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

In the Matter of	)	
	)	
Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters	)	IB Docket No. 16-408
	)	
	)	

NOTICE OF PROPOSED RULEMAKING

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TABLE OF CONTENTS

Heading Paragraph #

I. INTRODUCTION 1
II. BACKGROUND 3
III. DISCUSSION 4
A. Ka-band Plan 4
B. EPFD Limits 18
C. Avoidance of In-line Interference 22
D. Earth Station E.I.R.P. Density Limits 28
E. Milestones 31
F. Geographic Coverage 35
IV. PROCEDURAL MATTERS 36
A. *Ex Parte* Presentations 36
B. Comment Filing Requirements 37
C. Initial Regulatory Flexibility Analysis 38
D. Paperwork Reduction Act 39
V. ORDERING CLAUSES 40
APPENDIX A – Proposed Rule Changes
APPENDIX B – Current Ka-band Plan
APPENDIX C – Proposed Ka-band Plan
APPENDIX D – Initial Regulatory Flexibility Analysis

I. INTRODUCTION

1. In this Notice of Proposed Rulemaking, we propose revisions to certain of our rules and policies governing satellite services, prompted by a planned new generation of large, non-geostationary-satellite orbit (NGSO), fixed-satellite service (FSS) systems. We propose to update, clarify, and streamline our rules to facilitate the deployment of NGSO FSS systems, which have the capability to provide services, including Internet access, to underserved communities worldwide. We also propose to

update certain rules governing operation of FSS space stations in the geostationary-satellite orbit (GSO) to enable greater operational flexibility.

2. Specifically, we propose to allocate additional spectrum for use by FSS systems on a secondary basis in the 17.8-18.3 GHz band, subject to power limits designed to protect primary terrestrial services. We propose additional flexibility for FSS operations within the 18.3-18.6 GHz, 18.8-19.4 GHz, 19.6-20.2 GHz, and 29.3-29.5 GHz bands, subject to coordination with terrestrial operations as necessary. To ensure compatible operation with GSO FSS networks, we propose to implement domestically the international power limits on NGSO FSS operations in portions of the 17.8-20.2 GHz and 27.5-30 GHz bands. We also seek comment on new and updated criteria to facilitate spectrum sharing among NGSO FSS systems. Finally, we propose to amend our satellite milestone policies and geographic coverage rules to provide additional regulatory flexibility to operators of NGSO FSS systems.

II. BACKGROUND

3. The Commission has established domestic frequency allocations and service rules for NGSO FSS operations in the 10.7-12.7 GHz (space-to-Earth), 12.75-13.25 GHz (Earth-to-space), 13.75-14.5 GHz (Earth-to-space), 18.8-19.3 GHz (space-to-Earth), and 28.6-29.1 GHz (Earth-to-space) frequency bands.[1] Additionally, in 1996 the Commission determined to permit NGSO FSS operation on a secondary basis in the 17.7-18.8 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), and 29.5-30 GHz (Earth-to-space) bands, but removed the secondary designations in the 17.7-18.8 GHz and 19.7-20.2 GHz downlink bands in 2000.[2] These rules and policies concerning NGSO FSS systems were generally adopted over a decade ago, and reflect the system plans of NGSO FSS applicants at that time. Currently, only one NGSO FSS system, operated by O3b Limited (O3b), provides commercial service in the United States.[3] Recently, however, proponents of a new generation of NGSO FSS systems have emerged and initiated the international coordination process for constellations of hundreds or thousands of satellites.[4] In this Notice, we primarily explore revisions to specific rules and policies affecting such NGSO FSS systems.

III. DISCUSSION

A. Ka-band Plan

4. *1996 Plan*. In 1996, the Commission adopted a plan of domestic licensing priority among stations in the 17.7-20.2 GHz and 27.5-30 GHz bands (the Ka-band).[5] The 1996 Ka-band Plan[6]

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[1] 47 CFR §§ 2.106, 25.145, 25.146; *see also, e.g.*, *The Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ka-band*, Report and Order, 18 FCC Rcd 14708 (2003) (*Ka-band NGSO FSS Order*); *The Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ku-band*, Report and Order, 17 FCC Rcd 7841 (2002) (*Ku-band NGSO FSS Service Rules Order*).

[2] See discussion in section III.A., *infra*.

[3] *O3b Limited*, Stamp Grant, IBFS File Nos. SAT-LOI-20141029-00118 and SAT-AMD-20150115-00004 (granted Jan. 22, 2015), http://licensing.fcc.gov/myibfs/download.do?attachment_key=1089853 (*O3b Grant*).

[4] *See, e.g.*, WorldVu Satellites Limited, Petition for a Declaratory Ruling Granting Access to the U.S. Market for the OneWeb System, IBFS File No. SAT-LOI-20160428-00041 (filed Apr. 28, 2016) (*OneWeb Petition*); The Boeing Company, Application for Authority to Launch and Operate a Non-Geostationary Low Earth Orbit Satellite System in the Fixed Satellite Service, IBFS File No. SAT-LOA-20160622-00058 (filed June 22, 2016).

[5] *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, First Report and Order and Fourth Notice of Proposed Rulemaking, 11 FCC Rcd 19005, 19024, para. 42, 19036, para. 77 (1996) (*28 GHz First Report and Order*).

"designated"[7] certain frequencies for licensing of NGSO FSS systems on a primary basis and designated other frequencies for licensing of GSO FSS networks on a primary basis.[8] The 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space) bands were designated for primary NGSO FSS licensing. The 17.7-18.8 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 28.35-28.6 GHz (Earth-to-space), and 29.5-30 GHz (Earth-to-space) bands were designated for primary GSO FSS licensing. In each of these bands where GSO FSS networks were primary, NGSO FSS systems were permitted on a secondary basis,[9] and vice versa.[10] In addition, feeder links[11] for NGSO space stations in the mobile-satellite service (MSS) were accommodated as co-primary with terrestrial services in the 19.3-19.7 GHz (space-to-Earth) and 29.1-29.25 GHz (Earth-to-space) bands, and co-primary with GSO FSS networks in the 29.25-29.5 GHz (Earth-to-space) band.[12]

5. *2000 Amendments*. In 2000, the Commission amended the Ka-band Plan with respect to the 17.7-20.2 GHz downlink band. Among other changes, the Commission removed the co-primary FSS (space-to-Earth) allocation in the 17.7-18.3 GHz band, leaving the band for sole use by the terrestrial fixed service (FS) under the band plan.[13] Further, concerned that mixed use of spectrum would inhibit ubiquitous deployment in primary services, the Commission removed all secondary designations in the 17.7-20.2 GHz band.[14] Regarding secondary FSS use of primary FS bands, the Commission concluded

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[6] As noted below, the Ka-band Plan was subsequently amended. The current Ka-band Plan is depicted in Appendix B.

[7] The Commission used an overlay of "designations" to set out the relative rights of different uses of the Ka-band. These designations restrict the licensing and use of the Ka-band beyond that indicated in the U.S. Table of Frequency Allocations and its footnotes.

[8] *28 GHz First Report and Order*, 11 FCC Rcd at 19024, para. 42, 19036, para. 77.

[9] In the context of a frequency allocation, stations of a "secondary" service must not cause harmful interference to, and cannot claim protection from, stations of "primary" services in the same band. Secondary operations may, however, claim protection from harmful interference from stations of the same or other secondary services to which frequencies may be assigned at a later date. 47 CFR §§ 2.104(d)(3), 2.105(c)(2). The Commission has defined a secondary designation with reference to these provisions for secondary allocations. *See, e.g., Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, Third Report and Order, 12 FCC Rcd 22310, 22325-26, para. 39 & n.53 (1997) (*28 GHz Third Report and Order*).

[10] Thus, all of the sub-bands noted above were available to both NGSO FSS and GSO FSS systems, with the relative status of each being either primary or secondary depending on the particular band.

[11] A feeder link is a radio link between an earth station at a given location and a space station conveying information for a space radiocommunication service other than the FSS. 47 CFR § 2.1.

[12] A total of 400 megahertz of spectrum was designated for NGSO MSS feeder links in each direction (19.3-19.7 GHz downlink and 29.1-29.5 GHz uplink). *28 GHz First Report and Order*, 11 FCC Rcd at 19024, para. 42, 19036, para. 77. As noted below, only 200 megahertz of this paired spectrum, at 19.4-19.6 GHz and 29.1-29.3 GHz, has since been put to use by an NGSO MSS operator in the United States.

[13] *Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, Report and Order, 15 FCC Rcd 13430, 13443, para. 28, 13445-46, paras. 31, 33 (2000) (*18 GHz Order*). In addition to the primary FS allocation/designation in the 17.7-18.3 GHz band, however, the U.S. non-Federal Table of Frequency Allocations contains a primary FSS (Earth-to-space) allocation in the 17.7-17.8 GHz band limited to feeder links for the broadcasting-satellite service (BSS), and a footnote also allocating the 18.1-18.3 GHz band on a primary basis to the meteorological-satellite service (space-to-Earth). 47 CFR § 2.106, nn.US271, US519.

[14] *18 GHz Order*, 15 FCC Rcd at 13456-59, paras. 55-58. The Commission subsequently affirmed its decisions to prohibit secondary uses of the 17.7-20.2 GHz band. *Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket*

(continued….)

that permitting such space-station downlink operations would raise costs for terrestrial operators through "either coordination with secondary [FSS] users before beginning service or delays in service while trying to find causes of interference."[15] The Commission rejected secondary GSO FSS use of primary NGSO FSS bands because of a concern that coexistence between GSO FSS and NGSO FSS operations would be unduly burdensome to the operations of the primary NGSO FSS systems.[16]

6. *Bureau Waivers*. More recently, the International Bureau has issued waivers to permit both GSO FSS and NGSO FSS operations within the 17.8-18.3 GHz band designated solely for the FS, subject to a non-interference condition and compliance with power flux-density (PFD)[17] limits designed to protect terrestrial services.[18] Similarly, GSO FSS space station operators have received waivers to operate on a non-interference basis in the 18.8-19.3 GHz band designated solely for NGSO FSS operations.[19] And NGSO FSS systems have been licensed or granted U.S. market access by waiver in the 18.3-18.6 GHz and 19.7-20.2 GHz bands on a non-interference basis, after demonstrating compliance with limits on equivalent power flux-density (EPFD)[20] designed to protect primary GSO FSS networks.[21]

7. *NGSO MSS Feeder Links*. In addition, since 1996, only one licensee has made use of the designation for NGSO MSS feeder links in the 19.3-19.7 GHz and 29.1-29.5 GHz bands. Iridium Constellation LLC operates feeder links in the 19.4-19.6 GHz and 29.1-29.3 GHz sub-bands for its

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Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use, First Order on Reconsideration, 16 FCC Rcd 19808, 19821-22, paras. 27-29 (2001) (*18 GHz Order First Reconsideration*).

[15] *18 GHz Order*, 15 FCC Rcd at 13459, para. 58. On reconsideration of a separate issue in the 2000 *18 GHz Order*, the Commission acknowledged that longstanding power limits in the 17.7-19.7 GHz band were already designed to "pre-coordinate" spacecraft transmissions with terrestrial fixed operations to avoid the need for coordination to ensure compatibility. *See 18 GHz Order First Reconsideration*, 16 FCC Rcd at 19827-28, para. 45.

[16] *18 GHz Order* at 13458-59, para. 57.

[17] The PFD is a measure of the power generated at a given point. It is defined as the amount of power flow through a unit area within a unit bandwidth. 47 CFR § 25.103. The Commission has adopted and applied specific PFD limits to satellite transmissions in specific frequency bands to protect terrestrial services.

[18] *Inmarsat Mobile Networks, Inc., Application to Operate a Fixed-Satellite Service Gateway Earth Station Facility in Lino Lakes, Minnesota with the Inmarsat-5 F2 Space Station*, Order and Authorization and Declaratory Ruling, 30 FCC Rcd 2770, 2778-79, para. 25 (IB/OET 2015) (approving GSO FSS operations in the 17.7-18.3 GHz band) (*Inmarsat Grant*); *O3b Grant*, Condition 4 (approving NGSO FSS operations in the 17.8-18.6 GHz band).

[19] *See, e.g.*, *Inmarsat Grant*, 30 FCC Rcd at 2777-78, para. 22; *ViaSat, Inc.*, Stamp Grant, IBFS File No. SAT-LOI-20080107-00006, Condition 4 (granted Aug. 18, 2009), http://licensing.fcc.gov/myibfs/download.do?attachment_key=734547.

[20] The EPFD is the sum of the power flux-densities produced at a receive earth station or space station of a GSO satellite system by all transmitting stations in an NGSO satellite system, taking into account the off-axis discrimination of the receiving antenna. *See* 47 CFR § 25.103. For a discussion of the concept of EPFD, see generally *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-band Frequency Range et al.*, First Report and Order and Further Notice of Proposed Rulemaking, 16 FCC Rcd 4096 (2000) (*Ku-band NGSO FSS Allocation Order*).

[21] *Northrop Grumman Space & Mission Systems Corporation, Applications for Authority to Operate a Global Satellite System Employing Geostationary Satellite Orbit and Non-Geostationary Satellite Orbit Satellites in the Fixed-Satellite Service in the Ka-band and V-band*, Order and Authorization, 24 FCC Rcd 2330, 2355, para. 75 (IB 2009) (*Northrop Grumman License*); *contactMEO Communications, LLC, For Authority to Launch and Operate a Non-Geostationary Orbit Fixed-Satellite System in the Ka-band Frequencies*, Order and Authorization, 21 FCC Rcd 4035, 4045, para. 26 (IB 2006) (*contactMEO License*) (both authorizing operations in the 19.7-20.2 GHz band based on EPFD showings); *O3b Grant*, Condition 4(b) (conditioning grant of U.S. market access in the 17.8-18.6 GHz band on compliance with EPFD limits).

current NGSO MSS constellation, and has requested and been authorized for the same frequencies on its upcoming second-generation constellation.[22] The 19.3-19.4 GHz, 19.6-19.7 GHz, and 29.3-29.5 GHz bands, in contrast, have not been used by any NGSO MSS licensee in the United States.

8. *Proposal Overview*. In light of the waiver decisions subsequent to the 2000 *18 GHz Order*, and to promote more flexible use of the spectrum, we propose to reinstate certain secondary FSS use in the 17.8-20.2 GHz band and to allow new FSS operations in the 19.3-19.4 GHz, 19.6-19.7 GHz, and 29.3-29.5 GHz bands.[23] This proposal would codify existing practices and formally enable the spectrum use proposed by NGSO FSS broadband constellations currently pending before the Commission.[24] It would further make available for FSS systems spectrum currently designated for, but never used by, NGSO MSS feeder links.

9. *17.8-18.3 GHz*. We propose to create a new secondary allocation to the FSS in the 17.8-18.3 GHz band, subject to protections for the primary FS. We anticipate that the PFD limits established by the International Telecommunication Union (ITU)[25] for protection of the FS by the FSS in the 17.7-18.3 GHz band are also sufficient to protect U.S. terrestrial fixed users, without generally requiring coordination.[26] This has long been the case in the 3700-4200 MHz band, for example.[27] And the United States participated actively in the development of ITU PFD limits in the 17.8-18.3 GHz band, with input from U.S. terrestrial operators. Thus, we are no longer concerned about the coordination and delay concerns that the Commission expressed in 2000.[28] And, as noted above, both NGSO FSS and GSO FSS systems have been successfully authorized to operate in this band by waiver on an unprotected, non-interference basis with respect to the FS.[29] Accordingly, and to promote additional operational flexibility, we propose to adopt a secondary allocation to the FSS (space-to-Earth) in the 17.8-18.3 GHz band currently designated solely for the FS.[30] We intend to limit this allocation to individually licensed earth stations, which are more likely than ubiquitously deployed user terminals to be able to operate

[22] *Iridium Constellation LLC, Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation*, Order and Authorization, DA 16-875 (IB/OET 2016).

[23] Our proposed Ka-band Plan is depicted in Appendix C for ease of reference, in addition to being described here.

[24] *See, e.g.*, *OneWeb Petition*; Telesat Canada, Petition for Declaratory Ruling to Grant Access to the U.S. Market for Telesat's NGSO Constellation, IBFS File No. SAT-LOI-20161115-00108 (filed Nov. 15, 2016).

[25] The ITU is the United Nations specialized agency for information and communication technologies. The Radiocommunication Sector of the ITU coordinates the international management of the radiofrequency spectrum and satellite orbits.

[26] ITU Radio Regulations, Article 21, Table 21-4, http://www.itu.int/pub/R-REG-RR-2012; *see also* 47 CFR § 25.208(c) (containing PFD limits for GSO networks in the 17.7-17.8 GHz band, among others); *18 GHz Order First Reconsideration*, 16 FCC Rcd at 19827-28, para. 45 (finding that "the pfd limit set in the 17.7-19.7 GHz band had been internationally adopted since September 6, 1983 to protect Fixed Service operations, and to avoid the need for Fixed Service / Fixed Satellite Service coordination"). The Commission relies on space station compliance with PFD limits to protect terrestrial services in other bands as well. *See, e.g.*, *Ku-band NGSO FSS Allocation Order*, 16 FCC Rcd at 4116, para. 39.

[27] In this band, FSS space stations operate on a co-primary basis with FS terrestrial stations. The space stations are subject to ITU PFD limits codified in section 25.208(a), and are not typically coordinated with terrestrial operators. 47 CFR § 25.208(a); ITU Radio Regulations, Article 21, Table 21-4.

[28] The Commission did not discuss the adequacy of any PFD limits in this context. *18 GHz Order*, 15 FCC Rcd at 13459, para. 58.

[29] We also note that WorldVu Satellites Limited, d/b/a OneWeb, has filed a petition for declaratory ruling to access the U.S. market in the 17.8-18.6 GHz band using its proposed system of 720 NGSO satellites. *OneWeb Petition*.

[30] Both GSO FSS and NGSO FSS operations would be permitted under this secondary FSS allocation. Non-Federal FSS operations would also be secondary to primary Federal FSS operations in this band.

successfully on an unprotected basis with respect to primary FS stations.[31] We also propose to include in our rules the international PFD limits on space stations in this band.[32] Finally, to promote compatibility among FSS systems, we propose to authorize NGSO FSS systems in this band only on an unprotected, non-interference basis with respect to GSO FSS networks.[33] We seek comment on these proposals. As indicated above, we anticipate that PFD limits established by the ITU, with significant involvement of the United States, will be adequate to protect U.S. fixed users from interference. However, we seek comment on these PFD limits. In the unlikely event that harmful interference did occur to an FS station, we expect that the FS operator would attempt to locate and contact the source of the interference, or seek assistance from the Commission. We seek comment on this issue.

10. *18.3-18.6 GHz and 19.7-20.2 GHz.* We also propose to allow NGSO FSS systems to operate on an unprotected basis with respect to GSO FSS networks in the 18.3-18.6 GHz and 19.7-20.2 GHz bands, subject to limits on EPFD to ensure protection of GSO FSS networks, as explained below.[34] As we concluded for operations in the 10.7-14.5 GHz band, which is available for licensing of both GSO and NGSO FSS systems, we anticipate that compliance with EPFD limits applicable internationally will be sufficient to protect GSO FSS networks from unacceptable interference, by generally limiting NGSO FSS operations near the geostationary orbit.[35] Permitting NGSO FSS operations in the 18.3-18.6 GHz and 19.7-20.2 GHz bands would also be consistent with waivers issued on delegated authority, as noted above.

11. *18.8-19.3 GHz.* In addition, we propose to allow GSO FSS operation in the 18.8-19.3 GHz downlink band on an unprotected, non-interference basis with respect to NGSO FSS systems, consistent with Bureau waivers and matching the current secondary GSO FSS designation in the paired 28.6-29.1 GHz uplink band. Because NGSO FSS systems would not be required to alter their operations to accommodate any GSO FSS operations in this band, we do not believe this allowance for GSO FSS would prove burdensome to NGSO FSS systems, but we seek comment on such burdens.

12. *18.8-19.3 GHz and 28.6-29.1 GHz.* Internationally, these bands are allocated to the FSS on a primary basis. GSO satellite networks and NGSO systems in these bands are subject to coordination, and No. 22.2 of the ITU Radio Regulations[36] does not apply. We request comment on the possibility of giving GSO operations co-primary status with NGSO operations in these bands, as opposed to the secondary designation already existing in the 28.6-29.1 GHz band and our proposal above for the 18.8-19.3 GHz band. We seek comment on any potential difficulties that this approach might raise, particularly since our rules separately address GSO-like applications[37] and NGSO-like applications,[38] but do not provide a mechanism for us to consider an application of one type (GSO-like or NGSO-like) vis-à-vis previous applications or authorizations of the other type in the bands 18.8-19.3 GHz and 28.6-29.1 GHz. Significantly, in these bands NGSO-like operations do not have to meet EPFD limits in order to

[31] *See infra* Appx. A (proposed footnote NGXX2).

[32] *See infra* Appx. A (proposed revisions to section 25.208(c) and (e)). Section 25.208(c) already includes PFD limits on GSO space stations in the adjacent 17.7-17.8 GHz and 18.3-18.8 GHz bands.

[33] *See infra* Appx. A (proposed footnote NGXX3).

[34] We do not propose to extend NGSO FSS operation to the 18.6-18.8 GHz band, in which GSO FSS networks are also currently designated co-primary, due to concerns of protection for the coequal Earth exploration-satellite service (passive) and the space research service (passive). 47 CFR § 2.106.

[35] *See generally Ku-band NGSO FSS Allocation Order*, 16 FCC Rcd 4096.

[36] This rule provides that, regardless of their ITU filing dates, NGSO systems must not cause unacceptable interference to and, unless otherwise specified in the Radio Regulations, must not claim protection from GSO FSS and GSO BSS networks operating in accordance with the Radio Regulations.

[37] 47 CFR § 25.158.

[38] 47 CFR § 25.157.

ensure the protection of GSO-like operations.

13. *19.3-19.4 GHz, 19.6-19.7 GHz, and 29.3-29.5 GHz*. To facilitate satellite use of the bands, we propose to permit both GSO and NGSO FSS systems to operate in the 19.3-19.4 GHz, 19.6-19.7 GHz, and 29.3-29.5 GHz bands currently designated for, but unused by, NGSO MSS feeder links. We propose to authorize NGSO FSS systems on an unprotected, non-interference basis with respect to GSO FSS networks in these bands. In the 19.3-19.4 GHz and 19.6-19.7 GHz bands, which are shared on a co-primary basis with terrestrial services, any FSS earth stations would be individually licensed and coordinated with terrestrial stations. Existing terrestrial operations in these bands would not have to protect any new FSS deployment under general first-come, first-served coordination procedures.[39] Further, we anticipate that new stations in the FS and the FSS will be compatible in these bands through coordination of the specific operating parameters of each station, FS or FSS, at the time of licensing. We seek comment on this proposal, including relevant technical analyses regarding coordination parameters for new individually licensed earth stations and future FS stations.

14. *Codification*. For clarity, we propose at this time to codify the Ka-band Plan's satellite designations into footnotes to the U.S. Table of Frequency Allocations,[40] and to remove duplicative notes in section 25.202(a)(1), except with respect to the Commission's recent decision regarding the 27.5-28.35 GHz band in the Spectrum Frontiers proceeding.[41] Similarly, we propose to incorporate into footnotes in the Table the remaining frequency-use restrictions in section 25.202(a)(1) that were not recently amended in the Commission's Spectrum Frontiers proceeding. However, we propose to specify the limitation on NGSO FSS deployment in the 10.7-11.7 GHz and 12.75-13.25 GHz bands as to individually licensed earth stations only, rather than to gateway earth stations only as currently prescribed.[42] This would be consistent both with our proposal for the 17.8-18.3 GHz band and with the Commission's recent decision regarding the shared 27.5-28.35 GHz band in the Spectrum Frontiers proceeding. In addition, rather than attempt to reproduce in section 25.202(a)(1) all of the frequency bands available for FSS, which are already stated completely in the Table of Frequency Allocations in section 2.106,[43] we propose to use this paragraph only to note the restrictions on FSS not codified in the Table.

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[39] PFD limits are already in place to protect such terrestrial operations from downlink interference. 47 CFR § 25.208(c).

[40] In doing so, we propose to specify that, in the 27.5-28.35 GHz band, NGSO FSS systems must operate on an unprotected, non-interference basis with respect to GSO FSS networks. *See infra* Appx. A (proposed footnote NGXX3). This treatment would promote compatibility between the two system designs and is consistent with our proposals in most shared GSO-NGSO FSS bands. Additionally, while the MSS is not designated in the Commission's Ka-band Plan, we do not propose to remove the allocations for this service in the 19.7-20.2 GHz and 29.5-30 GHz bands.

[41] *See infra* Appendices A and C (proposed revisions to section 2.106); *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services et al.*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8023-43, paras. 19-72 (2016). The Commission has employed the term "28 GHz band" to describe the frequencies 27.5-28.35 GHz in the ongoing Spectrum Frontiers proceeding. *Id.* at 8018, para. 4. Earlier Commission proceedings used the term "28 GHz band" to refer to the entire 27.5-30 GHz frequency band. *See, e.g., 28 GHz First Report and Order*, 11 FCC Rcd at 19007, para. 1 & n.1.

[42] Specifically, note 6 in section 25.202(a)(1) provides that NGSO FSS operations are limited to communications with gateway earth stations in the bands 5091-5250 MHz (Earth-to-space), 6700-7025 MHz (space-to-Earth), 10.7-11.7 GHz (space-to-Earth), 12.75-13.25 GHz (Earth-to-space), and 15.43-15.63 GHz (Earth-to-space). Within these bands, footnotes US444A, 5.447A, 5.458B, and US359 to the U.S. Table of Frequency Allocations state that the FSS allocations in the 5091-5150 MHz, 5150-5250 MHz, 6700-7075 MHz, and 15.43-15.63 GHz bands, respectively, are limited to feeder links for NGSO MSS systems. In light of these restrictions already in the U.S. Table, we propose to add to a separate footnote only the restriction on NGSO FSS operations in the remaining 10.7-11.7 GHz and 12.75-13.25 GHz bands. *See infra* Appx. A (proposed footnote NGXX1).

[43] Section 25.202(a)(1), in contrast, is presently a non-exhaustive list of frequencies available for FSS.

15. *PFD Limits in 17.7-19.7 GHz for GSO FSS Space Stations*. Section 25.208(c) contains PFD limits on emissions from space stations in, among others, the following frequency bands: 18.3-18.8 GHz and 19.3-19.7 GHz.[44] In addition, section 25.208(e) contains PFD limits on emissions by NGSO FSS space stations in the 18.8-19.3 GHz band.[45] Since we are proposing changes to the U.S. Table of Frequency Allocations that will allow the operation of GSO FSS and/or NGSO FSS space stations in frequency bands where such operation was not previously contemplated, we propose to extend the applicability of PFD limits to these frequency bands. Accordingly, we propose to make the limits in section 25.208(c) applicable to GSO FSS space stations in the frequency bands 17.7-19.7 GHz and to all space stations in the bands 22.55-23.55 GHz and 24.45-24.75 GHz.[46] These limits have already been applied in portions of the 17.7-19.7 GHz band when granting authorizations for operation in this band through waivers.

16. *PFD Limits for NGSO FSS Space Stations*. We also propose to make the limits in section 25.208(e) applicable to NGSO FSS space stations in the frequency bands 17.8-18.6 GHz and 18.8-19.7 GHz. We recognize, however, that these limits were derived for constellations up to a certain number of satellites and may not be appropriate for some of the large NGSO FSS constellations being currently proposed. The interference produced by an NGSO FSS constellation to a terrestrial station is time-varying and, for that reason, the protection of such a station would be better ensured through the establishment of an EPFD limit. We invite comment on this point and on what would be an appropriate EPFD for the protection of a terrestrial station in the frequency bands under consideration. As an alternative, and until such EPFD limit can be developed, we propose that an NGSO FSS constellation be deemed as having met the requirements in section 25.208(e) if the aggregate PFD produced by the whole constellation at any point in the Earth's surface does not exceed -115 (dBW/m^2)/MHz. We invite comments on this proposal.

17. *Other*. As NGSO FSS systems deploy in different frequency bands, it is important to consider how these systems can share spectrum with other non-satellite systems. In this respect, we request comments on any other emerging uses, technologies, or platforms that should be taken into account as additional NGSO uses occur. Would the rules proposed in this Notice preclude in any way other uses of this spectrum or hinder future sharing with other services? Are there additional technical rules or other means by which we can facilitate additional sharing in these bands?

B. EPFD Limits

18. *Background*. The ITU has adopted power limits for NGSO FSS satellite systems to allow shared use of spectrum with GSO FSS and GSO BSS satellite networks.[47] These limits are expressed in terms of uplink and downlink EPFD levels and establish conditions for the use of specified frequency bands within the 3.7-30 GHz range by NGSO FSS systems on an international basis, creating interference limits for GSO FSS or GSO BSS networks. NGSO FSS systems may exceed these limits in Article 22 of the ITU Radio Regulations only if agreed to by concerned administrations.[48] Domestically, the Commission has adopted the Article 22 EPFD limits as requirements for NGSO FSS operation within the 10.7-14.5 GHz band.[49]

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[44] 47 CFR § 25.208(c).

[45] It is possible to interpret section 25.208(e) as applying to a GSO FSS space station when n=1. 47 CFR § 25.208(e).

[46] Section 25.208(c) already applies to space station emissions in the 22.55-23.55 GHz and 24.45-24.75 GHz bands. 47 CFR § 25.208(c). We are not proposing to change the PFD limits in these frequencies.

[47] ITU Radio Regulations, Article 22, Section II.

[48] *Id.*, No. 22.5I.

[49] 47 CFR §§ 25.146, 25.208(g)-(m).

19. *Ka-band*. While the Commission has not previously included in its rules the Article 22 EPFD limits in the Ka-band, NGSO FSS applicants in these bands have nonetheless demonstrated compliance with the limits when seeking to operate on a non-interference basis vis-à-vis GSO FSS networks.[50] The International Bureau has approved such operations on the basis of these showings.[51] Similarly, we expect that compliance with the Article 22 EPFD limits will be sufficient for NGSO FSS systems to protect GSO FSS networks in the 17.8-18.6 GHz, 19.7-20.2 GHz, 27.5-28.35 GHz, and 29.5-30 GHz bands, as the U.S. GSO FSS community participated actively in their development. Accordingly, to provide greater certainty regarding the compatibility of NGSO FSS and GSO FSS operations, we propose to require NGSO FSS applicants in these bands to demonstrate conformance with applicable EPFD limits in the same manner that NGSO FSS applicants must for operation in the 10.7-14.5 GHz band.[52] In addition, we propose to incorporate EPFD limits on inter-satellite emissions from NGSO FSS space stations into GSO FSS space stations, which are currently found in Article 22 but omitted from our rules.[53] We also propose to extend relevant Article 22 EPFD limits to the 19.3-19.4 GHz, 19.6-19.7 GHz, and 29.3-29.5 GHz bands in which we are proposing to allow new NGSO FSS operations on an unprotected, non-interference basis with respect to GSO FSS networks.

20. *Consolidation*. In adding these Ka-band EPFD rules, we propose to consolidate our NGSO FSS licensing provisions for operation in the Ka-band, currently found in section 25.145, into the licensing rules for NGSO FSS operation in the 10.7-14.5 GHz band, set forth in section 25.146. In doing so, we propose to delete section 25.145(e), similar provisions in sections 25.142(d) and 25.143(d), and the cross-references to section 25.142(d) in section 25.217, all of which proscribe certain exclusionary arrangements to serve foreign markets. These provisions have been superseded by section 648 of the Open-market Reorganization for the Betterment of International Telecommunications (ORBIT) Act, which contains a parallel prohibition.[54] We also request comment on ways we might simplify section 25.146.

21. *NGSO-GSO Default Sharing*. Finally, the first sentence of section 25.156(d)(5) provides that, in frequency bands in which the Commission has not yet adopted sharing criteria between GSO-like and NGSO-like satellite operations, the Commission will not grant an application for NGSO-like operation after it has granted an application for GSO-like operation, or vice versa.[55] The effect of this provision is to preclude joint NGSO-like and GSO-like use of frequency bands until the Commission has

[50] *Northrop Grumman License*, 24 FCC Rcd at 2353, para. 70; *contactMEO License*, 21 FCC Rcd at 4043, para. 21; *O3b Limited, Petition for a Declaratory Ruling Granting Access to the U.S. Market for the O3b MEO Satellite System*, IBFS File No. SAT-LOI-20141029-00118, Narrative, Attach. A at 15-28, http://licensing.fcc.gov/myibfs/download.do?attachment_key=1068871.

[51] *Northrop Grumman License*, 24 FCC Rcd at 2354, para. 73, 2355, para. 75; *contactMEO License*, 21 FCC Rcd at 4044, para. 24, 4045, para. 26; *O3b Grant*.

[52] 47 CFR §§ 25.146, 25.208(g)-(m). We intend that compliance with EPFD limits in the Ka-band would satisfy any obligation on an NGSO FSS system to operate on a non-interference basis with respect to a GSO FSS network. *See infra* Appx. A (proposed footnote NGXX3).

[53] *See infra* Appx. A (proposed section 25.208(f)). These limits are found in Table 22-3 of the ITU Radio Regulations and apply to NGSO FSS transmissions in the 17.8-18.4 GHz band worldwide, as well as the 10.7-11.7 GHz and 12.5-12.75 GHz bands in ITU Region 1 (generally, Europe, the former Soviet Union, the Middle East, and Africa) and the 12.7-12.75 GHz band in ITU Region 2 (generally, North and South America and the Caribbean).

[54] 47 U.S.C. § 765g.

[55] 47 CFR § 25.156(d)(5); *see also Amendment of the Commission's Space Station Licensing Rules and Policies*, First Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 10760, 10786-87, para. 58 (2003) (*Space Station Licensing Reform Order*); *see also generally* 47 CFR § 25.203(h) (default coordination criteria for "NGSO" and "GSO earth stations"). Section 25.156(d)(5) could be used, for example, when GSO-like and NGSO-like operations would be performed on a coequal basis and when no EPFD limits have been adopted on NGSO systems in that band.

adopted formal sharing criteria between the different types of satellite operation in that band. As noted above, however, the International Bureau has approved by waiver both GSO-like and NGSO-like operations in the same Ka-band frequencies without EPFD sharing criteria yet codified in our rules.[56] Similarly, we believe that an applicant demonstrating that it can operate compatibly with any existing operations, either through technical demonstrations or coordination, ought not be precluded from providing service to the public while the Commission initiates and conducts a rulemaking to establish formal sharing criteria. We therefore propose to delete the first sentence of section 25.156(d)(5). We also request comment as to whether we should adopt, as a default sharing rule, a provision similar to No. 22.2 of the ITU Radio Regulations. This provision would state that, except as otherwise provided in our rules, NGSO systems must not cause unacceptable interference to, and must not claim protection from, GSO FSS networks and GSO BSS networks.[57]

C. Avoidance of In-line Interference

22. *Background*. The Commission has adopted a default mechanism to enable spectrum sharing among NGSO FSS systems in the 10.7-12.7 GHz, 12.75-13.25 GHz, 13.75-14.5 GHz, 18.8-19.3 GHz, and 28.6-29.1 GHz bands.[58] Under this mechanism, an NGSO FSS system may operate throughout its authorized band except during "in-line" events. An "in-line" event occurs when satellites of different NGSO FSS systems are physically aligned with an operating earth station of one of those systems, such that the topocentric angle between the satellites is less than 10 degrees as measured from the earth station.[59] To avoid interference among the systems experiencing an in-line event, the Commission requires the affected satellite operators to divide the commonly assigned spectrum equally according to the chosen "home" spectrum for the duration of the in-line event, absent another sharing agreement by the operators.[60]

23. *Section 25.261*. The avoidance of in-line interference mechanism is codified in section 25.261. This section, however, omits the 10.7-12.7 GHz, 12.75-13.25 GHz, and 13.75-14.5 GHz bands.[61] We propose to correct this omission. We also propose to include in section 25.261 the bands in which we currently designate NGSO FSS operation on a secondary basis—27.5-28.6 GHz and 29.5-30 GHz—and the bands in which we are proposing to allow NGSO FSS operation—17.8-18.6 GHz, 19.3-19.4 GHz, 19.6-20.2 GHz, and 29.3-29.5 GHz. We otherwise propose to clarify that section 25.261 applies only to NGSO FSS systems communicating with earth stations with directional antennas. We seek comment on expanding this spectrum sharing method to NGSO FSS operations in other frequency bands, in place of the alternative procedure for assigning spectrum to NGSO satellite systems by simply dividing it equally

[56] *See also Application of Virtual Geosatellite, LLC, for Authority to Launch and Operate a Global Fixed-Satellite Service System Employing Non-Geostationary Satellites in Sub-Geosynchronous Elliptical Orbits*, Order and Authorization, 21 FCC Rcd 14687, 14703, para. 52 (IB 2006) (waiving section 25.156(d)(5) to permit NGSO-like operation in the 3700-4200 MHz and 5925-6725 MHz bands, which are used by GSO-like systems) (*Virtual Geo License*).

[57] For example, the 18.8-19.3 GHz and 28.6-29.1 GHz bands would be excepted from such a provision, because in these bands we require GSO FSS networks to operate on an unprotected, non-interference basis with respect to NGSO FSS systems.

[58] 47 CFR § 25.261; *Ka-band NGSO FSS Order*, 18 FCC Rcd at 14714, para. 18; *Ku-band NGSO FSS Service Rules Order*, 17 FCC Rcd at 7850, para. 27.

[59] 47 CFR § 25.261(b); *Ka-band NGSO FSS Order*, 18 FCC Rcd at 14719, para. 35, 14719-20, para. 37; *Ku-band NGSO FSS Service Rules Order*, 17 FCC Rcd at 7855, para. 47, 7856, para. 49.

[60] 47 CFR § 25.261(c), (d); *Ka-band NGSO FSS Order*, 18 FCC Rcd at 14722, para. 45; *Ku-band NGSO FSS Service Rules Order*, 17 FCC Rcd at 7857, paras. 53-54.

[61] *International Bureau Provides Guidance Concerning Avoidance of In-line Interference Events among Ku-band NGSO FSS Systems*, Public Notice, 30 FCC Rcd 11534 (IB 2015).

among the qualified applicants in a processing round.[62] In this regard, we propose to clarify in section 25.157 that these band-splitting procedures do not apply to applications granted on the condition of compliance with the avoidance of in-line interference mechanism specified in section 25.261.[63] We also seek comment on any other standard for assigning spectrum.

24. *Ephemeris Data*. In order to effectuate the avoidance of in-line interference mechanism, NGSO FSS operators must know the locations of co-frequency NGSO FSS space stations to predict when in-line events will occur. Section 25.271(e) requires NGSO FSS licensees in the 10.7-14.5 GHz band to maintain a website with ephemeris data for each satellite in its constellation, which facilitates coordination for this purpose.[64] NGSO FSS licensees in the 18.8-19.3 GHz and 28.6-29.1 GHz bands must also share ephemeris data.[65] Accordingly, we propose to include the 18.8-19.3 GHz and 28.6-29.1 GHz bands in section 25.271(e), along with the portions of the Ka-band currently designated for NGSO FSS operation on a secondary basis or proposed for NGSO FSS operation in this Notice, i.e., the 17.8-18.6 GHz, 19.3-19.4 GHz, 19.6-20.2 GHz, 27.5-28.6 GHz, and 29.3-30 GHz bands. We also propose to apply this requirement explicitly to non-U.S.-licensed NGSO FSS operators that are granted market access in the United States.[66]

25. We understand that satellites in the low-Earth orbit (LEO) region[67] that do not have station-keeping capability have experienced orbital perturbations from solar events resulting in a reduction in altitude of up to several kilometers from a single solar event. We invite comment as to whether the current ephemeris data update frequency of once every three days as required by section 25.271(e) is appropriate for such satellites, or whether we should require more frequent updates, and if so, what the appropriate update interval would be. We also invite comment as to whether an electronic website bulletin board as currently required by section 25.271(e) is the most appropriate means of making ephemeris data available, or whether another method, such as requiring active participation in the Space Data Association and/or requiring the sharing of data with the U. S. Strategic Command's Joint Space Operations Center (or any successor) might be a more effective means.

26. *10-degree Trigger*. In addition, we note that the 10-degree default separation for co-frequency NGSO FSS space station operations is based on the characteristics of satellite systems proposed around the turn of the millennium.[68] We invite comment as to whether the separation-angle trigger should be increased or decreased to reflect current system designs.

27. *Accommodation of Later Entrants*. Finally, when authorizing NGSO FSS systems in the past, the International Bureau has required licensees to abide by the avoidance of in-line interference mechanism generally with respect to later-authorized NGSO FSS systems, unless coordination

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[62] 47 CFR § 25.157(e); *see also Space Station Licensing Reform Order*, 18 FCC Rcd at 10865-66, para. 280 (declining to impose the band-splitting licensing approach on pending Ka-band NGSO FSS applications).

[63] *See infra* Appx. A (proposed section 25.157(b)(2)).

[64] 47 CFR § 25.271(e). Ephemeris data give the orbital parameters of satellites at different times. Publication of the ephemeris data of NGSO FSS systems can also aid GSO FSS satellite operators in correlating any interference with a specific satellite in an NGSO FSS constellation. *Ku-band NGSO FSS Allocation Order*, 16 FCC Rcd at 4138, para. 102.

[65] *Ka-band NGSO FSS Order*, 18 FCC Rcd at 14720, para. 38.

[66] The rule currently specifies Commission licensees. 47 CFR § 25.271(e). Like a Commission licensee, the recipient of U.S. market access for an NGSO FSS system in the covered frequency bands must share spectrum under the avoidance of in-line interference mechanism. *See generally* 47 CFR § 25.137(d)(3); *see also infra* Appx. A. (proposed clarifications to section 25.261(a)).

[67] The "low-Earth orbit region" is the region of space at Earth altitudes below 2,000 km.

[68] *Ka-band NGSO FSS Order*, 18 FCC Rcd at 14721-22, para. 43; *Ku-band NGSO FSS Service Rules Order*, 17 FCC Rcd at 7855, para. 47.

agreements are reached.[69] To the extent that later-authorized systems increase the frequency of in-line events, or increase the number of satellite systems involved in an in-line event, such later entrants can diminish the amount of spectrum available to an existing NGSO FSS system. We invite comment on how best to balance the competing interests of encouraging new market entry and providing NGSO FSS operators certainty with respect to a minimum amount of spectrum available for their services. For example, should we specify that the avoidance of in-line interference mechanism applies only to those in-line events among the existing grantee, O3b, and any licensees and market access holders approved as a result of a processing round? In this case, an applicant requesting authority after any processing round would be required to protect existing NGSO FSS authorization holders, and would be required, during an in-line event, to cease operations on the commonly authorized spectrum.

D. Earth Station E.I.R.P. Density Limits

28. *Background*. As noted above, the Commission has adopted a spectrum sharing mechanism for NGSO FSS systems based on avoidance of in-line interference events. This mechanism requires that earth stations communicating with NGSO FSS space stations limit the amount of energy they radiate in off-axis directions, i.e., away from the target satellite. Prescribing default limits on these off-axis emissions, calculated in equivalent isotropically radiated power (e.i.r.p.) density, could facilitate frequency sharing among NGSO FSS systems by reducing the required angular separation between co-frequency space station operations.[70]

29. The Commission has recognized the spectrum-use efficiency benefits of e.i.r.p. density limits for NGSO FSS earth stations,[71] but has previously declined to specify such limits due to concerns of threatening the commercial viability of the NGSO FSS proposals then before the Commission.[72] More recently, however, the International Bureau has imposed e.i.r.p. density limits on NGSO FSS earth stations that are equivalent to the default limits set forth for GSO FSS networks operating in the same and nearby frequencies.[73]

30. *Comment Sought*. In light of the ability of an NGSO FSS system to operate within existing e.i.r.p. density criteria for GSO FSS earth stations, and considering the spectrum sharing benefits of such criteria, we invite comment on adopting e.i.r.p. density limits for NGSO FSS uplink transmissions. These could be based, for example, on the limits we have prescribed for FSS earth stations transmitting to GSO space stations. Such default limits could be exceeded to the extent that higher levels are coordinated with all other NGSO FSS systems authorized in the same frequency bands. If we were to adopt e.i.r.p. density limits for NGSO FSS uplink transmissions, should we simply require a certification

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[69] *See, e.g.*, *Northrop Grumman License*, 24 FCC Rcd at 2353, para. 69; *Virtual Geo License*, 21 FCC Rcd at 14712, para. 91.

[70] In the context of GSO FSS satellite networks, for example, the Commission has adopted default e.i.r.p. density criteria to permit frequency sharing by space stations located two degrees apart on the geostationary arc. *See, e.g.*, 47 CFR §§ 25.138(a), 25.218.

[71] *See The Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ku-band*, Notice of Proposed Rulemaking, 16 FCC Rcd 9680, 9695, para. 48 (2001) (*Ku-band NGSO FSS Service Rules NPRM*); *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-band Frequency Range, and Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates*, Notice of Proposed Rulemaking, 14 FCC Rcd 1131, 1172, para. 78 (1998).

[72] *Ku-band NGSO FSS Service Rules Order*, 17 FCC Rcd at 7859-60, para. 61; *Ku-band NGSO FSS Service Rules NPRM*, 16 FCC Rcd at 9695, para. 49. The Commission has adopted antenna gain standards for NGSO FSS gateway stations in certain bands, however. *Ku-band NGSO FSS Allocation Order*, 16 FCC Rcd at 4187-88, para. 243; 47 CFR § 25.209(h).

[73] *O3b Limited*, IBFS File No. SES-LIC-20141001-00781, Condition 6653 (granted June 8, 2015), http://licensing.fcc.gov/myibfs/displayLicense.do?filingKey=-267997; 47 CFR § 25.138(a)(1) (2015).

from applicants that they will abide by these default power limits unless higher transmission levels are appropriately coordinated?[74] We also seek comment on whether, similar to our policy regarding GSO FSS space stations, there are appropriate downlink power limits and earth station receive gain criteria that we should adopt to facilitate sharing among NGSO FSS systems.[75] We further seek comment on any other measures that should be recommended to facilitate sharing.

E. Milestones

31. *Background*. The Commission requires all satellites in an authorized NGSO constellation to be launched and operated within six years of grant.[76] This milestone requirement is intended to ensure timely provision of service, and to prevent "warehousing" of spectrum and orbital resources.[77] Failure to meet this requirement, incorporated as a condition of the constellation grant, renders the authorization null and void,[78] and subjects the grantee to forfeiture of up to $5 million under the surety bond posted for the authorization.[79]

32. *NGSO Milestone*. Operation of every space station in an authorized constellation, however, may not be necessary to provide the services proposed in the application. Additional space stations could be authorized to reduce latency or to increase capacity and reliability, for example. And while failure to successfully launch and operate such additional space stations within six years might not preclude service to the public, it could, under current rules, result in automatic termination of the license.[80] To afford operators greater flexibility with system design and implementation, we propose to modify the six-year milestone obligation for NGSO systems to require the launch and operation of a percentage of the authorized constellation sufficient to provide substantial service to the public. We tentatively conclude that 75 percent is an appropriate number for this requirement.[81] Satisfaction of this milestone would release the operator from its surety bond obligation. Failure to operate the minimum number of space stations by this milestone, however, would result in forfeiture of the bond and an

[74] This certification requirement could be similar to certification requirements the Commission has recently adopted for GSO FSS and 17/24 GHz BSS space station operations. *Comprehensive Review of Licensing and Operating Rules for Satellite Services*, Second Report and Order, 30 FCC Rcd 14713, 14756-57, paras. 119-20 (2015) (*Part 25 Second Report and Order*).

[75] *See id.* at 14844-45, 14854-56 (revising sections 25.140 and 25.209(a)-(b)).

[76] 47 CFR §§ 25.164(b) (milestone requirement for U.S. licensees), 25.137(d)(1) (milestone requirement for entities granted U.S. market access through non-U.S.-licensed space stations). Space stations in the Satellite Digital Audio Radio Service, which may operate in non-geostationary orbits, must comply with the four milestone requirements annunciated in section 25.144(b). 47 CFR § 25.144(b).

[77] Warehousing occurs when an entity holds exclusive authorization or priority for spectrum use or an orbital position, but is unable or unwilling to deploy its authorized satellite system in a timely manner. Such warehousing can hinder the availability of services by blocking entry by another party committed and able to proceed. *Space Station Licensing Reform Order*, 18 FCC Rcd at 10827, para. 173.

[78] 47 CFR § 25.161(a)(1).

[79] 47 CFR §§ 25.165(a)(1), (c) (bond requirement for U.S. licensees), 25.137(d)(4) (bond requirement for market access recipients).

[80] Under section 25.161(a)(1), a licensee failing to meet its milestone deadline may avoid the automatic termination provision by demonstrating that the failure was caused by circumstances beyond the licensee's control. 47 CFR § 25.161(a)(1); *see also* 47 CFR §§ 25.117(e) (application requirements for milestone extensions), 25.165(c) (definition of milestone default triggering forfeiture of the bond).

[81] Space Exploration Technologies Corp. (SpaceX), which has announced plans to develop a large NGSO FSS constellation, has suggested such a 75 percent completion milestone. *See* SpaceX Reply, IB Docket No. 12-267, at 8-9 (Mar. 2, 2015), http://apps.fcc.gov/ecfs/document/view?id=60001038920; *Part 25 Second Report and Order*, 30 FCC Rcd at 14738, para. 58, 14739-40, para. 64.

automatic reduction in the number of authorized satellites to the number actually in orbit as of the milestone date.[82] For operators that satisfy the first milestone, we propose a second milestone, nine years after grant, requiring launch and operation of the entire authorized constellation. Operators failing to complete their constellations by this second milestone date would similarly have their number of authorized space stations reduced automatically to the number deployed as of the second milestone date. We invite comment on this and any other modifications to our NGSO milestone policy.

33. As an alternative to specifying a percentage of the authorized constellation for an initial milestone, for example, should we require the launch and operation of a number of satellites specific to the services and constellation proposed? If so, should the applicant be required to state the minimum number of satellites necessary to provide the services it proposes? If we adopt a more flexible milestone requirement, should it be limited to large NGSO constellations, and if so what size? Should we add additional, periodic milestones, to automatically reduce the number of authorized satellites if a licensee demonstrates that it is unlikely to maintain its larger, authorized constellation size following the decommissioning of its initial deployment? We could, for example, specify that the number of authorized satellites is reduced automatically to the greatest number operated concurrently during the previous year if the licensee falls below a certain percentage of its authorized constellation. If, after satisfaction of any milestones, an NGSO licensee fails to maintain at least one operational satellite in orbit for a specified period of time, should its license be terminated automatically?

34. *Replacements*. We also propose to clarify in section 25.164 that both GSO and NGSO replacement space stations, which must be scheduled for launch before the retirement of the space stations being replaced, are not subject to the separate milestone requirements in that section.[83]

F. Geographic Coverage

35. The Commission requires the design of NGSO FSS systems that will operate in the 10.7-14.5 GHz, 18.8-19.3 GHz, or 28.6-29.1 GHz bands to enable service worldwide for at least 18 hours every day.[84] This requirement is intended to foster seamless global communication networks[85] and to maximize the use of global spectrum resources,[86] but also prohibits certain NGSO system designs.[87] In light of the spectrum sharing opportunities among NGSO FSS systems, and given the separate requirements for coverage of the United States already included in our rules,[88] we propose to eliminate this global coverage requirement in order to provide operators greater flexibility to design their systems to meet market demands. We invite comment on this proposal.

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[82] Even under this "keep what you use" proposal, however, we would continue to terminate automatically the full license of a satellite system if no authorized space stations were functional in orbit as of the time of the milestone deadline. *See* 47 CFR § 25.161(a)(1).

[83] *See infra* Appx. A. We also propose additional clarifications in this section. *Id.* Replacement space stations, as defined in section 25.165(e), are explicitly exempt from the related bond-posting requirement. 47 CFR § 25.165(a), (e).

[84] 47 CFR §§ 25.145(c)(1), 25.146(i)(2). The sparsely populated areas north of 70° North Latitude and south of 55° South Latitude are excluded from this coverage obligation.

[85] *28 GHz Third Report and Order*, 12 FCC Rcd at 22323, para. 34.

[86] *Ku-band NGSO FSS Service Rules Order*, 17 FCC Rcd at 7860, para. 64.

[87] *Id*. For example, NGSO satellites that orbit the Earth near the plane of the equator may be unable to provide service in high-latitude regions.

[88] 47 CFR §§ 25.145(c)(2), 25.146(i)(1).

IV. PROCEDURAL MATTERS

A. *Ex Parte* Presentations

36. Pursuant to section 1.1200(a),[89] this proceeding will be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.[90] Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with section 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

B. Comment Filing Requirements

37. Pursuant to sections 1.415 and 1.419,[91] interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS).[92]

- *Electronic Filers*. Comments may be filed electronically using the Internet by accessing the ECFS, http://apps.fcc.gov/ecfs.
- *Paper Filers*. Parties who file by paper must include an original and four copies of each filing.

  Filings may be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

  - All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th Street, SW, Room TW-A325, Washington, DC 20554. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.
  - Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
  - U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

[89] 47 CFR § 1.1200(a).

[90] 47 CFR § 1.1200 *et seq.*

[91] 47 CFR §§ 1.415, 1.419.

[92] *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- *Persons with Disabilities*. To request materials in accessible formats for persons with disabilities (braille, large print, electronic files, audio format), or to request reasonable accommodations for filing comments (accessible format documents, sign language interpreters, CART, etc.), send an email to fcc504@fcc.gov or call 202-418-0530 (voice) or 202-418-0432 (TTY).

C. Initial Regulatory Flexibility Analysis

38. As required by the Regulatory Flexibility Act of 1980, as amended,[93] the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) for this Notice of the possible significant economic impact on small entities of the policies and rules addressed in this document. The IRFA is set forth as Appendix D. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the Notice indicated on the first page of this Notice. The Regulatory Flexibility Act of 1980, as amended (RFA),[94] requires that a regulatory flexibility analysis be prepared for rulemaking proceedings unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities."[95] The RFA generally defines the term "small entity" as referring to any "small business," "small organization," or "small governmental jurisdiction."[96] The term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[97] 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).[98] A small organization is generally "any not-for-profit enterprise which is independently owned and operated and is not dominant in its field."[99] "Small governmental jurisdiction" generally means governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population less than 50,000.[100]

D. Paperwork Reduction Act

39. This document contains proposed new and modified information collection requirements. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget to comment on the information collection requirements contained in this document, as required by the Paperwork Reduction Act of 1995.[101] In addition, pursuant to the Small Business Paperwork Relief Act of 2002,[102] we seek specific comment on how we might

[93] 5 U.S.C. § 603.

[94] The RFA, *see* 5 U.S.C. § 601 *et seq*., has been amended by the Contract With America Advancement Act of 1996, Pub. L. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996.

[95] 5 U.S.C. § 605(b).

[96] 5 U.S.C. § 601(6).

[97] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, 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." 5 U.S.C. § 601(3).

[98] Small Business Act, 15 U.S.C. § 632 (1996).

[99] 5 U.S.C. § 601(4).

[100] 5 U.S.C. § 601(5).

[101] Pub. L. 104-13.

[102] Pub. L. 107-198.

further reduce the information collection burden for small business concerns with fewer than 25 employees.[103]

V. ORDERING CLAUSES

40. Accordingly, IT IS ORDERED, pursuant to sections 4(i), 303, and 316 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303, 316, that this Notice of Proposed Rulemaking IS ADOPTED.

41. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center will send a copy of this Notice of Proposed Rulemaking, including the initial regulatory flexibility analysis, 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*.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

[103] 44 U.S.C. § 3506(c)(4).

APPENDIX A

Proposed Rule Changes

The Federal Communications Commission proposes to amend title 47 of the Code of Federal Regulations, 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. Amend §2.106 as follows:

a. Revise pages 48, 49, 52, and 55 of the Table of Frequency Allocations.

b. Revise footnotes NG164, NG165, and NG166.

c. Add footnotes NGXX1, NGXX2, NGXX3, and NGXX4.

§2.106 Table of Frequency Allocations.

9.9-10 RADIOLOCATION Fixed 5.477 5.478 5.479			9.9-10 RADIOLOCATION 5.479	9.9-10 Radiolocation 5.479	
10-10.45 FIXED MOBILE RADIOLOCATION Amateur 5.479	10-10.45 RADIOLOCATION Amateur 5.479 5.480	10-10.45 FIXED MOBILE RADIOLOCATION Amateur 5.479	10-10.5 RADIOLOCATION US108 G32	10-10.45 Amateur Radiolocation US108 5.479 US128 NG50	Private Land Mobile (90) Amateur Radio (97)
10.45-10.5 RADIOLOCATION Amateur Amateur-satellite 5.481			5.479 US128	10.45-10.5 Amateur Amateur-satellite Radiolocation US108 US128 NG50	
10.5-10.55 FIXED MOBILE Radiolocation	10.5-10.55 FIXED MOBILE RADIOLOCATION		10.5-10.55 RADIOLOCATION US59		Private Land Mobile (90)
10.55-10.6 FIXED MOBILE except aeronautical mobile Radiolocation			10.55-10.6	10.55-10.6 FIXED	Fixed Microwave (101)
10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) Radiolocation 5.149 5.482 5.482A			10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) US130 US131 US482	10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED US482 SPACE RESEARCH (passive) US130 US131	
10.68-10.7 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.483			10.68-10.7 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US131 US246		
10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A (Earth-to-space) 5.484 MOBILE except aeronautical mobile	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A MOBILE except aeronautical mobile		10.7-11.7 US131 US211	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 US131 US211 NG52 NGXX1	Satellite Communications (25) Fixed Microwave (101)
11.7-12.5 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487 5.487A	11.7-12.1 FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A 5.488 Mobile except aeronautical mobile 5.485 12.1-12.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.488 5.485 5.489	11.7-12.2 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487 5.487A	11.7-12.2	11.7-12.2 FIXED-SATELLITE (space-to-Earth) 5.485 5.488 NG55 NG143	Satellite Communications (25)

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
(See previous page)	12.2-12.7 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487A 5.488 5.490	12.2-12.5 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile BROADCASTING 5.484A 5.487	12.2-12.75	12.2-12.7 FIXED BROADCASTING-SATELLITE 5.487A 5.488 5.490	Satellite Communications (25) Fixed Microwave (101)
12.5-12.75 FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.494 5.495 5.496	12.7-12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile	12.5-12.75 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493		12.7-12.75 FIXED NG118 FIXED-SATELLITE (Earth-to-space) MOBILE	TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
12.75-13.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space research (deep space) (space-to-Earth)			12.75-13.25 US251	12.75-13.25 FIXED NG118 FIXED-SATELLITE (Earth-to-space) 5.441 NG52 NGXX1 MOBILE US251 NG53	Satellite Communications (25) TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
13.25-13.4 EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIONAVIGATION 5.497 SPACE RESEARCH (active) 5.498A 5.499			13.25-13.4 EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIONAVIGATION 5.497 SPACE RESEARCH (active) 5.498A	13.25-13.4 AERONAUTICAL RADIONAVIGATION 5.497 Earth exploration-satellite (active) Space research (active)	Aviation (87)
13.4-13.75 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space) 5.499 5.500 5.501 5.501B			13.4-13.75 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space) 5.501B	13.4-13.75 Earth exploration-satellite (active) Radiolocation Space research Standard frequency and time signal-satellite (Earth-to-space)	Private Land Mobile (90)
13.75-14 FIXED-SATELLITE (Earth-to-space) 5.484A RADIOLOCATION Earth exploration-satellite Standard frequency and time signal-satellite (Earth-to-space) Space research 5.499 5.500 5.501 5.502 5.503			13.75-14 RADIOLOCATION G59 Standard frequency and time signal-satellite (Earth-to-space) Space research US337 US356 US357	13.75-14 FIXED-SATELLITE (Earth-to-space) US337 Standard frequency and time signal-satellite (Earth-to-space) Space research Radiolocation US356 US357	Satellite Communications (25) Private Land Mobile (90)
14-14.25 FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.504B 5.504C 5.506A Space research			14-14.2 Space research US133	14-14.2 FIXED-SATELLITE (Earth-to-space) NG55 Mobile-satellite (Earth-to-space) Space research US133	Satellite Communications (25)

	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) NGXX2 NGXX3 US334 US519	Satellite Communications (25) TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
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 US139	18.3-18.6 FIXED-SATELLITE (space-to-Earth) NGXX3 US139 US334	Satellite Communications (25)
18.4-18.6 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B MOBILE					
18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A 5.522C	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.522B MOBILE except aeronautical mobile SPACE RESEARCH (passive) 5.522A	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) US255 US334 G117 SPACE RESEARCH (passive) US139 US254	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED-SATELLITE (space-to-Earth) US255 NG164 SPACE RESEARCH (passive) US139 US254 US334	
18.8-19.3 FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.523A MOBILE			18.8-20.2 FIXED-SATELLITE (space-to-Earth) US334 G117	18.8-19.3 FIXED-SATELLITE (space-to-Earth) NG165 US139 US334	
19.3-19.7 FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.523B 5.523C 5.523D 5.523E MOBILE				19.3-19.7 FIXED FIXED-SATELLITE (space-to-Earth) NG166 NGXX2 NGXX3 US334	Satellite Communications (25) TV Broadcast Auxiliary (74F) Cable TV Relay (78) Fixed Microwave (101)
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B Mobile-satellite (space-to-Earth) 5.524	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528 5.529	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B Mobile-satellite (space-to-Earth) 5.524		19.7-20.2 FIXED-SATELLITE (space-to-Earth) NGXX3 MOBILE-SATELLITE (space-to-Earth)	Satellite Communications (25)
20.1-20.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528			US139	5.525 5.526 5.527 5.528 5.529 US334	
20.2-21.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth) 5.524			20.2-21.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth) G117	20.2-21.2 Standard frequency and time signal-satellite (space-to-Earth)	

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE	27-27.5 FIXED FIXED-SATELLITE (Earth-to-space) INTER-SATELLITE 5.536 5.537 MOBILE		27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE	27-27.5 Inter-satellite 5.536	RF Devices (15)
27.5-28.5 FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 MOBILE 5.538 5.540			27.5-30	27.5-28.35 FIXED FIXED-SATELLITE (Earth-to-space) NGXX3 MOBILE	RF Devices (15) Satellite Communications (25) Upper Microwave Flexible Use (30) Fixed Microwave (101)
				28.35-29.1 FIXED-SATELLITE (Earth-to-space) NG165 NGXX3	Satellite Communications (25)
28.5-29.1 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.523A 5.539 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540					
29.1-29.5 FIXED FIXED-SATELLITE (Earth-to-space) 5.516B 5.523C 5.523E 5.535A 5.539 5.541A MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540				29.1-29.25 FIXED FIXED-SATELLITE (Earth-to-space) NG166 MOBILE	RF Devices (15) Satellite Communications (25) Fixed Microwave (101)
				29.25-29.5 FIXED-SATELLITE (Earth-to-space) NGXX3 NGXX4	Satellite Communications (25)
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.525 5.526 5.527 5.529 5.540 5.542	29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542		29.5-30 FIXED-SATELLITE (Earth-to-space) NGXX3 MOBILE-SATELLITE (Earth-to-space) 5.525 5.526 5.527 5.529 5.543	Satellite Communications (25)
29.9-30 FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.539 MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542					
30-31 FIXED-SATELLITE (Earth-to-space) 5.338A MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth) 5.542			30-31 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth) G117	30-31 Standard frequency and time signal-satellite (space-to-Earth)	

NG164 The use of the band 18.6-18.8 GHz by the fixed-satellite service (space-to-Earth) is limited to geostationary-satellite networks.

NG165 In the bands 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space), geostationary-satellite networks in the fixed-satellite service shall not cause harmful interference to, or claim protection from, non-geostationary-satellite systems in the fixed-satellite service.

NG166 The use of the bands 19.4-19.6 GHz (space-to-Earth) and 29.1-29.25 GHz (Earth-to-space) by the fixed-satellite service is limited to feeder links for non-geostationary-satellite systems in the mobile-satellite service.

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NGXX1 The use of the bands 10.7-11.7 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by non-geostationary-satellite systems in the fixed-satellite service is limited to communications with individually licensed earth stations.

NGXX2 The use of the bands 17.8-18.3 GHz, 19.3-19.4 GHz, and 19.6-19.7 GHz by the fixed-satellite service (space-to-Earth) is limited to communications with individually licensed earth stations. Ubiquitously deployed user terminals are not permitted.

NGXX3 In the bands 17.8-18.6 GHz (space-to-Earth), 19.3-19.4 GHz (space-to-Earth), 19.6-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), and 29.3-30 GHz (Earth-to-space), non-geostationary-satellite systems in the fixed-satellite service shall not cause unacceptable interference to, or claim protection from, geostationary-satellite networks in the fixed-satellite service.

A non-geostationary-satellite system operating within the applicable equivalent power flux-density limits set forth in §25.208 of this chapter shall not be considered to cause unacceptable interference to any geostationary-satellite network in the fixed-satellite service.

NGXX4 The use of the band 29.25-29.3 GHz by the fixed-satellite service (Earth-to-space) is limited to geostationary-satellite networks and to feeder links for non-geostationary-satellite systems in the mobile-satellite service.

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PART 25 – SATELLITE COMMUNICATIONS

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

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

4. In §25.108, revise paragraph (a); redesignate paragraphs (b)(2) through (b)(5) as paragraphs (b)(3) through (b)(6), respectively; and add paragraph (b)(2) to read as follows:

§25.108 Incorporation by Reference.

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved material is available for inspection at the Federal Communications Commission, 445 12th Street SW, Reference Information Center, Room CY-A257, Washington, DC 20554, 202-418-0270, and is available from the sources listed below. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030 or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(b) ***

(2) ITU Radio Regulations, Volume 2: Appendices, Appendix 4, “Consolidated list and tables of characteristics for use in the application of the procedures of Chapter III,” Annex 2, “Characteristics of satellite networks, earth stations or radio astronomy stations,” Section A.4, “Orbital Information,” Edition of 2012, http://www.itu.int/pub/R-REG-RR-2012. Incorporation by reference approved for §25.146.

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5. Revise §25.114(d)(12) to read as follows:

§25.114 Applications for space station authorizations.

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(d) ***

(12) The information required by §25.146, if the application is for an NGSO FSS system authorization in the 10.7-14.5 GHz, 17.8-18.6 GHz, 18.8-19.4 GHz, 19.6-20.2 GHz, 27.5-29.1 GHz, or 29.3-30 GHz bands.

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§25.142 [Amended]

6. In §25.142, remove paragraphs (c) and (d).

§25.143 [Amended]

7. Remove §25.143(d).

8. Remove §25.145.

9. In §25.146, revise the section heading; the first sentence in paragraph (a) introductory text; the first sentence in paragraph (b) introductory text; and paragraphs (b)(1)(v), (b)(2), (c), (e), and (i) to read as follows:

§25.146 Licensing and operating provisions for NGSO FSS satellite systems in the 10.7-14.5 GHz, 17.8-18.6 GHz, 18.8-19.4 GHz, 19.6-20.2 GHz, 27.5-29.1 GHz, or 29.3-30 GHz bands.

(a) A comprehensive technical showing must be submitted for the proposed NGSO FSS system in the 10.7-14.5 GHz, 17.8-18.6 GHz, 18.8-19.4 GHz, 19.6-20.2 GHz, 27.5-29.1 GHz, or 29.3-30 GHz bands.

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(b) Ninety days prior to the initiation of service to the public, the NGSO FSS system licensee must submit a comprehensive technical showing for the NGSO FSS system. ***

(1) ***

(v) Provide the result, the cumulative probability distribution function of EPFD, of the execution of the verification computer program described in paragraph (b)(1)(iii) of this section by using only the input parameters contained in paragraphs (b)(1)(i) and (b)(1)(iv) of this section for each of the submitted test points provided by the Commission. These test points are based on information from U.S.-licensed GSO FSS and Broadcasting-Satellite Service operators in the 10.7-14.5 GHz, 17.8-18.6 GHz, 18.8-19.4 GHz, 19.6-20.2 GHz, 27.5-29.1 GHz, and 29.3-30 GHz bands. Each U.S.-licensed GSO FSS and Broadcasting-Satellite Service operator may submit up to 10 test points for this section containing the latitude, longitude, altitude, azimuth, elevation angle, antenna size, efficiency to be used by NGSO FSS licensees during the upcoming year.

(2) Operational equivalent power flux-density, space-to-Earth direction, (operational $EPFD_{down}$) limits. Using the information contained in (b)(1) of this section plus the measured space station antenna patterns, provide the result of the execution of the computer simulation for the anticipated in-line operational $EPFD_{down}$ levels for each of the submitted test points provided by the Commission. Submitted test points are based on inputs from U.S.-licensed GSO FSS and Broadcasting-Satellite Service operators in the 10.7-14.5 GHz, 17.8-18.6 GHz, 18.8-19.4 GHz, 19.6-20.2 GHz, 27.5-29.1 GHz, and 29.3-30 GHz bands. Each U.S.-licensed GSO FSS and Broadcasting-Satellite Service operator may submit up to 10 test points for this section containing the latitude, longitude, altitude, azimuth, elevation angle, antenna size, efficiency to be used by NGSO FSS licensees during the upcoming year.

(c) Applicants for NGSO FSS system authorizations proposing space-to-Earth transmissions in the 10.7-11.7 GHz, 12.5-12.75 GHz, or 17.8-18.4 GHz frequency bands must also demonstrate, in accordance with ITU-R S.1503-2 (incorporated by reference, see §25.108), that the $EPFD_{is}$ limits in §25.208(f) will be met.

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(e) An NGSO FSS system licensee operating a system in compliance with the limits specified in §25.208(g), (i), (j), (k), (l), and (m) must not claim protection from GSO FSS and BSS networks operating in accordance with this part.

*****

(i) NGSO FSS applicants must also provide the following:

(1) Sufficient information on the NGSO FSS system characteristics to properly model the system in computer sharing simulations, including, at a minimum, NGSO hand-over and satellite switching strategies, NGSO satellite antenna gain patterns, and NGSO earth station antenna gain patterns. In particular, except for operation in the 18.8-19.3 GHz or 28.6-29.1 GHz bands, each NGSO FSS applicant must explain the switching protocols it will use to avoid transmitting while passing through the geostationary satellite orbit arc, or provide an explanation as to how the PFD limits in §25.208 will be met without using geostationary-satellite orbit arc avoidance. In addition, each NGSO FSS applicant must provide the orbital parameters contained in Section A.4 of Annex 2 to Appendix 4 of the ITU Radio Regulations (incorporated by reference, see §25.108). Further, each NGSO FSS applicant must provide a sufficient technical showing to demonstrate that the proposed NGSO system meets the applicable PFD limits in §25.208.

(2) For operation in the 10.7 GHz-14.5 GHz, 18.8-19.3 GHz, or 28.6-29.1 GHz bands, a demonstration that the proposed system is capable of providing FSS on a continuous basis throughout the fifty states, Puerto Rico and the U.S. Virgin Islands.

§25.156 [Amended]

10. Remove the first sentence of §25.156(d)(5).

11. Revise §25.157(b) to read as follows:

§25.157 Consideration of applications for NGSO-like satellite operation.

*****

(b)(1) The procedures prescribed in this section do not apply to an application for authority to operate a replacement space station(s) that meets the relevant criteria in §25.165(e)(1) and (2) and that will be launched before the space station(s) to be replaced is retired from service or within a reasonable time after loss of a space station during launch or due to premature failure in orbit.

(2) The procedures in paragraphs (e), (f), and (g) of this section do not apply to an application granted with a condition to share spectrum pursuant to §25.261.

*****

12. Revise §25.161(a) to read as follows:

§25.161 Automatic termination of station authorization.

*****

(a)(1) The failure to meet an applicable milestone specified in §25.164(a) and/or (b), if no authorized space station is functional in orbit;

(2) The failure to meet an applicable milestone specified in §25.164(b)(1) or (b)(2), if at least one authorized space station is functional in orbit, which failure will result in the termination of authority for the number, type, and orbital parameters of space stations not in orbit as of the milestone date; or

(3) The failure to meet any other milestone or construction requirement imposed as a condition of authorization. In the case of a space station authorization when at least one authorized space station is functional in orbit, however, such termination will be with respect to only the authorization for any space stations not in orbit as of the milestone date.

*****

13. In §25.164, revise paragraphs (a), (b), and (g) to read as follows:

§25.164 Milestones.

(a) The recipient of an initial license for a GSO space station, other than a DBS space station, SDARS space station, or replacement space station as defined in §25.165(e), must launch the space station, position it in its assigned orbital location, and operate it in accordance with the station authorization no later than five years after the grant of the license, unless a different schedule is established by Title 47, Chapter I, or the Commission.

(b)(1) The recipient of an initial authorization for an NGSO satellite system, other than an SDARS system, must launch 75 percent of the maximum number of space stations authorized for service, place them in their assigned orbits, and operate them in accordance with the station authorization no later than six years after the grant of the authorization, unless a different schedule is established by Title 47, Chapter I, or the Commission. This paragraph does not apply to replacement NGSO space stations as defined in §25.165(e).

(2) A licensee that satisfies the requirement in paragraph (b)(1) of this section must launch the remaining space stations necessary to complete its authorized service constellation, place them in their assigned orbits, and operate each of them in accordance with the authorization no later than nine years after the grant of the authorization.

*****

(g) Licensees of satellite systems that include both NGSO satellites and GSO satellites must meet the requirement in paragraph (a) of this section with respect to the GSO satellite(s) and the applicable requirements in paragraph (b) of this section with respect to the NGSO satellites.

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14. In §25.165, revise paragraphs (c) and (d) to read as follows:

§25.165 Surety bonds.

*****

(c) A licensee will be considered to be in default with respect to a bond filed pursuant to paragraph (a) of this section if it surrenders the license before meeting the applicable milestone requirement(s) in §25.164(a) and/or (b)(1) or if it fails to satisfy any such milestone.

(d) A licensee will be relieved of its bond obligation under paragraph (a) of this section upon a Commission finding that the licensee has satisfied the applicable milestone requirement(s) in §25.164(a) and/or (b)(1) for the authorization.

*****

15. Revise §25.202(a)(1) to read as follows:

§25.202 Frequencies, frequency tolerance, and emission limits.

(a)(1) In addition to the frequency-use restrictions set forth in §2.106 of this chapter, the following restrictions apply:

(i) In the 27.5-28.35 GHz band, the FSS (Earth-to-space) is secondary to the Upper Microwave Flexible Use Service authorized pursuant to part 30 of this chapter, except for FSS operations associated with earth stations authorized pursuant to §25.136.

(ii) Use of the 37.5-40 GHz band by the FSS (space-to-Earth) is limited to individually licensed earth stations. Earth stations in this band must not be ubiquitously deployed and must not be used to serve individual consumers.

*****

16. In §25.208, revise the section heading; paragraph (c) introductory text; the first sentence of paragraph (e); and paragraphs (f), (g), (h), (j), and (k) to read as follows:

§25.208 Power flux-density limits.

*****

(c) For a GSO space station in the 17.7-19.7 GHz, 22.55-23.55 GHz, or 24.45-24.75 GHz bands, or for an NGSO space station in the 22.55-23.55 GHz or 24.45-24.75 GHz bands, the PFD at the Earth's surface produced by emissions for all conditions and for all methods of modulation must not exceed the following values:

*****

(e) For an NGSO space station, the PFD at the Earth's surface produced by emissions in the 17.8-18.6 GHz or 18.8-19.7 GHz bands, for all conditions and for all methods of modulation, must not exceed the following values, unless the aggregate PFD produced by the entire authorized constellation at any point at the Earth's surface does not exceed -115 ((dBW/m^2)/MHz):

*****

(f) The EPFD produced at any point in the geostationary-satellite orbit by emissions from all the space stations in an NGSO FSS system ($EPFD_{is}$), in the frequency bands and Regions listed below, for all conditions and for all methods of modulation, must not exceed the given limits for the specified percentages of time. These limits relate to the EPFD that would be obtained under free-space propagation conditions into a reference antenna and in the reference bandwidth specified below, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit.

LIMITS TO THE $EPFD_{is}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS

Frequency band (GHz)	$EPFD_{is}$ (dB(W/m^2))	Percentage of time during which $EPFD_{is}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna beamwidth and reference radiation pattern[1]
10.7-11.7 12.5-12.75	−160	100	40	4° Recommendation ITU-R S.672-4, Ls = −20
17.8-18.4 19.3-19.4 19.6-19.7	−160	100	40	4° Recommendation ITU-R S.672-4, Ls = −20

[1]In this Table, the reference pattern of Recommendation ITU-R S.672-4 must be used only for the calculation of interference from NGSO FSS systems into GSO FSS networks. In applying the equations of Annex 1 to Recommendation ITU-R S.672-4, the parabolic main beam equation must start at zero.

(g) In the frequency bands and Regions listed in Tables 1G through 4G below, the single-entry EPFD in the space-to-Earth direction ($EPFD_{down}$) at any point on the Earth's surface produced by emissions from all co-frequency space stations of a single NGSO FSS system must not exceed the specified limits for the given percentages of time.

TABLE 1G—LIMITS TO THE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS[1, 2]

Frequency band (GHz)	$EPFD_{down}$ ($dB(W/m^2)$)	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[3]
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−175.4 −174 −170.8 −165.3 −160.4 −160 −160	0 90 99 99.73 99.991 99.997 100	40	60 cm Recommendation ITU-R S.1428-1
	−181.9 −178.4 −173.4 −173 −164 −161.6 −161.4 −160.8 −160.5 −160 −160	0 99.5 99.74 99.857 99.954 99.984 99.991 99.997 99.997 99.9993 100	40	1.2 m Recommendation ITU-R S.1428-1
	−190.45 −189.45 −187.45 −182.4 −182 −168 −164 −162 −160 −160	0 90 99.5 99.7 99.855 99.971 99.988 99.995 99.999 100	40	3 m Recommendation ITU-R S.1428-1
	−195.45 −195.45 −190 −190 −172.5 −160 −160	0 99 99.65 99.71 99.99 99.998 100	40	10 m Recommendation ITU-R S.1428-1

[1]In addition to the limits shown in Table 1G, the limits shown in Table 2G apply to all antenna sizes greater than 60 cm in the frequency bands listed in Table 1G.

[2]For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the $EPFD_{down}$ levels and logarithmic for the time percentages, with straight lines joining the data points.

[3]The earth station antenna reference patterns are to be used only for the calculation of interference from NGSO FSS systems into GSO FSS networks.

TABLE 2G—LIMITS TO THE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS AT CERTAIN LATITUDES

100% of the time $EPFD_{down}$ (dB(W/(m^2/40 kHz)))	Latitude (North or South in degrees)
–160	0 <| Latitude | ≤ 57.5
–160 + 3.4(57.5 − | Latitude |)/4	57.5 <| Latitude | ≤ 63.75
–165.3	63.75 ≤| Latitude |

TABLE 3G—LIMITS TO THE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS[2, 4]

Frequency band (GHz)	$EPFD_{down}$ (dB(W/m^2))	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[3]
17.8-18.6	−175.4	0	40	1 m Recommendation ITU-R S.1428-1
	−175.4	90		
19.3-19.4	−172.5	99		
	−167	99.714		
19.6-19.7	−164	99.971		
	−164	100		
	−161.4	0	1000	
	−161.4	90		
	−158.5	99		
	−153	99.714		
	−150	99.971		
	−150	100		
	−178.4	0	40	2 m Recommendation ITU-R S.1428-1
	−178.4	99.4		
	−171.4	99.9		
	−170.5	99.913		
	−166	99.971		
	−164	99.977		
	−164	100		
	−164.4	0	1000	
	−164.4	99.4		
	−157.4	99.9		
	−156.5	99.913		
	−152	99.971		
	−150	99.977		
	−150	100		
	−185.4	0	40	5 m Recommendation ITU-R S.1428-1
	−185.4	99.8		
	−180	99.8		
	−180	99.943		
	−172	99.943		
	−164	99.998		

	−164	100		
	−171.4	0	1000	
	−171.4	99.8		
	−166	99.8		
	−166	99.943		
	−158	99.943		
	−150	99.998		
	−150	100		

[4]An NGSO satellite system must meet the limits of Table 3G in both the 40 kHz and the 1 MHz reference bandwidths.

TABLE 4G— LIMITS TO THE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS[2, 4]

Frequency band (GHz)	$EPFD_{down}$ ($dB(W/m^2)$)	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[3]
19.7-20.2	−187.4	0	40	70 cm Recommendation ITU-R S.1428-1
	−182	71.429		
	−172	97.143		
	−154	99.983		
	−154	100		
	−173.4	0	1000	
	−168	71.429		
	−158	97.143		
	−140	99.983		
	−140	100		
	−190.4	0	40	90 cm Recommendation ITU-R S.1428-1
	−181.4	91		
	−170.4	99.8		
	−168.6	99.8		
	−165	99.943		
	−160	99.943		
	−154	99.997		
	−154	100		
	−176.4	0	1000	
	−167.4	91		
	−156.4	99.8		
	−154.6	99.8		
	−151	99.943		
	−146	99.943		
	−140	99.997		
	−140	100		
	−196.4	0	40	2.5 m Recommendation ITU-R S.1428-1
	−162	99.98		
	−154	99.99943		
	−154	100		
	−182.4	0	1000	
	−148	99.98		
	−140	99.99943		
	−140	100		

	−200.4 −189.4 −187.8 −184 −175 −164.2 −154.6 −154 −154	0 90 94 97.143 99.886 99.99 99.999 99.9992 100	40	5 m Recommendation ITU-R S.1428-1
	−186.4 −175.4 −173.8 −170 −161 −150.2 −140.6 −140 −140	0 90 94 97.143 99.886 99.99 99.999 99.9992 100	1000	

Note to paragraph (g): These limits relate to the EPFD that would be obtained under free-space propagation conditions for all conditions and for all methods of modulation.

(h) In the frequency bands and Regions listed in Tables 1H through 4H below, the aggregate EPFD in the space-to-Earth direction ($EPFD_{down}$) at any point on the Earth's surface produced by emissions from all co-frequency space stations of all NGSO FSS systems must not exceed the specified limits for the given percentages of time.

TABLE 1H—LIMITS ON AGGREGATE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS[1, 2]

Frequency band (GHz)	$EPFD_{down}$ ($dB(W/m^2)$)	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[3]
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3	−170 −168.6 −165.3 −160.4 −160 −160	0 90 99 99.97 99.99 100	40	60 cm Recommendation ITU-R S.1428
	−176.5 −173 −164 −161.6 −164.4 −160.8 −160.5 −160 −160	0 99.5 99.84 99.945 99.97 99.99 99.99 99.9975 100	40	1.2 m Recommendation ITU-R S.1428
	−185 −184	0 90	40	3 m Recommendation

	−182 −168 −164 −162 −160 −160	99.5 99.9 99.96 99.982 99.997 100		ITU-R S.1428
	−190 −190 −166 −160 −160	0 99 99.99 99.998 100	40	10 m Recommendation ITU-R S.1428

[1]In addition to the limits shown in Table 1H, the aggregate $EPFD_{down}$ limits shown in Table 2H apply to all antenna sizes greater than 60 cm in the frequency bands listed in Table 1H.

[2]For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the $EPFD_{down}$ levels and logarithmic for the time percentages, with straight lines joining the data points.

[3]The earth station antenna reference patterns are to be used only for the calculation of interference from NGSO FSS systems into GSO FSS networks.

TABLE 2H— LIMITS ON AGGREGATE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS AT CERTAIN LATITUDES

100% of the time $EPFD_{down}$ (dB(W/(m^2/40 kHz)))	**Latitude (North or South in degrees)**
−160	0 <| Latitude | ≤ 57.5
−160 + 3.4(57.5 − | Latitude |)/4	57.5 <| Latitude | ≤ 63.75
−165.3	63.75 ≤| Latitude |

TABLE 3H— LIMITS ON AGGREGATE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS[2, 4]

Frequency band (GHz)	**$EPFD_{down}$ (dB(W/m^2))**	**Percentage of time during which $EPFD_{down}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter and reference radiation pattern[3]**
17.8-18.6 19.3-19.4	−170 −170 −164 −164	0 90 99.9 100	40	1 m Recommendation ITU-R S.1428
19.6-19.7	−156 −156 −150 −150	0 90 99.9 100	1000	
	−173 −173 −166	0 99.4 99.9	40	2 m Recommendation ITU-R S.1428

	−164 −164	99.92 100		
	−159 −159 −152 −150 −150	0 99.4 99.9 99.92 100	1000	
	−180 −180 −172 −164 −164	0 99.8 99.8 99.992 100	40	5 m Recommendation ITU-R S.1428
	−166 −166 −158 −150 −150	0 99.8 99.8 99.992 100	1000	

[4]An NGSO system must meet the limits of this Table in both the 40 kHz and the 1 MHz reference bandwidths.

TABLE 4H— LIMITS ON AGGREGATE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS[2, 4]

Frequency band (GHz)	$EPFD_{down}$ ($dB(W/m^2)$)	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter and reference radiation pattern[3]
19.7-20.2	−182 −172 −154 −154	0 90 99.94 100	40	70 cm Recommendation ITU-R S.1428
	−168 −158 −140 −140	0 90 99.94 100	1000	
	−185 −176 −165 −160 −154 −154	0 91 99.8 99.8 99.99 100	40	90 cm Recommendation ITU-R S.1428
	−171 −162 −151 −146 −140 −140	0 91 99.8 99.8 99.99 100	1000	
	−191 −162 −154 −154	0 99.933 99.998 100	40	2.5 m Recommendation ITU-R S.1428

	−177 −148 −140 −140	0 99.933 99.998 100	1000	
	−195 −184 −175 −161 −154 −154	0 90 99.6 99.984 99.9992 100	40	5 m Recommendation ITU-R S.1428
	−181 −170 −161 −147 −140 −140	0 90 99,6 99,984 99,9992 100	1000	

Note to paragraph (h): These limits relate to the EPFD, which would be obtained under free-space propagation conditions, for all conditions and for all methods of modulation.

*****

(j) In the frequency bands and Regions listed in Tables 1J and 2J below, the operational EPFD in the space-to-Earth direction (operational $EPFD_{down}$) at any point on the Earth's surface, produced by actual operational emissions from the in-line co-frequency space station of an NGSO FSS system, must never exceed the specified operational limits:

TABLE 1J—OPERATIONAL LIMITS TO THE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS[1]

Frequency band (GHz)	$EPFD_{down}$ ($dB(W/m^2)$)	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	GSO system receive earth station antenna gain (dBi)	Orbital inclination of the GSO satellite (degrees)
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3, and 12.5-12.75 in Regions 1 and 3 (prior to 31 December 2005)	−163 −166 −167.5 −169.5	100	40	3 6 9 ≥ 18	≤ 2.5
	−160 −163 −164.5 −166.5	100	40	3 6 9 ≥ 18	> 2.5 and ≤ 4.5
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5	−161.25 −164 −165.5 −167.5	100	40	3 6 9 ≥ 18	≤ 2.5
	−158.25	100	40	3	> 2.5 and ≤ 4.5

in Region 3, and 12.5-12.75 in Regions 1 and 3 (from 31 December 2005)	−161 −162.5 −164.5			6 9 ≥ 18	

[1]The operational limits on the $EPFD_{down}$ radiated by NGSO FSS systems must be the values given in Table 2G or this table, whichever are the more stringent.

[2]For antenna diameters between the values given in this table, the limits are given by linear interpolation using a linear scale for $EPFD_{down}$ in decibels and a logarithmic scale for antenna diameter in meters.

TABLE 2J—OPERATIONAL LIMITS TO THE $EPFD_{DOWN}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS[3]

Frequency band (GHz)	$EPFD_{down}$ ($dB(W/m^2)$)	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	GSO system receive earth station antenna gain (dBi)	Orbital inclination of the GSO satellite (degrees)
19.7-20.2	−157 −157 −155	100 100 100	40 40 40	≥ 49 ≥ 43[3] ≥ 49	≤ 2.5 ≤ 2.5 > 2.5 and ≤ 4.5
19.7-20.2	−143 −143 −141	100 100 100	1000 1000 1000	≥ 49 ≥ 43[3] ≥ 49	≤ 2.5 ≤ 2.5 > 2.5 and ≤ 4.5
17.8-18.6 19.3-19.4 19.6-19.7	−164 −162	100 100	40 40	≥ 49 ≥ 49	≤ 2.5 > 2.5 and ≤ 4.5
17.8-18.6 19.3-19.4 19.6-19.7	−150 −148	100 100	1000 1000	≥ 49 ≥ 49	≤ 2.5 > 2.5 and ≤ 4.5

[3]The operational limit applies to NGSO systems operating at altitudes of 7000 km or above in order to protect GSO FSS networks employing adaptive coding.

Note to paragraph (j): These limits relate to the operational EPFD which would be obtained under free-space propagation conditions, for all conditions, for all methods of modulation and for the specified inclined GSO FSS operations.

(k) In the frequency bands and Regions listed in the following Table, the EPFD in the Earth-to-space direction ($EPFD_{up}$) produced at any point on the GSO by the emissions from all co-frequency earth stations in an NGSO FSS system, for all conditions and for all methods of modulation, must not exceed the specified limits for the given percentages of time:

LIMITS TO THE $EPFD_{UP}$ RADIATED BY NGSO FSS SYSTEMS IN CERTAIN FREQUENCY BANDS

Frequency band (GHz)	$EPFD_{up}$ ($dB(W/m^2)$)	Percentage of time during which $EPFD_{up}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna beamwidth and reference radiation pattern[1]
12.5-12.75 12.75-13.25 13.75-14.5	−160	100	40	4° Recommendation ITU-R S.672-4, Ls = –20
17.3-18.1 (Regions 1 and 3) 17.8-18.1 (Region 2)[2]	−160	100	40	4° Recommendation ITU-R S.672-4, Ls = –20
27.5-28.6	–162	100	40	1.55° Recommendation ITU-R S.672-4, Ls = –20
29.3-30	–162	100	40	1.55° Recommendation ITU-R S.672-4, Ls = –20

[1]For the case of $L_s = -10$, the values a = 1.83 and b = 6.32 should be used in the equations in the Annex of Recommendation ITU-R S.672-4 for single-feed circular beams. In all cases of L_s, the parabolic main beam equation should start at zero.

[2]This $EPFD_{up}$ level also applies to the 17.3-17.8 GHz band to protect BSS feeder links in Region 2 from NGSO FSS Earth-to-space transmissions in Regions 1 and 3.

Note to paragraph (k): These limits relate to the uplink EPFD, which would be obtained under free-space propagation conditions, for all conditions and for all methods of modulation.

*****

17. In §25.217, revise paragraphs (b)(1) and (c)(1) to read as follows:

§25.217 Default service rules.

*****

(b)(1) For all NGSO-like satellite licenses for which the application was filed pursuant to the procedures set forth in §25.157 after August 27, 2003, authorizing operations in a frequency band for which the Commission has not adopted frequency band-specific service rules at the time the license is granted, the licensee will be required to comply with the following technical requirements, notwithstanding the frequency bands specified in these rule provisions: §§25.143(b)(2)(ii), (iii), 25.204(e), 25.210(f), (i).

*****

(c)(1) For all GSO-like satellite licenses for which the application was filed pursuant to the procedures set forth in §25.158 after August 27, 2003, authorizing operations in a frequency band for which the Commission has not adopted frequency band-specific service rules at the time the license is granted, the licensee will be required to comply with the following technical requirements, notwithstanding the frequency bands specified in these rule provisions: §§25.143(b)(2)(iv), 25.204(e), 25.210(f), (i), (j).

*****

18. Revise §25.261 to read as follows:

§25.261 Procedures for avoidance of in-line interference among NGSO FSS systems.

(a) Scope. This section applies to NGSO FSS satellite systems that communicate with earth stations with directional antennas and that operate under a Commission license or grant of U.S. market access under this part in the 10.7-12.7 GHz (space-to-Earth), 12.75-13.25 GHz (Earth-to-space), 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 18.8-19.4 GHz (space-to-Earth), 19.6-20.2 GHz (space-to-Earth), 27.5-29.1 GHz (Earth-to-space), or 29.3-30 GHz (Earth-to-space) bands.

(b) Definition of "In-line event." For purposes of this section, an "in-line event" associated with a specific frequency range occurs when there is physical alignment of space stations of two or more NGSO FSS satellite systems authorized to use this frequency range with an operating earth station of one of these systems such that the angular separation between operational links of the satellite systems is less than 10° as measured at the earth station.

(c) Default procedure. Unless otherwise coordinated pursuant to paragraph (d) of this section, NGSO FSS satellite operators experiencing an in-line event must divide their commonly assigned spectrum in accordance with the following procedure:

(1) Each of n (number of) satellite systems involved in a particular in-line event must select 1/n of the commonly assigned frequency range for its "home" spectrum. The selection order for each satellite system will be determined by the date that the first space station in the satellite system commences operation.

(2) The affected space station(s) of the respective satellite systems must operate only in the selected (1/n) spectrum associated with its satellite system, its home spectrum, for the duration of the in-line event.

(3) All affected space station(s) may resume operations throughout the frequency range associated with the in-line event once the angular separation between the space stations exceeds 10°.

(d) Coordination procedure. Any coordination procedure agreed among the affected operating satellite systems, which allows operations of the satellite systems when each system's respective space stations are within the 10 degree avoidance angle associated with an in-line event, will supersede the default procedure of paragraph (c) of this section. All parties must coordinate in good faith.

19. Revise §25.271(e) to read as follows:

§25.271 Control of transmitting stations.

*****

(e) The licensee or market access recipient for an NGSO FSS satellite system operating in the 10.7-14.5 GHz, 17.8-18.6 GHz, 18.8-19.4 GHz, 19.6-20.2 GHz, 27.5-29.1 GHz, or 29.3-30 GHz bands must maintain an electronic website bulletin board to list the satellite ephemeris data for each satellite in the constellation, using the North American Aerospace Defense Command (NORAD) two-line orbital element format. The orbital elements must be updated at least once every three days.

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APPENDIX B

Current Ka-band Plan[1]

17.7-20.2 GHz Band

U.S. Non-Fed. Allocation	FS FSS (↑) US271 US334	FS US334 US519	FSS (↓) NG164 US139 US334	FSS (↓) US255 NG164 EESS & SRS (passive) US139 US254 US334	FSS (↓) NG165 US139 US334	FS FSS (↓) NG166 US334	FSS (↓) MSS (↓) 5.525 5.526 5.527 5.528 5.529 US334
Ka-band Plan	FS	FS	GSO FSS (↓)	GSO FSS (↓)	NGSO FSS (↓)	FS NGSO MSS FL (↓)	GSO FSS (↓)
Total MHz	100 MHz	500 MHz	300 MHz	200 MHz	500 MHz	400 MHz	500 MHz

17.7 17.8 18.3 18.6 18.8 19.3 19.7 20.2 GHz

27.5-30 GHz Band

U.S. Non-Fed. Allocation	FS FSS (↑) MS					FSS (↑) MSS (↑) 5.525 5.526 5.527 5.529 5.543
Ka-band Plan	UMFUS fss (↑)	GSO FSS (↑) ngso fss (↑)	NGSO FSS (↑) gso fss (↑)	LMDS NGSO MSS FL (↑)	GSO FSS (↑) NGSO MSS FL (↑)	GSO FSS (↑) ngso fss (↑)
Total MHz	850 MHz	250 MHz	500 MHz	150 MHz	250 MHz	500 MHz

27.5 28.35 28.6 29.1 29.25 29.5 30 GHz

[1] In these charts, capitalized acronyms indicate primary services, and lower-case acronyms indicate secondary services. The abbreviations used are as follows: Earth exploration-satellite service (EESS); feeder link (FL); fixed-satellite service (FSS); fixed service (FS); geostationary-satellite orbit (GSO); Local Multipoint Distribution Service (LMDS); mobile-satellite service (MSS); mobile service (MS); non-geostationary-satellite orbit (NGSO); space research service (SRS); and Upper Microwave Flexible Use Service (UMFUS). The "↑" symbol denotes the Earth-to-space direction for transmissions (uplink); the "↓" symbol denotes the space-to-Earth direction for transmissions (downlink).

Selected footnotes:

NG164 The use of the band 18.3-18.8 GHz by the fixed-satellite service (space-to-Earth) is limited to systems in the geostationary-satellite orbit.

NG165 The use of the band 18.8-19.3 GHz by the fixed-satellite service (space-to-Earth) is limited to systems in non-geostationary-satellite orbits.

NG166 The use of the band 19.3-19.7 GHz by the fixed-satellite service (space-to-Earth) is limited to feeder links for the mobile-satellite service.

US139 Fixed stations authorized in the band 18.3-19.3 GHz under the provisions of 47 CFR 74.502(c), 74.602(g), 78.18(a)(4), and 101.147(r) may continue operations consistent with the provisions of those sections.

US271 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.

US519 The band 18-18.3 GHz is also allocated to the meteorological-satellite service (space-to-Earth) on a primary basis. Its use is limited to geostationary satellites and shall be in accordance with the provisions of Article 21, Table 21-4 of the ITU *Radio Regulations*.

APPENDIX C

Proposed Ka-band Plan[1]

17.7-20.2 GHz Band

U.S. Non-Fed. Allocation	FS FSS (↑) US271 US334	FS fss (↓) NGXX2 NGXX3 US334 US519	FSS (↓) NGXX3 US139 US334	FSS (↓) US255 NG164 EESS & SRS (passive) US139 US254 US334	FSS (↓) NG165 US139 US334	FS FSS (↓) NG166 NGXX2 NGXX3 US334			FSS (↓) NGXX3 MSS (↓) 5.525 5.526 5.527 5.528 5.529 US334
Ka-band Plan	FS	FS fss (↓)	GSO FSS (↓) ngso fss (↓)	GSO FSS (↓)	NGSO FSS (↓) gso fss (↓)	FS GSO FSS (↓) ngso fss (↓)	FS NGSO MSS FL (↓)	FS GSO FSS (↓) ngso fss (↓)	GSO FSS (↓) ngso fss (↓)
Total MHz	100 MHz	500 MHz	300 MHz	200 MHz	500 MHz	100 MHz	200 MHz	100 MHz	500 MHz

17.7 17.8 18.3 18.6 18.8 19.3 19.4 19.6 19.7 20.2 GHz

27.5-30 GHz Band

U.S. Non-Fed. Allocation	FS FSS (↑) NGXX3 MS	FSS (↑) NG165 NGXX3		FS FSS (↑) NG166 MS	FSS (↑) NGXX3 NGXX4		FSS (↑) NGXX3 MSS (↑) 5.525 5.526 5.527 5.529 5.543
Ka-band Plan	UMFUS fss (↑)	GSO FSS (↑) ngso fss (↑)	NGSO FSS (↑) gso fss (↑)	LMDS NGSO MSS FL (↑)	GSO FSS (↑) NGSO MSS FL (↑)	GSO FSS (↑) ngso fss (↑)	GSO FSS (↑) ngso fss (↑)
Total MHz	850 MHz	250 MHz	500 MHz	150 MHz	50 MHz	200 MHz	500 MHz

27.5 28.35 28.6 29.1 29.25 29.3 29.5 30 GHz

[1] In these charts, capitalized acronyms indicate primary services, and lower-case acronyms indicate secondary services. The abbreviations used are as follows: Earth exploration-satellite service (EESS); feeder link (FL); fixed-satellite service (FSS); fixed service (FS); geostationary-satellite orbit (GSO); Local Multipoint Distribution Service (LMDS); mobile-satellite service (MSS); mobile service (MS); non-geostationary-satellite orbit (NGSO); space research service (SRS); and Upper Microwave Flexible Use Service (UMFUS). The "↑" symbol denotes the Earth-to-space direction for transmissions (uplink); the "↓" symbol denotes the space-to-Earth direction for transmissions (downlink).

Selected footnotes:

NG164 The use of the band 18.6-18.8 GHz by the fixed-satellite service (space-to-Earth) is limited to geostationary-satellite networks.

NG165 In the bands 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space), geostationary-satellite networks in the fixed-satellite service shall not cause harmful interference to, or claim protection from, non-geostationary-satellite systems in the fixed-satellite service.

NG166 The use of the bands 19.4-19.6 GHz (space-to-Earth) and 29.1-29.25 GHz (Earth-to-space) by the fixed-satellite service is limited to feeder links for non-geostationary-satellite systems in the mobile-satellite service.

NGXX1 The use of the bands 10.7-11.7 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by non-geostationary-satellite systems in the fixed-satellite service is limited to communications with individually licensed earth stations.

NGXX2 The use of the bands 17.8-18.3 GHz, 19.3-19.4 GHz, and 19.6-19.7 GHz by the fixed-satellite service (space-to-Earth) is limited to communications with individually licensed earth stations. Ubiquitously deployed user terminals are not permitted.

NGXX3 In the bands 17.8-18.6 GHz (space-to-Earth), 19.3-19.4 GHz (space-to-Earth), 19.6-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), and 29.3-30 GHz (Earth-to-space), non-geostationary-satellite systems in the fixed-satellite service shall not cause unacceptable interference to, or claim protection from, geostationary-satellite networks in the fixed-satellite service.

A non-geostationary-satellite system operating within the applicable equivalent power flux-density limits set forth in §25.208 of this chapter shall not be considered to cause unacceptable interference to any geostationary-satellite network in the fixed-satellite service.

NGXX4 The use of the band 29.25-29.3 GHz by the fixed-satellite service (Earth-to-space) is limited to geostationary-satellite networks and to feeder links for non-geostationary-satellite systems in the mobile-satellite service.

US139 Fixed stations authorized in the band 18.3-19.3 GHz under the provisions of 47 CFR 74.502(c), 74.602(g), 78.18(a)(4), and 101.147(r) may continue operations consistent with the provisions of those sections.

US271 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.

US519 The band 18-18.3 GHz is also allocated to the meteorological-satellite service (space-to-Earth) on a primary basis. Its use is limited to geostationary satellites and shall be in accordance with the provisions of Article 21, Table 21-4 of the ITU *Radio Regulations*.

APPENDIX D

Initial Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act (RFA),[1] the Commission has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities by the policies and rules proposed in this Notice of Proposed Rulemaking (NPRM). We request written public comments on this IRFA. Commenters must identify their comments as responses to the IRFA and must file the comments by the deadlines for comments on the NPRM provided above in section IV.B. The Commission will send a copy of the NPRM, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.[2] In addition, summaries of the NPRM and IRFA will be published in the Federal Register.[3]

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

The NPRM seeks comment on several proposals relating to the Commission's rules and policies for satellite services, especially those concerning non-geostationary-satellite (NGSO), fixed-satellite service (FSS) systems. Adoption of the proposed changes would, among other things, provide for more flexible use of the 17.8-20.2 GHz bands for FSS; promote shared use of spectrum among NGSO FSS satellite systems; and remove unnecessary design restrictions on NGSO FSS systems.

The NPRM proposes several changes to 47 CFR parts 2 and 25. Principally, it proposes to:

1) Allocate additional spectrum for use by FSS systems on a secondary basis in the 17.8-18.3 GHz band, subject to power flux-density limits designed to protect primary terrestrial services.

2) Allow additional operation of NGSO FSS systems in segments of the 17.8-20.2 GHz band within limits protective of FSS satellite systems in the geostationary-satellite orbit (GSO).

3) Allow GSO FSS operation in the 18.8-19.3 GHz band on an unprotected, non-interference basis with regard to NGSO FSS systems, to provide additional operational flexibility.

4) Amend the Commission's satellite milestone policies and geographic coverage rules to provide additional regulatory flexibility to operators of NGSO FSS systems.

B. Legal Basis

The proposed action is authorized under sections 4(i), 303, and 316 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303, 316.

C. Description and Estimate of the Number of Small Entities to Which the Proposed Rules May 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 adoption of proposed rules.[4] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[5] In addition, the term "small business" has the same meaning as the

[1] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 *et seq.*, has been amended by the Contract With America Advancement Act of 1996, Pub. L. No. 104-121, Title II, 110 Stat. 847 (1996) (CWAAA).

[2] *See* 5 U.S.C. § 603(a).

[3] *Id.*

[4] 5 U.S.C. § 604(a)(3).

[5] 5 U.S.C. § 601(6).

term "small business concern" under the Small Business Act.[6] 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).[7] Below, we describe and estimate the number of small entity licensees that may be affected by adoption of the proposed rules.

Satellite Telecommunications and All Other Telecommunications

The rules proposed in this NPRM would affect some providers of satellite telecommunications services, if adopted. Satellite telecommunications service providers include satellite and earth station operators. Since 2007, the SBA has recognized two census categories for satellite telecommunications firms: "Satellite Telecommunications" and "Other Telecommunications." Under both categories, a business is considered small if it had $32.5 million or less in annual receipts.[8]

The first category of Satellite Telecommunications "comprises establishments primarily engaged in providing point-to-point 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."[9] For this category, Census Bureau data for 2007 show that there were a total of 512 satellite communications firms that operated for the entire year. Of this total, 482 firms had annual receipts of under $25 million.

The second category of Other Telecommunications is comprised of entities "primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems. Establishments providing Internet services or voice over Internet protocol (VoIP) services via client-supplied telecommunications connections are also included in this industry."[10] For this category, Census Bureau data for 2007 show that there were a total of 2,383 firms that operated for the entire year.[11] Of this total, 2,346 firms had annual receipts of under $25 million.[12] We anticipate that some of these "Other Telecommunications firms," which are small entities, are earth station applicants/licensees that might be affected if our proposed rule changes are adopted.

We anticipate that our proposed rule changes may have an impact on earth station and space station applicants and licensees. Space station applicants and licensees, however, rarely qualify under the definition of a small entity. Generally, space stations cost hundreds of millions of dollars to construct, launch, and operate. Consequently, we do not anticipate that any space station operators are small entities that would be affected by our proposed actions.

[6] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, 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." 5 U.S.C. § 601(3).

[7] Small Business Act, 15 U.S.C. § 632 (1996).

[8] *See* 13 CFR § 121.201, NAICS codes 517410, 517919.

[9] U.S. Census Bureau, 2007 NAICS Definitions, "517410 Satellite Telecommunications."

[10] U.S. Census Bureau, 2007 NAICS Definitions, "517919 Other Telecommunications."

[11] *See* 13 CFR § 121.201, NAICS code 517919.

[12] U.S. Census Bureau, 2007 Economic Census, Subject Series: Information, Table 5, "Establishment and Firm Size: Employment Size of Firms for the United States: 2007 NAICS Code 517919" (issued Nov. 2010).

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

The NPRM proposes and seeks comment on several rule changes that would affect compliance requirements for earth station and space station operators. Most proposed changes, however, are directed at space station applicants and licensees. As noted above, these parties rarely qualify as small entities.

For example, we propose to allow additional uses of certain frequencies within the 17.8-20.2 GHz band, subject to compliance with power limits designed to protect other users of the bands. We also seek comment on revised or new technical standards to promote sharing among NGSO FSS systems, and ask whether we should allow entities to certify that that will comply with such resulting requirements, as a means to avoid unnecessary regulatory burdens.

We also propose modified rules for satellite system implementation to provide additional flexibility to operators. We propose to eliminate a geographic service requirement that restricts the design possibilities of certain NGSO FSS satellite systems. In total, the proposals and questions in the NPRM 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.

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

The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): "(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rules 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."[13]

The NPRM seeks comment from all interested parties. The Commission is aware that some of the proposals under consideration may impact small entities. Small entities are encouraged to bring to the Commission's attention any specific concerns they may have with the proposals outlined in the NPRM.

The Commission expects to consider the economic impact on small entities, as identified in comments filed in response to the NPRM, in reaching its final conclusions and taking action in this proceeding.

In this NPRM, the Commission invites comment on means to minimize negative economic impacts on applicants and licensees, including small entities. For example, the Commission seeks comment on whether compliance with certain power limits could be certified to by applicants, rather than demonstrated technically, thereby reducing burdens. And the Commission proposes to relax a satellite system geographic coverage requirement, which could lessen the economic burden on applicants and licensees. Overall, the proposals in the NPRM seek to increase flexibility for NGSO FSS applicants and licensees and reduce burdens, while maintaining adequate protections against interference.

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

None.

[13] 5 U.S.C. § 603(c)(1)-(4).