operations have been coordinated with the adjacent operator of a previously authorized or proposed co-frequency space station, or must provide an interference analysis of the kind described in paragraph (a) of this section, except that the applicant must demonstrate that its proposed network will not cause more interference to the adjacent space station transmitting in the 17.3–17.8 GHz band operating in compliance with the technical requirements of this part, than if the applicant were located at an orbital separation of four degrees from the previously licensed or proposed space station.

(i) Applicants for a 17/24 GHz BSS space station transmitting in the 17.3–17.8 GHz band to be located less than four degrees from a previously authorized or proposed co-frequency 17/24 GHz BSS space station;

(ii) Applicants for a FSS space station transmitting in the 17.3–17.8 GHz band to be located less than four degrees from a previously authorized or proposed co-frequency 17/24 GHz BSS space station; and

(iii) Applicants for a 17/24 GHz BSS space station transmitting in the 17.3–17.8 GHz band to be located less than four degrees from a previously authorized or proposed co-frequency FSS space station transmitting in the 17.3–17.8 GHz band.

(5) Where an authorized or proposed 17/24 GHz BSS or FSS space station is located within four degrees of a previously authorized or proposed 17/24 GHz BSS space station, no new third proposed 17/24 GHz BSS or FSS space station may be located within eight degrees of the first authorized or proposed space station in the same direction as the second authorized or proposed space station, unless the applicant for the third space station certifies that its proposed operation has been coordinated with the operator of the first previously authorized or proposed 17/24 GHz BSS space station, or the applicant for the third proposed space station provides an interference analysis of the kind described in paragraph (a) of this section, or the applicant for the third proposed space station demonstrates that its proposed network will not cause more interference to the first previously authorized or proposed space station than if the applicant for the third proposed space station were located at an orbital separation of eight degrees from the first previously authorized or proposed 17/24 GHz BSS space station.

(6) In addition to the requirements of paragraphs (b)(3), (4), and (5) of this section, the link budget for any satellite transmitting in the 17.3–17.8 GHz band (space-to-Earth) must take into account longitudinal station-keeping tolerances. Any applicant for a space station transmitting in the 17.3–17.8 GHz band that has reached a coordination agreement with an operator of another space station to allow that operator to exceed the pfd levels specified in paragraph (a)(3)(iii) or (b)(3) of this section, must use those higher pfd levels for the purpose of this showing.

* * * * *

(d) An operator of a GSO FSS space station in the conventional or extended C-bands, conventional or extended Ku-bands, 24.75–25.25 GHz band (Earth-to-space), or conventional or extended Ka-bands may notify the Commission of its non-routine transmission levels and be relieved of the obligation to coordinate such levels with later applicants and petitioners.

* * * * *

■ 9. Amend § 25.202 by:

■ a. Redesignating paragraphs (a)(10) introductory text, (a)(10)(i), and (a)(10)(ii) as paragraphs (a)(10)(i), (ii), and (iii), respectively; and

■ b. Revising newly redesignated paragraph (a)(10)(ii).

The revision reads as follows:

§ 25.202 Frequencies, frequency tolerance, and emission limits.

(a) * * *

(10) * * *

(ii) The following frequencies are available for use by Earth Stations in Motion (ESIMs) communicating with GSO FSS space stations, subject to the provisions in § 2.106 of this chapter:

(A) 10.7–11.7 GHz (space-to-Earth).

(B) 11.7–12.2 GHz (space-to-Earth).

(C) 14.0–14.5 GHz (Earth-to-space).

(D) 17.3–17.7 GHz (space-to-Earth).

(E) 17.7–17.8 GHz (space-to-Earth).

(F) 17.8–18.3 GHz (space-to-Earth).

(G) 18.3–18.8 GHz (space-to-Earth).

(H) 18.8–19.3 GHz (space-to-Earth)

(I) 19.3–19.4 GHz (space-to-Earth).

(J) 19.6–19.7 GHz (space-to-Earth).

(K) 19.7–20.2 GHz (space-to-Earth).

(L) 28.35–28.6 GHz (Earth-to-space).

(M) 28.6–29.1 GHz (Earth-to-space).

(N) 29.25–30.0 GHz (Earth-to-space).

* * * * *

■ 10. Amend § 25.203 by revising the table in paragraph (m)(1) and paragraph (m)(3) to read as follows:

§ 25.203 Choice of sites and frequencies.

* * * * *

(m) * * *

(1) * * *

TABLE 2 TO PARAGRAPH (m)(1)

Space service designation in which the transmitting earth station operates	Fixed-Satellite	
Frequency bands (GHz)	17.3–17.7	17.3–17.8
Space service designation in which the receiving earth station operates	Broadcasting-Satellite	Fixed-Satellite
Orbit	GSO	GSO
Modulation at receiving earth station	N (digital)	N (digital)

TABLE 2 TO PARAGRAPH (m)(1)—Continued

Receiving earth station interference parameters and criteria:	17/24 GHZ BSS			FSS	
p_0 (%)	0.015			0.003	
n	2			2	
p (%)	0.015			0.0015	
N_L(dB)	1			1	
M_s (dB)	In the area specified in § 25.140(b)(3)			In the area specified in § 25.140(a)(3)(iii)	
	(i) and (iv)	(ii)	(iii)	(A)	(B)
	4.8	3.0	1.8	2.5	0.8
W(dB)	4			0	
Receiving earth station parameters:	17/24 GHz BSS			FSS	
G_m (dBi)	36			N/A	
G_r	0			0	
ε_{min}	20°			5°	
T_e (K)	150			300	
Reference bandwidth: B (Hz)	10^6				
Permissible interference power: P_r(p) (dBW) in B	In the area specified in § 25.140(b)(3)			In the area specified in § 25.140(a)(3)(iii)	
	(i) and (iv)	(ii)	(iii)	(A)	(B)
	−146.8	−149.8	−152.8	−144	−150.1

* * * * *

(3) Each applicant for such new or modified feeder-link earth stations shall file with its application memoranda of coordination with each co-frequency licensee authorized to construct BSS receive earth stations or an individually licensed FSS receive earth station within the coordination zone. Feeder link earth station applicants are not required to complete coordination with blanket-licensed receiving FSS earth stations in the 17.3–17.8 GHz band.

* * * * *

§ 25.208 [Amended]

■ 11. Amend § 25.208 by removing and reserving paragraph (w).

■ 12. Amend § 25.209 by revising the introductory text of paragraphs (a)(1), (3), (4), and (6) and (b)(1) through (3) to read as follows:

§ 25.209 Earth station antenna performance standards.

(a) * * *

(1) In the plane tangent to the GSO arc, as defined in § 25.103, for earth stations not operating in the conventional Ku-band, the 24.75–25.25 GHz band, or the 27.5–30 GHz band:

* * * * *

(3) In the plane tangent to the GSO arc, for earth stations operating in the 24.75–25.25 GHz or 27.5–30 GHz bands:

* * * * *

(4) In the plane perpendicular to the GSO arc, as defined in § 25.103, for earth stations not operating in the conventional Ku-band, the 24.75–25.25 GHz band, or the 27.5–30 GHz band:

* * * * *

(6) In the plane perpendicular to the GSO arc, for earth stations operating in the 24.75–25.25 GHz or 27.5–30 GHz bands:

* * * * *

(b) * * *

(1) In the plane tangent to the GSO arc, for earth stations not operating in the 24.75–25.25 GHz or 27.5–30 GHz bands:

* * * * *

(2) In the plane perpendicular to the GSO arc, for earth stations not operating in the 24.75–25.25 GHz or 27.5–30 GHz bands:

* * * * *

(3) In the plane tangent to the GSO arc or in the plane perpendicular to the GSO arc, for earth stations operating in the 24.75–25.25 GHz or 27.5–30 GHz bands:

* * * * *

■ 13. Amend § 25.210 by:

■ a. Revising paragraph (f); and

■ b. Removing and reserving paragraph (i).

The revision reads as follows:

§ 25.210 Technical requirements for space stations.

* * * * *

(f) All space stations in the Fixed-Satellite Service operating in any portion of the 3600–4200 MHz, 5091–5250 MHz, 5850–7025 MHz, 10.7–12.7 GHz, 12.75–13.25 GHz, 13.75–14.5 GHz, 15.43–15.63 GHz, 17.3–17.8 GHz (space-to-Earth), 18.3–20.2 GHz, 24.75–25.25 GHz, or 27.5–30.0 GHz bands, including feeder links for other space services, and in the Broadcasting-Satellite Service in the 17.3–17.8 GHz band (space-to-Earth), shall employ state-of-the-art full frequency reuse, either through the use of orthogonal polarizations within the same beam and/or the use of spatially independent beams. This requirement does not apply to telemetry, tracking, and command operation.

* * * * *

■ 14. Amend § 25.212 by revising paragraphs (e) and (h) to read as follows:

§ 25.212 Narrowband analog transmissions and digital transmissions in the GSO FSS.

* * * * *

(e) An earth station may be routinely licensed for digital transmission in the conventional or extended Ka-bands if

the input power spectral density into the antenna will not exceed 3.5 dBW/MHz and the application includes certification pursuant to § 25.132(a)(1) of conformance with the antenna gain performance requirements in § 25.209(a) and (b).

* * * * *

(h) Applications for authority for fixed earth station operation in the conventional C-band, the extended C-band, the conventional Ku-band, the extended Ku-band, the conventional Ka-band, or the extended Ka-band that do not qualify for routine processing under relevant criteria in this section, § 25.211, or § 25.218 are subject to the requirements in § 25.220.

■ 15. Amend § 25.218 by revising paragraph (a), adding a heading for paragraph (b), and revising paragraphs (i) heading and (j) to read as follows:

§ 25.218 Off-axis EIRP density envelopes for FSS earth stations transmitting in certain frequency bands.

(a) *Applicability.* This section applies to applications for fixed and temporary-fixed FSS earth stations transmitting to geostationary space stations in the conventional C-band, extended C-band, conventional Ku-band, extended Ku-band, conventional Ka-band, extended Ka-band, or 24.75–25.25 GHz, and applications for ESIMs transmitting in the conventional C-band, conventional Ku-band, conventional Ka-band, except for applications proposing transmission of analog command signals at a band edge with bandwidths greater than 1 MHz or transmission of any other type of analog signal with bandwidths greater than 200 kHz.

(b) *Routine processing.* * * *

(i) *Digital earth station operation in the conventional or extended Ka-band.*

* * *

(j) *Non-qualifying applications.* Applications for authority for fixed earth station operation in the conventional C-band, extended C-band, conventional Ku-band, extended Ku-band, conventional Ka-band, extended Ka-band, or 24.75–25.25 GHz, that do not qualify for routine processing under relevant criteria in this section, § 25.211, or § 25.212 are subject to the requirements in § 25.220.

■ 16. Amend § 25.220 by revising paragraph (a) to read as follows:

§ 25.220 Non-routine transmit/receive earth station operations.

(a) The requirements in this section apply to applications for, and operation of, earth stations transmitting in the conventional or extended C-bands, the conventional or extended Ku-bands, or the conventional or extended Ka -bands that do not qualify for routine licensing under relevant criteria in § 25.211, § 25.212, or § 25.218.

* * * * *

■ 17. Revise § 25.262 to read as follows:

§ 25.262 Licensing and domestic coordination requirements for 17/24 GHz BSS space stations and FSS space stations transmitting in the 17.3–17.8 GHz band.

(a) A 17/24 GHz BSS or FSS applicant seeking to transmit in the 17.3–17.8 GHz band may be authorized to operate a space station at levels up to the maximum power flux density limits defined in paragraphs (a)(1) and (2) of this section without coordinating its power flux density levels with adjacent licensed or permitted operators, as follows:

(1) For 17/24 GHz BSS applicants, up to the power flux density levels specified in § 25.140(b)(3) only if there is no licensed space station, or prior-filed application for a space station transmitting in the 17.3–17.8 GHz band at a location less than four degrees from the orbital location at which the applicant proposes to operate; and

(2) For FSS space station applicants transmitting in the 17.3–17.8 GHz band, up to the maximum power flux density levels in § 25.140(a)(3)(iii), only if there is no licensed 17/24 GHz BSS space station, or prior-filed application for a 17/24 GHz BSS space station, at a location less than four degrees from the orbital location at which the FSS applicant proposes to operate, and there is no licensed FSS space station, or prior-filed application for an FSS space station transmitting in the 17.3–17.8 GHz band, at a location less than two degrees from the orbital location at which the applicant proposes to operate.

(b) Any U.S. licensee or permittee authorized to transmit in the 17.3–17.8 GHz band that does not comply with the applicable power flux-density limits set forth in § 25.140(a)(3)(iii) and/or (b)(3) shall bear the burden of coordinating with any future co-frequency licensees and permittees of a space station transmitting in the 17.3–17.8 GHz band as required in § 25.114(d)(15)(ii).

(c) If no good faith agreement can be reached, the operator of the FSS space station transmitting in the 17.3–17.8 GHz band that does not comply with § 25.140(a)(3)(iii) or the operator of the 17/24 GHz BSS space station that does not comply with § 25.140(b)(3), shall reduce its power flux-density levels to be compliant with those specified in § 25.140(a)(3)(iii) and/or (b)(3) as appropriate.

(d) Any U.S. licensee or permittee of a space station transmitting in the 17.3–17.8 GHz band that is required to provide information in its application pursuant to § 25.140(a)(2) or (b)(4) must accept any increased interference that may result from adjacent space stations transmitting in the 17.3–17.8 GHz band that are operating in compliance with the rules for such space stations specified in §§ 25.140(a) and (b), 25.202(a)(9) and (e) through (g), 25.210(i) through (j), 25.224, 25.262, 25.264(h), and 25.273(a)(3).

(e) Notwithstanding the provisions of this section, licensees and permittees will be allowed to apply for a license or authorization for a replacement satellite that will be operated at the same power level and interference protection as the satellite to be replaced.

■ 18. Amend § 25.264 by revising the section heading and the introductory text to paragraph (a), paragraphs (a)(4) and (6), the introductory text to paragraph (b), the introductory text to paragraph (b)(2), paragraphs (b)(2)(ii), (b)(3) and (4), and (c), the introductory text to paragraph (d), paragraph (d)(1)(ii), the introductory text to paragraph (d)(2), the introductory text to paragraphs (e) and (e)(1) and (2), paragraph (e)(3), the introductory text to paragraph (f), paragraphs (f)(2) and (g), and the introductory text to paragraphs (h) and (i) to read as follows:

§ 25.264 Requirements to facilitate reverse-band operation in the 17.3–17.8 GHz band.

(a) Each applicant or licensee for a space station transmitting in the 17.3–17.8 GHz band must submit a series of tables or graphs containing predicted off-axis gain data for each antenna that will transmit in any portion of the 17.3–17.8 GHz band, in accordance with the following specifications. Using a Cartesian coordinate system wherein the X axis is tangent to the geostationary orbital arc with the positive direction pointing east, *i.e.,* in the direction of travel of the satellite; the Y axis is parallel to a line passing through the geographic north and south poles of the Earth, with the positive direction pointing south; and the Z axis passes through the satellite and the center of the Earth, with the positive direction pointing toward the Earth, the applicant or licensee must provide the predicted transmitting antenna off-axis antenna gain information:

* * * * *

(4) At a minimum of one measurement frequency at the center of the portion of the 17.3–17.8 GHz frequency band over which the space station is designed to transmit. Applicants or licensees must provide additional measurement data at 5 MHz

above the lower edge of the band and/or at 5 MHz below the upper edge of the band, upon request by the Commission staff.

* * * * *

(6) The predictive gain information must be submitted to the Commission for each license application that is filed for a space station transmitting in any portion of the 17.3–18.8 GHz band no later than two years after license grant for the space station.

(b) A space station applicant or licensee transmitting in any portion of the 17.3–17.8 GHz band must submit power flux density (pfd) calculations based on the predicted gain data submitted in accordance with paragraph (a) of this section, as follows:

* * * * *

(2) The calculations must take into account the aggregate pfd levels at the DBS receiver at each measurement frequency arising from all antenna beams on the space station transmitting in the 17.3–17.8 GHz band. They must also take into account the maximum permitted longitudinal station-keeping tolerance, orbital inclination and orbital eccentricity of both the space station transmitting in the 17.3–17.8 GHz band and DBS space stations, and must:

* * * * *

(ii) Indicate the extent to which the calculated pfd of the space station's transmissions in the 17.3–17.8 GHz band exceed the threshold pfd level of −117 dBW/m2/100 kHz at those prior-filed U.S. DBS space station locations.

(3) If the calculated pfd exceeds the threshold level of −117 dBW/m2/100 kHz at the location of any prior-filed U.S. DBS space station, the applicant or licensee must also provide with the pfd calculations a certification that all affected DBS operators acknowledge and do not object to such higher off-axis pfd levels. No such certification is required in cases where the frequencies assigned to the DBS and to the space station transmitting in the 17.3–17.8 GHz band do not overlap.

(4) The information and any certification required by paragraph (b) of this section must be submitted to the Commission for each license application that is filed for a space station transmitting in any portion of the 17.3–17.8 GHz band no later than two years after license grant for the space station.

(c) No later than two months prior to launch, each licensee of a space station transmitting in any portion of the 17.3–17.8 GHz band must update the predicted transmitting antenna off-axis gain information provided in accordance with paragraph (a) of this section by submitting measured transmitting antenna off-axis gain information over the angular ranges, measurement frequencies and polarizations specified in paragraphs (a)(1) through (5) of this section. The transmitting antenna off-axis gain information should be measured under conditions as close to flight configuration as possible. As an alternative, licensees authorized to operate at locations one degree or greater from a prior-filed DBS space station may submit simulated transmitting antenna off-axis gain data in lieu of measured data, over the same angular ranges, frequencies and polarizations.

(d) No later than two months prior to launch, or when applying for authority to change the location of a space station transmitting in any portion of the 17.3–17.8 GHz band that is already in orbit, each such space station licensee must provide pfd calculations based on the measured off-axis gain data submitted in accordance with paragraph (c) of this section, as follows:

(1) * * *

(ii) At the location of any subsequently filed U.S. DBS space station where the pfd level in the 17.3–17.8 GHz band calculated on the basis of measured gain data exceeds −117 dBW/m²/100 kHz. In this paragraph (d)(1)(ii), the term ''subsequently filed U.S. DBS space station'' refers to any co-frequency Direct Broadcast Satellite service space station proposed in a license application filed with the Commission after the operator of a space station transmitting in any portion of the 17.3–17.8 GHz band submitted the predicted data required by paragraphs (a) and (b) of this section but before submission of the measured data required by this paragraph. Subsequently filed U.S. DBS space stations may include foreign-licensed DBS space stations seeking authority to serve the United States market. The term does not include any applications (or authorizations) that have been denied, dismissed, or are otherwise no longer valid, nor does it include foreign-licensed DBS space stations that have not filed applications with the Commission for market access in the United States.

(2) The pfd calculations must take into account the maximum permitted longitudinal station-keeping tolerance, orbital inclination and orbital eccentricity of both the transmitting 17.3–17.8 GHz and DBS space stations, and must:

* * * * *

(e) If the aggregate pfd level calculated from the measured data submitted in accordance with paragraph (d) of this section is in excess of the threshold pfd level of −117 dBW/m2/100 kHz:

(1) At the location of any prior-filed U.S. DBS space station as defined in paragraph (b)(1) of this section, then the operator of the space station transmitting in any portion of the 17.3–17.8 GHz band must either:

* * * * *

(2) At the location of any subsequently filed U.S. DBS space station as defined in paragraph (d)(1) of this section, where the aggregate pfd level submitted in accordance with paragraph (d) of this section is also in excess of the pfd level calculated on the basis of the predicted data submitted in accordance with paragraph (a) of this section that were on file with the Commission at the time the DBS space station application was filed, then the operator of the space station transmitting in the 17.3–17.8 GHz band must either:

* * * * *

(3) No coordination or adjustment of operating parameters is required in cases where there is no overlap in frequencies assigned to the DBS and the space station transmitting in the 17.3–17.8 GH band.

(f) The applicant or licensee for the space station transmitting in the 17.3–17.8 GHz band must modify its license, or amend its application, as appropriate, based upon new information:

* * * * *

(2) If the operator of the space station transmitting in the 17.3–17.8 GHz band adjusts its operating parameters in accordance with paragraph (e)(1)(ii) or (e)(2)(ii) or this section.

(g) Absent an explicit agreement between operators to permit more closely spaced operations, U.S. authorized 17/24 GHz BSS or FSS space stations transmitting in the 17.3–17.8 GHz band and U.S. authorized DBS space stations with co-frequency assignments may not be licensed to operate at locations separated by less than 0.2 degrees in orbital longitude.

(h) All operational space stations transmitting in the 17.3–17.8 GHz band must be maintained in geostationary orbits that:

* * * * *

(i) U.S. authorized DBS networks may claim protection from space path interference arising from the reverse-band operations of U.S. authorized space stations transmitting in the 17.3–17.8 GHz band to the extent that the DBS space station operates within the bounds of inclination and eccentricity listed in paragraphs (i)(1) and (2) of this section. When the geostationary orbit of

the DBS space station exceeds these bounds on inclination and eccentricity, it may not claim protection from any additional space path interference arising as a result of its inclined or eccentric operations and may only claim protection as if it were operating within the bounds listed in paragraphs (i)(1) and (2) of this section:

* * * * *

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FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 64

[CG Docket Nos. 03–123, 10–51, 12–38; FCC 22–49; FR ID 114537]

TRS Fund Contributions

AGENCY: Federal Communications Commission.

ACTION: Final rule.

SUMMARY: The Federal Communications Commission (Commission) modifies the cost recovery rules for funding two forms of internet-based telecommunications relay services (TRS)—video relay service (VRS) and internet Protocol Relay Service (IP Relay). The Commission expands the Interstate TRS Fund (TRS Fund or Fund) contribution base for support of those services to include intrastate as well as interstate end-user revenues of TRS Fund contributors. This action will ensure fair treatment of intrastate and interstate communications services and users in the funding of relay services.

DATES:

Effective date: This rule is effective December 27, 2022.

Compliance date: July 1, 2023.

FOR FURTHER INFORMATION CONTACT: Michael Scott, Disability Rights Office, Consumer & Governmental Affairs Bureau, at (202) 418–1264 or *Michael.Scott@fcc.gov.*

SUPPLEMENTARY INFORMATION: This is a summary of the Report and Order, document FCC 22–49, adopted June 26, 2022, released June 30, 2022, in CG Docket Nos. 03–123, 10–51, and 12–38. The Commission previously sought comment on these issues in *Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities, Structure and Practices of the Video Relay Service Program, Misuse of internet Protocol (IP) Relay Service,* Notice of Proposed Rulemaking (*NPRM*), CG Docket Nos. 03–123, 10–51, and 12–38, FCC 20–161, published at 86 FR 14859, March 19, 2021. To request materials in accessible formats for people with disabilities (Braille, large print, electronic files, audio format), send an email to *fcc504@fcc.gov,* or call the Consumer and Governmental Affairs Bureau at (202) 418–0530 (voice).

Synopsis

1. *Background.* Section 225 of the Communications Act of 1934, as amended (the Act), requires the Commission to ensure that both ''interstate and intrastate'' TRS are available ''to the extent possible and in the most efficient manner.'' 47 U.S.C. 225(b)(1). The Act directs the Commission to adopt, administer, and enforce regulations governing the provision of interstate and intrastate TRS, including rules on cost separation, which ''shall generally provide'' that interstate TRS costs are recovered from all subscribers for every interstate service and intrastate TRS costs are recovered from the intrastate jurisdiction. The Act also authorizes, but does not require, the establishment of state-administered TRS programs, subject to approval by the Commission. Currently, all 50 states, the District of Columbia, and several United States territories have TRS programs approved by the Commission. For ease of reference, The Commission refers to all state and territory TRS programs as state TRS programs. The Commission requires that state TRS programs include text-based TRS and speech-to-speech relay (STS).

2. To provide for the recovery of interstate TRS costs, the Commission established the interstate TRS Fund in 1993. Telecommunications carriers, as well as providers of interconnected and non-interconnected voice-over-internet-Protocol (VoIP) service, are required to contribute to the TRS Fund, on a quarterly basis, a specified percentage of their end-user revenues for the prior year. Providers of international as well as interstate services are currently required to contribute to the TRS Fund. For ease of reference, the Commission uses the term ''interstate'' to mean ''interstate and international.''

3. Although initially limited to supporting interstate TRS, the scope of the TRS Fund changed beginning in 2000, as the Commission authorized internet-based forms of TRS—VRS, IP Relay, and internet Protocol Captioned Telephone Service (IP CTS). VRS is a form of TRS that enables people with hearing or speech disabilities who use sign language to make telephone calls over broadband with a videophone. IP Relay is a form of TRS that permits an individual with a hearing or a speech disability to communicate in text using an internet Protocol-enabled device via the internet. IP CTS is a form of TRS that permits an individual who can speak but who has difficulty hearing over the telephone to use a telephone and an internet Protocol-enabled device via the internet to simultaneously listen to the other party and read captions of what the other party is saying.

4. When the Commission first authorized use of internet-based forms of TRS, it decided, as an interim measure to speed the development of these services, that all of the costs of providing internet-based TRS should be paid by contributors to the TRS Fund, based only on their interstate end-user revenues. This approach was deemed preferable to burdening state relay programs with the responsibility to fund and supervise, on a state-by-state basis, the provision of intrastate relay services via these nascent technologies. In those proceedings, the Commission did not consider the alternative, adopted here, of expanding the TRS Fund contribution base to include intrastate end-user revenues. However, the Commission stated an intention to revisit these interim funding arrangements in the future.

5. In 2019, the Commission revisited the funding arrangement for one form of internet-based TRS, IP CTS. Recognizing that the ''interim'' funding mechanism for IP CTS disproportionately burdens providers and users of interstate services, the Commission concluded it was no longer justifiable. Therefore, the Commission amended its rules to expand the TRS Fund contribution base for that service to include intrastate as well as interstate end-user revenues. TRS Fund Contributions, Document FCC 19–118, published at 85 FR 462, January 6, 2020 (*IP CTS Contributions Order*).

6. *Discussion.* The Commission amends its rules to provide that TRS Fund contributions for the support of VRS and IP Relay shall be calculated based on the total interstate and intrastate end-user revenues of each telecommunications carrier and VoIP service provider. The Commission thereby replaces ''interim'' funding measures adopted nearly two decades ago. The record supports the Commission's conclusion that the rules it adopts will provide a fair allocation of TRS Fund contribution obligations among those entities subject to its TRS funding authority. The total contributions needed to support the TRS Fund will not be affected, but the Commission anticipates that (assuming there is no unrelated change in the TRS Fund budget for supporting these