

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

In the Matter of)	
)	
The Boeing Company)	IBFS File Nos. SAT-LOA-20170301-00028
)	SAT-AMD-20170929-00137
Application for Authority to Launch and Operate a)	SAT-AMD-20180131-00013
Non-Geostationary Satellite Orbit System in the)	
Fixed-Satellite Service)	Call Sign S2993

ORDER AND AUTHORIZATION

Adopted: November 2, 2021

Released: November 3, 2021

By the Commission: Commissioner Starks not participating.

I. INTRODUCTION

1. In this Order and Authorization, we grant in part and dismiss in part the application of The Boeing Company (Boeing)¹ to construct, deploy and operate a proposed non-geostationary orbit (NGSO) fixed-satellite service (FSS)² system using frequencies in portions of the V-band, and to operate inter-satellite links (ISLs) using frequencies in portions of the V-band and the Ka-band.³ Specifically, we grant authority for Boeing to provide FSS in parts of the V-band and operate ISLs in the 65-71 GHz part of the V-band. We dismiss Boeing's request to operate ISLs in other portions of the V-band and in the Ka-band, and deny certain waivers requested by Boeing. Our decision addresses concerns expressed by commenters seeking various conditions on the grant. Grant of this application will enable Boeing to provide broadband and communications services to residential, commercial, institutional, governmental and professional users in the United States and globally.⁴

II. BACKGROUND

2. *Application and Amendments.* On March 1, 2017, Boeing filed an application for a

¹ *The Boeing Company, Application for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Fixed-Satellite Service*, IBFS File No. SAT-LOA-20170301-00028 (filed Mar. 1, 2017). Boeing subsequently filed an amendment to update various system parameters. See IBFS File No. SAT-AMD-20170929-00137 (filed Sept. 29, 2017) (Boeing 2017 Amendment). Boeing filed another amendment requesting to add additional inter-satellite links. See IBFS File No. SAT-AMD-20180131-00013 (filed Jan. 31, 2018) (Boeing 2018 Amendment). All three filings are collectively referred to as the "Boeing Application".

² The fixed-satellite service (FSS) is "A radiocommunication service between earth stations at given positions, when one or more satellites are used; the given position may be a specified fixed point or any fixed point within specified areas; in some cases this service includes satellite-to-satellite links, which may also be operated in the inter-satellite service; the [FSS] may also include feeder links of other space radiocommunication services." See 47 CFR § 25.103.

³ The term "V-band" generally refers to frequencies ranging from 40 to 75 GHz. The term "Ka-band" generally refers to frequencies ranging from 27 to 40 GHz.

⁴ IBFS File No. SAT-LOA-20170301-00028, Narrative Attachment at 1-9 (Boeing Narrative).

proposed NGSO FSS system, known as the V-band Constellation.⁵ The V-band Constellation will consist of 132 low Earth orbit (LEO) satellites in a circular orbit at an altitude of 1056 kilometers (km) and 15 highly inclined NGSO satellites at an altitude between approximately 27,355 and 44,221 km.⁶ The V-band Constellation would initially provide broadband internet and communications services to residential consumers, government and business users in the United States, Puerto Rico and the U.S. Virgin Islands.⁷ Once full deployment of the 147-satellite system is complete, the V-band Constellation would provide high speed data access to consumers on a global basis.⁸ The V-band Constellation would operate with user and gateway links in the 37.5-42.0 GHz (space-to-Earth), and the 47.2-50.2 and 50.4-51.4 GHz (Earth-to-space) bands.⁹ Boeing also seeks authority to operate ISLs in the same V-band frequencies,¹⁰ and in the 17.8-19.3 GHz and 19.7-20.2 GHz and the 27.5-29.1 GHz and 29.5-30.0 GHz Ka-band frequencies.¹¹ Boeing requests to operate ISLs between a Boeing LEO satellite and either another Boeing LEO satellite (V-band), a Boeing highly inclined NGSO satellite (V-band), a GSO satellite outside the Boeing constellation (Ka-band or V-band), or a NGSO satellite outside the Boeing constellation (Ka-band or V-band).¹² Boeing requests waivers of several rules.¹³

3. Subsequently, Boeing filed an amendment to update various satellite system parameters.¹⁴ Boeing filed another amendment in 2018 seeking authority to operate ISLs between any two of its LEO satellites in the 65-71 GHz frequency band.¹⁵ Boeing requests waivers of certain sections of our rules in conjunction with the Boeing 2018 Amendment.¹⁶

⁵ Boeing filed this application in response to an International Bureau public notice that initiated a “processing round” for additional NGSO applications in the 37.5-40.0 GHz, 40-42 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz frequency bands. *Boeing Application Accepted for Filing in Part, IBFS File No. SAT-LOA-20160622-00058; Cutoff Established for Additional NGSO-Like Satellite Applications or Petitions for Operations in the 37.5-40.0 GHz, 40.0-42.0 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz Bands*, Public Notice, 31 FCC Rcd 11957 (IB 2016) (*Boeing Application 2016 Public Notice*).

⁶ Boeing Narrative at 12-13.

⁷ *Id.* at 17.

⁸ *Id.*

⁹ *Id.* at 18-19.

¹⁰ See Opposition of The Boeing Company at ii, 10, 18 (filed Feb. 22, 2019) (Boeing Opposition); see also Letter from Bruce A. Olcott, Counsel to Boeing, to Jose P. Albuquerque, Chief, Satellite Division (dated July 24, 2017) (*July 24 Letter*); Letter from Bruce A. Olcott, Counsel to Boeing, to Jose P. Albuquerque, Chief, Satellite Division at 7-8 (dated July 25, 2017) (correcting errors in the *July 24 Letter*) (*July 2017 Letter*) (proposing to operate V-band ISLs from LEO satellites to GSO satellites and from LEO satellites to highly-inclined NGSO satellites); see also Letter from Jose P. Albuquerque, Chief, Satellite Division, to Bruce A. Olcott, Counsel to Boeing (dated June 22, 2017).

¹¹ Boeing Narrative at 20-23.

¹² *Id.* at 20; *July 2017 Letter*.

¹³ Boeing Narrative at 31-44; *July 2017 Letter* (requesting a waiver of sections 2.106 and 25.202(a)(1) to allow the Boeing LEO satellites to receive signals from other satellites operating in the 17.8-18.3 GHz band). See also, Boeing Opposition at 24.

¹⁴ See generally Boeing 2017 Amendment.

¹⁵ See generally, Boeing 2018 Amendment. Boeing also filed a new Schedule S that replaces the two previous Schedule S submissions. *Id.* at 1.

¹⁶ *Id.*

4. *Comments.* On December 14, 2018, Boeing's application was accepted for filing.¹⁷ Hughes Network Systems, LLC (Hughes), SES Americom, Inc. and O3b Limited (SES/O3b), and Space Exploration Holdings, LLC (SpaceX) filed petitions and comments in response to the Boeing Application.¹⁸ Boeing filed an opposition to these petitions and comments.¹⁹ Hughes, SES/O3b and SpaceX also filed reply comments.²⁰

5. *Rulemakings After the Closing of the Processing Round.* In September 2017, following the closing of the processing round, the Commission adopted the *NGSO FSS Report and Order*, updating several rules and policies governing NGSO FSS systems.²¹ The Order adopted, among other things, spectrum sharing rules and a more flexible milestone schedule for NGSO systems.

6. In November 2017, the Commission adopted the Spectrum Frontiers Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order,²² which, among other things, made or affirmed determinations that the 40-42 GHz and 48.2-50.2 GHz bands will be reserved for FSS use,²³ while limiting satellite operations to communications with individually licensed earth stations in the 37.5-40.0 GHz and 47.2-48.2 GHz frequency bands.²⁴ The Commission also affirmed the existing Power Flux Density (PFD) limit applicable to satellite operations in the 37.5-40.0 GHz band.²⁵

7. In April 2019, in the *Spectrum Frontiers Fifth Report and Order*, the Commission adopted rules permitting licensing of individual FSS earth stations in the 50.4-51.4 GHz band.²⁶

¹⁷ *Policy Branch Information, Space Stations Accepted for Filing*, Public Notice, Report No. SAT-01364 (IB Sat. Div. Dec. 14, 2018).

¹⁸ Hughes Network Systems, LLC Petition to Dismiss or Defer (filed Jan. 29, 2019) (Hughes Petition); Petition to Dismiss of SES Americom, Inc. and O3b Limited (filed Feb. 8, 2019) (SES/O3b Petition); Comments of Space Exploration Holdings, LLC (filed Feb. 8, 2019) (SpaceX Comments).

¹⁹ *See generally*, Boeing Opposition.

²⁰ Reply of Space Exploration Holdings, LLC (filed Mar. 4, 2019) (SpaceX Reply); Reply of Hughes Network Systems, LLC (filed Mar. 6, 2019) (Hughes Reply); Reply of SES Americom, Inc. and O3b Limited (filed Mar. 6, 2019) (SES/O3b Reply). In a footnote, SES/O3b states that Boeing's Opposition appears to have been filed a day late, but that it was treating the Boeing Opposition as timely-filed for purposes of its reply. SES/O3b Reply at 2 n.5. Contrary to SES/O3b's claim, Boeing timely filed its opposition pursuant to a grant of its request to extend the filing deadline to February 22, 2019. *See* Request for Extension (granted Feb. 5, 2019) in IBFS File Nos. SAT-LOA-20170301-00028, SAT-AMD-20170929-00 137, and SAT-AMD-20180131-00013.

²¹ *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809 (2017) (*NGSO FSS Report and Order*).

²² *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services et. al.*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10988 (2017). When citing to the *Second Report and Order* portion of the document, we will refer to the *Second R&O*, when citing to the *Second Further Notice of Proposed Rulemaking* portion of the document, we will refer to the *Second FNPRM*, and when citing to the *Memorandum Opinion and Order* portion of the document, we will refer to the *MO&O*.

²³ *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11050-51, paras. 189, 192.

²⁴ *Id.* at 11005, 11061, paras. 55, 220.

²⁵ *Id.* at 11058-60, paras 214-216.

²⁶ *Use of Spectrum Bands Above 24 GHz for Mobile Radio Service*, Fifth Report and Order, 34 FCC Rcd 2556, 2560, paras. 10-12 (2019) (*Spectrum Frontiers Fifth Report and Order*).

III. DISCUSSION

8. After review of the record, we conclude that grant in part of the Boeing Application will serve the public interest, subject to the requirements and conditions specified herein. We dismiss in part the application with respect to certain frequencies requested for ISLs, however, as those frequencies are not currently allocated internationally for such operations under the Radio Regulations of the International Telecommunication Union (ITU). We address the various outstanding issues raised by commenters on the application, and also address Boeing's waiver requests. Where appropriate, we defer matters of general applicability to ongoing or potential future rulemakings. We also note that where rules are modified as a result of the *Spectrum Frontiers* proceeding, the *NGSO FSS* proceeding, or in other relevant proceedings, Boeing's operations will be subject to those modified rules.

A. Allocation and Procedural Issues

9. We begin by addressing three threshold issues that involve frequency allocation and procedural matters that must be resolved prior to addressing the merits of Boeing's request for a license. For the reasons set forth below, we conclude that it is appropriate to dismiss in part Boeing's request for operations in certain frequency bands, but that the remainder of these issues do not prevent us from considering Boeing's request for a U.S. license on its merits.

10. *Proposed Inter-Satellite Links in the 17.8-19.3 GHz, 19.7-20.2 GHz, 27.5-29.1 GHz, 29.5-30.0 GHz, 37.5-42.0 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz Bands.* Boeing seeks authority to operate ISLs in the V-band at 37.5-42.0 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz, and in the Ka-band at 17.8-19.3 GHz, 19.7-20.2 GHz, 27.5-29.1 GHz and 29.5-30.0 GHz. Boeing acknowledges that the Commission's Table of Frequency Allocations does not include an Inter-Satellite Service (ISS) allocation in these frequency bands.²⁷ Boeing argues, however, that the definition of FSS in the definition section of part 25 of our rules,²⁸ which indicates that "in some cases [FSS] includes satellite-to-satellite links, which may also be operated in the inter-satellite service"²⁹ is in effect an allocation for such links in any band allocated for FSS.³⁰

11. Hughes, SES/O3b and SpaceX raise concerns about the lack of an ISS allocation in the relevant bands.³¹ Hughes contends that Boeing's request to operate ISLs must be dismissed or deferred because the frequencies that Boeing proposes for satellite-to-satellite communications have not been specifically allocated internationally for space-to-space operations.³²

12. Part 25 of the Commission's rules requires dismissal of a request for authority to operate a space station in a frequency band that is not allocated internationally for such operations under the Radio Regulations of the ITU.³³ Our rules indicate that such requests "will not be considered."³⁴ Hughes argues that the Commission has already stated that ISLs would not be in conformity with the Table of

²⁷ Boeing Narrative at 20. As discussed below, Boeing also seeks to operate ISLs in the 65-71 GHz band, but those frequencies are allocated to the ISS in the U.S. Table of Allocations. See generally Boeing 2018 Amendment.

²⁸ See 47 CFR § 25.103.

²⁹ *Id.*

³⁰ Boeing Narrative at 20 (citing 47 CFR §§ 2.1, 25.103).

³¹ Hughes Petition at 4; SES/O3b Petition at 7; SpaceX Comments at 8-9.

³² Hughes Petition at 4-5 (citing 47 CFR § 25.112(a)(3)).

³³ 47 CFR § 25.112(a)(3).

³⁴ 47 CFR § 25.112(b). This is unlike a request to operate in a frequency band that is allocated for such operations internationally but not domestically, which may be considered if accompanied by a request for a waiver of the U.S. Table. *Id.* at § 25.112(a)(2) and (b).

Allocations for spectrum allocated to FSS where “space-to-Earth” or “Earth-to-space” is specified.³⁵ Hughes contends that even if a waiver could be granted, Boeing fails to provide the technical analysis showing no harmful interference to GSO and NGSO systems.³⁶ Similarly, SES/O3b argues that Boeing fails to show how its proposed ISLs in the Ka- and V-band frequencies where there is no ISS allocation would operate compatibly with GSO and other NGSO systems.³⁷

13. *Discussion.* We dismiss Boeing’s request for ISL operations in the Ka-band and V-band frequencies at 17.8-19.3 GHz, 19.7-20.2 GHz, 27.5-29.1 GHz, 29.5-30.0 GHz, 37.5-42.0 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz, pursuant to our rule that finds applications for space station authority to be defective where the application requests authority to operate a space station in a frequency band that is not allocated internationally for such operations under the ITU Radio Regulations.³⁸ We decline to grant a waiver of that rule.

14. We disagree with Boeing’s assertion that the definition of FSS³⁹ indicates that ISLs may be operated in FSS-allocated spectrum not allocated for ISS⁴⁰ or not having a parenthetical directional indicator providing that the FSS operations may be in the “space-to-space” direction, because it states that “in some cases this service includes satellite-to-satellite links.”⁴¹ The definition of “FSS” does not create an ISS allocation in every frequency band allocated for FSS. In addition, the FSS allocations in the frequency bands listed above are accompanied by a directional indicator of either “space-to-Earth” or “Earth-to-space,” but not “space-to-space,” which provides a further indication that these frequency bands are not allocated for operations of ISLs.⁴² Boeing argues that because there are no FSS allocations that have an associated “space-to-space” parenthetical, the Commission should read the existing “space-to-

³⁵ Hughes Petition at 4 (citing *Streamlining Licensing Procedures for Small Satellites*, Notice of Proposed Rulemaking, 33 FCC Rcd 4152, para. 70 (2018) (*Small Satellite NPRM*)); see also Hughes Reply at 3. SpaceX makes a similar argument in its comments, arguing that Boeing’s proposed use of the FSS allocations for ISLs is a non-conforming use, and arguing that the Commission could only authorize such operations on a non-interference basis. SpaceX Comments at 8-9.

³⁶ Hughes Petition at 4-5. Hughes further argues that, even if the Commission could waive the rules, Boeing fails to justify a waiver. *Id.* at 5.

³⁷ SES/O3b Petition at 7-8. SES/O3b agrees with Boeing’s assertion that the Commission’s definition of FSS contemplates that in some cases FSS can include ISLs. See *id.*

³⁸ 47 CFR § 25.112(a)(3). There is an exception in our rules for small satellite or small spacecraft applications filed pursuant to sections 25.122 or 25.123, but this application does not fit those criteria. *Id.*

³⁹ The definition of “FSS” for both the International Table of Frequency Allocations and the U.S. Table of Frequency Allocations is set forth in Section 2.1 of the Commission’s rules, which is identical to the definition of “FSS” in the ITU Radio Regulations. See 47 CFR § 2.1 (defining FSS as a “radiocommunication service between earth stations at given positions, when one or more satellites are used; the given position may be a specified fixed point or any fixed point within specified areas; in some cases this service includes satellite-to-satellite links, which may also be operated in the inter-satellite service; the fixed-satellite service may also include feeder links for other space radiocommunication services”); ITU Radio Regulations, Article 1, § 1.21 (same).

⁴⁰ See 47 CFR § 2.1 (defining ISS as a “radiocommunication service providing links between artificial satellites”).

⁴¹ Boeing Narrative at 20, n. 12 (citing 47 CFR § 2.1).

⁴² See, e.g., *Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077, 13124, para. 115 (2019) (“We will continue to treat applications for . . . space-to-space operations as non-conforming with respect to the Table of Allocations where the applicant requests to operate in satellite frequency bands allocated only for operation in the space-to-Earth or Earth-to-space direction[.]”); International Table of Frequency Allocations, 47 CFR § 2.106 (example of “space-to-space” directional indicator for space operations allocation in the 2025-2110 MHz band).

Earth” and “Earth-to-space” parentheticals as indicating the direction of transmission of the ISLs.⁴³ In other words, in Boeing’s view, an “Earth-to-space” parenthetical to an FSS allocation would indicate that the frequency band was also allocated for inter-satellite communications from satellites at lower orbital altitudes to satellites at higher altitudes.⁴⁴ There is nothing in the ITU Radio Regulations to suggest this intention, and no technical requirements in the ITU Radio Regulations or the Commission’s rules supporting this broad interpretation of the definition of FSS.⁴⁵ Although the definition of FSS contemplates that it may include inter-satellite links in “some cases,” the technical parameters under which such space-to-space links would be allocated in the ITU Radio Regulations have not been established. In fact, satellite-to-satellite operations are in the process of being studied by the ITU, only with respect to a portion of the FSS bands in which Boeing seeks to operate its ISLs.⁴⁶ Additionally, there is no evidence that the “working document” Boeing cites in its opposition has been advanced through any ITU study processes since Boeing’s opposition was filed.⁴⁷

15. Our rules regarding dismissal and return of applications require that if an applicant requests authority to operate a space station in a frequency band that is not allocated internationally for such operations under the ITU Radio Regulations, the application will be unacceptable for filing.⁴⁸ Our rules also state that applications found to be defective as a result of a request for space station operations in a frequency band “will not be considered.”⁴⁹ We note that Boeing did not request a waiver of this rule and we decline to grant a waiver on our own motion. When this rule was adopted, the Commission noted that the international spectrum allocation process was outside its control, and that it was developing a procedure to dismiss satellite applications without prejudice before a needed international frequency allocation is adopted. We find no basis for granting a waiver of our rule regarding dismissal of

⁴³ Boeing Opposition at 13. Boeing also cites to the Commission’s *Small Satellite NPRM*, which discussed use of mobile-satellite service and FSS frequency bands for ISLs with small satellites, and argues that the NPRM was mistaken in the discussion of allocations for ISLs. See Boeing Opposition at 12-13. The Commission has since released a Report and Order in the proceeding, which includes a discussion that is consistent with the treatment of this issue here, although tailored to the small satellite context. See *Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077, 13124 (2019) (“[w]e will continue to treat applications for . . . space-to-space operations as non-conforming with respect to the Table of Allocations where the applicant requests to operate in satellite frequency bands allocated only for operations in the space-to-Earth or Earth-to-space directions[.]”). Accordingly, we do not address Boeing’s arguments specific to the *Small Satellite NPRM*.

⁴⁴ Boeing Opposition at 13.

⁴⁵ Boeing states that its ISLs would be able to share spectrum with co-frequency GSO and NGSO satellites using many of the same techniques that can be used to facilitate sharing involving space-to-Earth and Earth-to-space transmissions, but acknowledges that there are not technical standards applicable to various aspects of its proposed ISL operations. See Boeing Opposition at 14-18.

⁴⁶ See ITU-R Resolution 773 (World Radiocommunication Conference 2019 (WRC-19) (“Study of technical and operational issues and regulatory provisions for satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.02 GHz, and 27.5-30 GHz”).

⁴⁷ Boeing Opposition at 13-14, n.34 (citing United States of America, Working Document, A Regulatory Question Concerning Satellite-to-Satellite Links in Certain FSS (Earth-to-Space) Bands From LEO/MEO Non-GSO Systems to FSS Space Stations in the Geostationary Arc, Doc.4A/281-E (24 April 2017)).

⁴⁸ 47 CFR § 25.112(a)(3). Although in this particular instance we did accept Boeing’s application for filing, including with respect to the requested ISL operations, the Commission reserves the right to return any application, if, upon further examination, it is determined that the application is not in conformance with the Commission’s rules or policies.

⁴⁹ 47 CFR § 25.112(b). Section 25.112(b) states that the Commission may accept for filing certain categories of applications if the application is accompanied by a request for waiver of a rule with which the application is in conflict, or if the Commission, upon its own motion, waives or allows exception to a rule or requirement. 47 CFR § 25.112(b)(1),(2). These specified categories do not include requests not in accordance with international allocations, which “will not be considered.” See 47 CFR § 25.112(b).

applications or granting Boeing's request for a waiver of the U.S. Table of Frequency Allocations.⁵⁰ Boeing fails to provide sufficient justification to warrant grant of operations as part of its FSS system in the Ka- and V-bands not allocated for satellite-to-satellite operations, and we conclude that grant of a waiver would undermine the purpose of the rule in this instance. Furthermore, Boeing has not provided sufficient technical information demonstrating that it could operate the ISLs as part of its FSS system on a non-interference, unprotected basis in those un-allocated portions of the Ka- and V-bands. Accordingly, we dismiss Boeing's application request for ISL operations in the 17.8-19.3 GHz, 19.7-20.2 GHz, 27.5-29.1 GHz, 29.5-30.0 GHz, 37.5-42.0 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz frequency bands, without prejudice to Boeing filing a modification request for such operations as part of its FSS system, consistent with any future international allocation.

16. *Limit on Pending Applications.* At the time that Boeing filed this application to operate an NGSO system in the V-band, Boeing already had an NGSO application for V-band operations pending with the Commission.⁵¹ As a result, Boeing sought a waiver of the provision in our rules which prohibits applicants that already have a pending NGSO-like space station application from filing another application for an NGSO-like system in the same frequency band.⁵² Commenters oppose the waiver request, arguing in part, that Boeing's application should be dismissed.⁵³ In 2018, prior to this application being accepted for filing, Boeing withdrew its initial V-band application.⁵⁴ We grant Boeing's waiver request on alternative and independent grounds, and only to the extent required for Boeing to maintain both applications on file for the period of time prior to its withdrawal of its initial application. While SES/O3b and SpaceX suggest that the Commission incorrectly permitted Boeing to avoid the rule's mandate,⁵⁵ we find that maintaining both of Boeing's applications on file rather than dismissing one of the applications outright allowed time for consideration of Boeing's request for waiver, which we conclude subsequently became moot following Boeing's withdrawal of its initial application, since Boeing no longer has two NGSO-like system applications on file.

17. *Major Amendment.* In addition to the frequencies discussed above for operation of ISLs, Boeing seeks authority in the 2018 Amendment to operate ISLs between its LEO satellites in the 65-71 GHz band.⁵⁶ Boeing states that it amended its application to add the 65-71 GHz band in order to move many of its LEO-to-LEO ISL communications into this frequency band, which is specifically allocated for the ISS.⁵⁷ The 65-71 GHz band was not included in the V-band processing round public notice. Boeing argues that its proposal to add new frequencies should not be considered a "major amendment" under the Commission's rules because the 65-71 GHz band was not a part of the frequencies included in the V-band processing round.⁵⁸ Our rules provide that if a "major amendment" to a NGSO FSS processing round application is submitted after the cut-off date, which Boeing's amendment was, the

⁵⁰ 47 CFR § 2.106. Boeing only sought a waiver of the Table of Frequency Allocations for operations in the 17.8-18.3 GHz band. See *July 2017 Letter* at 7-8.

⁵¹ See IBFS File Nos. SAT-LOA-20160622-00058 and SAT-AMD-20170301-00030.

⁵² Boeing Narrative at 40-44; Boeing Opposition at 5-10; 47 CFR § 25.159(b).

⁵³ SES/O3b Petition at 2-6; SpaceX Comments at 2-5; SES/O3b Reply at 2-5; SpaceX Reply at 2-3. Boeing disagrees with the commenters and argues that section 25.159(b) should be repealed. Boeing Opposition at 5-10.

⁵⁴ Letter from Bruce A. Olcott, Counsel to The Boeing Company, to Jose P. Albuquerque, Chief, Satellite Division (dated July 31, 2018) (withdrawing two applications for authority to launch and operate NGSO systems operating in the Ka-band and the V-band, respectively).

⁵⁵ SES/O3b Petition at 5; SpaceX Comments at 2-5.

⁵⁶ Boeing 2018 Amendment at 3-4.

⁵⁷ Boeing Opposition at 19.

⁵⁸ Boeing 2018 Amendment at 7.

application will be considered newly filed and will lose its status in the processing round group. Generally, a “major amendment” is one that changes orbital locations, frequency bands or increases the potential for interference, among other things.⁵⁹

18. Boeing further argues that if the Commission determines that its amendment is a “major amendment”, the amendment should fall under an exception to the major amendment rule because the amendment resolves potential frequency conflicts with other NGSO FSS systems and licensees in the Upper Microwave Flexible Use Service (UMFUS) and does not create new or increased frequency conflicts.⁶⁰ Alternatively, Boeing requests a waiver of the major amendment rule because it would allow Boeing to lessen potential frequency conflicts from operating with the GSOs and other NGSOs in the 47.2-50.2 GHz and 50.4-51.4 GHz bands.⁶¹

19. Hughes argues that Boeing’s amendment to add the 65-71 GHz band for ISLs is a major amendment and, therefore, the Commission should dismiss Boeing’s application in this processing round or defer consideration until a new processing round.⁶² Hughes suggests that Boeing’s amendment does not fall under an exception to the major amendment rule, arguing that Boeing failed to provide technical analysis to demonstrate that the proposed change will not result in new or increased frequency conflicts with respect to GSO and other NGSO systems.⁶³ Lastly, Hughes opposes Boeing’s waiver request, stating that, without technical analysis from Boeing regarding the impact of the amendment on other NGSO operators, the Commission will be unable to pursue the policy objectives of the rule, which is to prevent applicants from requesting major changes that will affect the other NGSO applicants.⁶⁴ Boeing objects to Hughes’ arguments regarding the need for technical analysis.⁶⁵ Hughes counters that Boeing carries the burden of providing technical information to justify an exemption or waiver.⁶⁶

20. *Discussion.* We find that Boeing’s 2018 Amendment is a “major amendment” under part 25 of our rules, because there was a change in the frequencies requested for operations by adding additional frequencies.⁶⁷ However, we find that Boeing’s application does not need to be treated as a newly-filed application under our processing round procedures because the 2018 Amendment resolves frequency conflicts with other authorized stations or pending applications and does not generate new or increased frequency conflicts.⁶⁸ With respect to resolving frequency conflicts with other authorized stations, Boeing specifies that the ISL operations in the 65-71 GHz band will help to resolve potential conflicts and coordination obligations between Boeing’s NGSO FSS operations and terrestrial UMFUS

⁵⁹ 47 CFR § 25.116(b). Section 25.116(b)(5) indicates that amendments to “defective” space station applications within the meaning of section 25.112 will not be considered. 47 CFR § 25.116(b)(5). Although we find Boeing’s application to be defective in part, this amendment does not relate to the portion of Boeing’s application that is being dismissed, but instead provides an alternative for operations of some of the ISLs that would have been operated in the frequency bands subject to dismissal.

⁶⁰ Boeing 2018 Amendment at 7-9; Boeing Opposition at 20, 22. Section 25.116(c)(1) provides that the major amendment will not cause the underlying application to be newly filed if “[t]he amendment resolves frequency conflicts with authorized stations or other pending applications but does not create new or increased frequency conflicts.” 47 CFR § 25.116(c)(1).

⁶¹ Boeing 2018 Amendment at 9-10.

⁶² Hughes Petition at 2-3.

⁶³ *Id.* at 3; Hughes Reply at 2.

⁶⁴ Hughes Petition at 3.

⁶⁵ Boeing Opposition at 20-21.

⁶⁶ Hughes Reply at 2.

⁶⁷ 47 CFR § 25.116(b)(1).

⁶⁸ 47 CFR § 25.116(c)(1).

operations in the V-band because the operation of high-capacity ISLs in the 65-71 GHz band would enable Boeing the flexibility to be able to locate a greater proportion of its gateway earth stations outside of heavily populated areas and away from areas where UMFUS licensees operate.⁶⁹ We conclude these ISL operations would increase Boeing's flexibility in earth station siting, and expect Boeing to accordingly locate its gateway earth stations in order to facilitate coordination with UMFUS operations. We note that, because we dismiss the portion of Boeing's application to operate ISLs in the V-band and Ka-bands, we do not consider Boeing's argument that the amendment would resolve frequency conflicts between its LEO-to-LEO ISL operations and other NGSO FSS systems operating on a co-frequency basis in the V-band.⁷⁰

21. The 65-71 GHz band was not included in the V-band processing round that Boeing's application was filed as part of, or any prior processing rounds. In 2018, the Commission authorized Audacy Corporation to operate ISLs in the 65-71 GHz frequency band.⁷¹ In granting Audacy authority for ISLs generally, the Commission concluded that authorizing the proposed links, including in the 65-71 GHz band, served the public interest.⁷² As is the case for Boeing's application, in processing Audacy's application, the request for operations of ISLs in the 65-71 GHz band was accepted for filing, without a decision being made as to whether a separate processing round would be initiated for this frequency band.⁷³ In the *Audacy Order*, the Commission did not initiate a separate, further processing round, finding instead that the more efficient approach was to impose conditions on Audacy's operation, requiring coordination with existing operators that have ISLs in the bands requested by Audacy to ensure protection of such systems, as well as an obligation to cooperate fully with any future co-frequency systems.⁷⁴ In the case of Audacy, the Commission determined that waiver of the processing round procedures was justified. We similarly decline to initiate a processing round here in connection with Boeing's request for ISLs in the 65-71 GHz band and will apply the same terms and conditions to Boeing's operations in the 65-71 GHz band as were placed on Audacy's authorization.

22. We also find no new or increased frequency conflicts within the meaning of our major amendment rule as a result of Boeing's 2018 Amendment. Audacy is the only other operator currently authorized by the Commission for operations in the 65-71 GHz band, and as noted, in connection with a waiver of the processing round procedures, its license is conditioned on an obligation to cooperate fully with any future co-frequency systems – which will now include Boeing. Additionally, in lieu of initiating a processing round for these frequencies at this time, we condition Boeing's authorization on coordinating with existing operators of ISLs in this band, as well as oblige Boeing to cooperate fully with any future co-frequency systems.⁷⁵ We have also coordinated Boeing's proposed ISLs in this frequency band with the National Telecommunications and Information Administration (NTIA), since the 65-71 GHz band is also allocated for use by agencies of the federal government.⁷⁶ Audacy's operations, authorized outside

⁶⁹ See Boeing Amendment at 8, 10.

⁷⁰ See *id.* at 8.

⁷¹ *Audacy Corporation, Application for Authority to Launch and Operate a Non-Geostationary Medium Earth Orbit Satellite System in the Fixed- and Inter-Satellite Service*, Order and Authorization, 33 FCC Rcd 5554, 5562, para. 21 (2018) (*Audacy Order*).

⁷² *Id.*

⁷³ *Id.* at 5565, para. 26.

⁷⁴ *Id.*

⁷⁵ These conditions address Hughes' concern regarding Boeing's proposed operations not resulting in new or increased frequency conflicts with respect to GSO and other NGSO systems authorized in the same frequency band. See Hughes Petition at 3. To the extent that Hughes argues that Boeing's operations in the 65-71 GHz frequency band may result in adjacent band interference, those issues are separate from the "major amendment" determination, and we address those issues below.

⁷⁶ U.S. Table of Frequency Allocations, 47 CFR § 2.106.

of a processing round, are premised on the ability to accommodate future operations in the authorized frequency band, and so we find that the terms of Audacity's license already explicitly contemplate any increase in frequency conflicts resulting from future entrants into the band. This indicates that an alteration in the interference environment as a result of Boeing's operations vis-à-vis Audacity's system has been explicitly accepted by Audacity, and thus such changes would not be considered "new or increased frequency conflicts." Moreover, based on the conditions we place on Boeing's operations in this frequency band, we conclude that Boeing's proposed operations in the 65-71 GHz band do not create any new or increased frequency conflicts. Moreover, we agree with Boeing that we have previously recognized that the 65-71 GHz band can accommodate multiple NGSO systems.⁷⁷ Accordingly, we need not treat Boeing's application as a newly-filed application as a result of the major amendment,⁷⁸ and dismiss Boeing's request for waivers of the Commission's major amendment rule and the NGSO processing round rule as moot.⁷⁹

23. Consistent with the conditions outlined above, we emphasize that granting this portion of Boeing's application outside of a processing round does not confer on Boeing a higher status with respect to later authorized systems, unlike the first-come, first-served system specified in the Commission's rules for GSO-like satellite operations. Moreover, depending on the number of any such applications for operations in this frequency band, and their ability to effectively share spectrum, a processing round, including Boeing, may be initiated in the future to resolve mutual exclusivity concerns.

B. FSS Operations in the V-Band

24. *Space-to-Earth Operations in the 37.5-40.0 GHz Band.* The 37.5-40.0 GHz band is currently allocated to the fixed and mobile services on a primary basis. The band is also allocated to the FSS (space-to-Earth) on a primary basis, but operations are limited to communications with individually licensed earth stations, which must not be ubiquitously deployed and must not be used to serve individual consumers.⁸⁰ In addition, earth station operations in the FSS shall not claim interference protection from stations in the fixed and mobile services, except where the individually licensed earth stations are authorized under certain provisions of the Commission's rules.⁸¹ We authorize the V-band Constellation's space-to-Earth operations in this band, consistent with these requirements.

25. Part 25 includes PFD limits applicable to operations in the 37.5-40.0 GHz band.⁸² In the *Spectrum Frontiers MO&O*, the Commission declined to permit satellite operations in the 37.5-40.0 GHz band at higher PFD levels than the existing limits applicable to clear sky conditions.⁸³ The Commission

⁷⁷ Boeing 2018 Amendment at 9, n.13 (citing *Amendment of Part 2 of the Commission's Rules to Allocate Additional Spectrum to the Inter-Satellite, Fixed, and Mobile Services and to Permit Unlicensed Devices to Use Certain Segments in the 50.2-50.4 GHz and 51.4-71.0 GHz Bands*, Report and Order, FCC 00-442, ¶ 45 (Dec. 22, 2000)).

⁷⁸ See 47 CFR § 25.116(c)(1). Since we conclude that Boeing's amendment to add the 65-71 GHz band will not result in treatment of its application as a newly-filed application, we do not address Boeing's arguments seeking waiver of the major amendment rule, section 25.116(c).

⁷⁹ 47 CFR §§ 25.116, 25.157.

⁸⁰ 47 CFR § 25.202(a)(1)(ii). We note that Boeing sought a waiver of this requirement. See Section III.E for our discussion about why we declined Boeing's request.

⁸¹ 47 CFR § 25.136.

⁸² 47 CFR § 25.208(r). The PFD limits in section 25.208 were adopted alongside the limitations on FSS earth station operations, in implementing the Commission's soft segmentation plan for the V-band, to accommodate high density fixed service in the 37.5-40.0 GHz band and FSS in the 40-42 GHz band. *Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz, and 48.2-50.2 GHz Frequency Bands, et. al.*, Second Report and Order, 18 FCC Rcd 25428, 25439-40, paras. 23-24 (2003) (*V-band Second R&O*).

⁸³ *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11058-60, paras. 214-216.

considered studies by satellite operators to support satellite systems transmitting at higher power levels in this band, but found that the studies were insufficient to show that higher satellite power levels could be permitted while at the same time promoting deployment of flexible terrestrial technologies.⁸⁴ Boeing stated it did not intend to seek a waiver for the PFD limits in the Commission's rules for the 37.5-40.0 GHz band⁸⁵ and that it would comply with the outcome of the *Spectrum Frontiers* proceeding.⁸⁶ Therefore, the V-band Constellation must comply with the PFD limits under all types of weather conditions, consistent with our findings in the *Spectrum Frontiers MO&O*.

26. *Space-to-Earth Operations in the 40-42 GHz Band.* In the *Spectrum Frontiers* proceeding, the Commission reserved the 40-42 GHz band for FSS use.⁸⁷ Boeing's proposed use of the 40-42 GHz band is consistent with the Commission's rules and the Table of Frequency allocations.⁸⁸ We therefore grant Boeing's request for FSS space-to-Earth operations in this band. Specifically, the V-band Constellation's transmissions in the 40-42 GHz band must comply with the PFD limits in part 25 of the Commission's rules.⁸⁹

27. *Earth-to-Space Operations in the 47.2-50.2 GHz Band.* The 47.2-48.2 GHz portion of the V-band is currently allocated in the U.S. Table of Allocations for FSS, fixed service, and mobile service, limited to non-Federal stations, and the 48.2-50.2 GHz portion is allocated for these same services for both Federal and non-Federal stations.⁹⁰ In the *Spectrum Frontiers Second R&O*, the Commission decided to limit operations to individually-licensed stations in the 47.2-48.2 GHz portion of the band, which will also be authorized for terrestrial UMFUS operations,⁹¹ and it declined to provide any mechanism for satellite end user equipment in that band. In addition, earth station operations in the FSS in the 47.2-48.2 GHz band must not cause interference to stations in the fixed and mobile services, except where the individually licensed earth stations are authorized under section 25.136 of the Commission's rules.⁹² In the *Spectrum Frontiers Second R&O*, the Commission indicated that the 48.2-50.2 GHz portion of the band will be reserved for FSS use, including for deployment of satellite user terminals.⁹³ We grant Boeing's request for Earth-to-space operations in the 47.2-50.2 GHz band, subject to the rules adopted in the *Spectrum Frontiers* proceeding.

⁸⁴ *Id.* at 11058-59, para. 214.

⁸⁵ 47 CFR §25.208(r).

⁸⁶ Boeing Narrative at 11.

⁸⁷ *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11051, para. 192.

⁸⁸ U.S. Table of Frequency Allocations, 47 CFR § 2.106.

⁸⁹ 47 CFR § 25.208(s), (t).

⁹⁰ Historically, the 47.2-50.2 GHz band has been subject to a band plan for sharing between wireless services and FSS. In 1998, as part of the V-band plan, the Commission designated the lower segment of the band, 47.2-48.2 GHz for wireless services use, and the upper 48.2-50.2 GHz segment for FSS use. *Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands, et. al.*, First Report and Order, 13 FCC Rcd 24649, 24651, para. 2 (1998) (*V-band First Report and Order*). In 2003, the Commission noted that it was preserving the 47.2-48.2 GHz FSS uplink allocation for gateway operations, pairing with downlink operations in the 37.5-40.0 GHz band. *V-band Second R&O*, 18 FCC Rcd at 25457, para. 67. The upper portion of the band, 48.2-50.2 GHz (Earth-to-space) band is identified in international footnote 5.516B for use by high-density applications in the FSS in ITU Region 2. International Table of Frequency Allocations, 47 CFR § 2.106, footnote 5.516B. Earth station operations in the 47.2-50.2 GHz band, including limitations on such operations, will be addressed as part of the earth station licensing process.

⁹¹ *Spectrum Frontiers Second Report and Order*, 32 FCC Rcd at 11005-6, paras. 54-56.

⁹² Section 25.136 specifies processes for earth station applicants in the 47.2-48.2 GHz band and includes procedures to enable sharing with UMFUS. 47 CFR § 25.136(d).

⁹³ *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11050, para. 189.

28. *Earth-to-Space Operations in the 50.4-51.4 GHz Band.* In the *V-band First Report and Order*, the Commission designated the 50.4-51.4 GHz segment for use by fixed and mobile service.⁹⁴ In the *Spectrum Frontiers Fifth Report and Order*, the Commission adopted rules to provide for the licensing of individual FSS earth stations in the 50.4-51.4 GHz band, applying the licensing criteria adopted by the Commission for the 24.75-25.25 GHz band—that is, applying the permitted aggregate population limits within the specified earth station power flux density contour on a per-county basis and adopting constraints on the number of permitted earth stations on both a per county and a per partial economic area basis.⁹⁵ Accordingly, we authorize the V-band Constellation to operate Earth-to-space in the 50.4-51.4 GHz band, subject to the limitations imposed by section 25.136 of the Commission’s rules.

29. *Unwanted Emissions into the 50.2-50.4 GHz Band.* In November of 2019, the World Radiocommunication Conference 2019 (WRC 19) revised the limits on unwanted emission power into the 50.2-50.4 GHz band, used by the earth exploration-satellite service (passive), from earth stations operating with NGSO FSS satellite systems in the adjacent 49.7-50.2 GHz and 50.4-50.9 GHz bands.⁹⁶ The new limits, contained in Resolution 750, are equal to or more stringent than the unwanted emissions limits previously adopted by the Commission and set forth in footnote US156 to the U.S. Table of Frequency Allocations.⁹⁷ We will require Boeing to operate in accordance with Resolution 750 (Rev. WRC-19) at this time,⁹⁸ however, we note that this determination is subject to any future Commission proceedings, including any decision by the Commission whether or not to adopt such limits into its rules.

30. *Sharing with GSO FSS Systems.* The Commission does not currently have service rules relevant to sharing between NGSO and GSO FSS systems in the V-band frequencies that Boeing requested in its application. There are no FCC-licensed GSO FSS systems currently operating in the bands requested by Boeing. The FCC has licensed one GSO operator authority to operate in the 40-42 GHz and 47.2-50.2 GHz bands.⁹⁹ SES/O3b argues that the Commission should adopt aggregate EPFD limits in order to protect future GSO systems.¹⁰⁰ SES/O3b further argues that any grant of Boeing’s application must include EPFD limits and be subject to change in order to ensure that aggregate

⁹⁴ *V-Band First Report and Order*, 13 FCC Rcd at 24651 (jointly referring to fixed and mobile services as “wireless service”).

⁹⁵ *Spectrum Frontiers Fifth Report and Order* at 2560-61, paras. 10-12.

⁹⁶ See ITU-R Resolution 750 (WRC-19).

⁹⁷ See *id.*; 47 CFR § 2.106, footnote US156.

⁹⁸ See, e.g., *WorldVu Satellites Limited, Debtor-in-Possession, Petition for Declaratory Ruling Granting Access to the U.S. Market for the OneWeb Non-Geostationary Satellite Orbit Fixed-Satellite Service V-Band System*, Order and Declaratory Ruling, 35 FCC Rcd 10150, 10153-54, para. 10 (2020) (“we now condition grant of the instant application on the WRC-19 limits [on unwanted emissions into the 50.2-50.4 GHz band] that were adopted upon their entry into force on January 1, 2021”); *Space Exploration Holdings, LLC, Application for Approval for Orbital Deployment and Operating Authority for the SpaceX V-band NGSO Satellite System*, Memorandum Opinion, Order and Authorization, 33 FCC Rcd 11434, 11438, para. 8 (2018) (“we also explicitly condition SpaceX’s authorization upon compliance with any future limits applicable to unwanted emissions in this band that may be adopted, either because of modifications approved by [WRC-19], or as a result of any future Commission rulemaking, independent of any ITU deliberation.”).

⁹⁹ Hughes Network Systems, LLC was authorized to launch and operate a GSO satellite that includes operations in the 40-42 GHz (space-to-Earth) and 47.2-50.2 GHz (Earth-to-space) bands. Hughes Network Systems, IBFS File Nos. SAT-LOA-20170621-00092 and SAT-AMD-20170908-00128 (granted in part and deferred in part, Mar. 20, 2018) (*Hughes V-Band Grant*). In granting the application, the Commission deferred consideration of Hughes’ request for operations in the 50.4-51.4 GHz band. *Id.* The Commission subsequently adopted rules for the 50.4-51.4 GHz band. 47 CFR § 25.136.

¹⁰⁰ SES/O3b Petition at 8-9.

interference levels do not cause harmful interference to future GSO systems in the V-band.¹⁰¹ Boeing counters that its system will be able to share V-band spectrum with GSO systems, in part, because its system will use narrow transmission beams that can be targeted to avoid emissions towards the GSO satellites.¹⁰² Boeing further states it will comply with any sharing requirements adopted in the future by the ITU and/or the Commission.¹⁰³

31. In the *NGSO FSS Report and Order*, the Commission adopted a rule requiring that, unless otherwise provided in the rules, an NGSO system licensee must not cause unacceptable interference to, or claim protection from, a GSO FSS or Broadcasting-Satellite Service (BSS) network.¹⁰⁴ Accordingly, a condition requiring compliance with this rule is included in this grant. Article 22 of the ITU Radio Regulations also contains provisions to ensure compatibility of NGSO FSS operations with GSO networks.¹⁰⁵ However, we recognize that within the 37.5 GHz to 51.4 GHz range there are currently no ITU EPFD limits for NGSO FSS systems. Rather, at WRC-2019, the ITU chose to adopt new rules to address protection of GSO networks from NGSO networks operating in the 37.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) bands.¹⁰⁶ Accordingly, as we did in our order granting market access to WorldVu Satellites Limited (OneWeb) in the 47.2-50.2 and 50.4-51.4 GHz bands,¹⁰⁷ we condition Boeing's space-to-Earth and Earth-to-space operations in the 37.5-42 GHz and 47.2-50.2 GHz and 50.4-51.4 GHz bands at this time on compliance with the recently adopted ITU rules Nos. 22.5L and 22.5M.¹⁰⁸ We believe that these conditions adequately address the concerns raised by the commenters about spectrum sharing among GSO and NGSO systems (apart from Boeing's proposed non-conforming ISL operations, which are dismissed), including the request by SES/O3b to develop aggregate EPFD limits in the V-band.¹⁰⁹ Boeing's operations in these frequency bands will be subject to any future Commission proceedings related to the protection of GSO networks.

32. *Sharing with NGSO FSS Systems.* SpaceX raises concerns about interference from Boeing's uplink beams to its highly inclined satellites and recommends that Boeing utilize higher gain antennas on those satellites with corresponding reductions in uplink power levels.¹¹⁰ We decline to adopt SpaceX's proposal. The Commission declined to adopt any additional requirements in the *NGSO FSS Report and Order* to address potential interference among NGSO FSS systems, instead adopting a framework for co-existence among NGSO FSS systems, and SpaceX provides no basis on this particular

¹⁰¹ SES/O3b Petition at 9.

¹⁰² Boeing Opposition at 26.

¹⁰³ *Id.* at 27.

¹⁰⁴ 47 CFR § 25.289.

¹⁰⁵ See generally ITU R.R. Article 22, Section II.

¹⁰⁶ See WRC-19 Final Acts, Art. 22, at 65-66; ITU-R Resolution 770 (WRC-19). No. 22.5L specifies single-entry limits for certain link budget parameters (i.e., carrier-to-noise ratio (C/N) and spectral efficiency) associated with GSO reference links and are calculated based on procedures and methodologies contained in Resolution 770 (WRC-19). No. 22.5M specifies aggregate limits to be imposed once two or more systems are launched that will be based on actual system characteristics.

¹⁰⁷ *WorldVu Satellites Limited, Debtor-in-Possession Petition for Declaratory Ruling Granting Access to the U.S. Market for the OneWeb Non-Geostationary Satellite Orbit Fixed-Satellite Service V-Band System*, Order and Declaratory Ruling, 35 FCC Red 10150, 10160, para. 30.i. (2020).

¹⁰⁸ Boeing noted that it would accept a condition on its authorization that it must comply with any operational limits that are eventually adopted by the ITU and/or the Commission covering NGSO/GSO spectrum sharing in the V-band. Boeing Opposition at iv, 27.

¹⁰⁹ See SES/O3b Petition at 8-9.

¹¹⁰ SpaceX Comments at 5-7.

issue to warrant departure from the established framework already in place to address concerns regarding interference between NGSO systems, and to adopt a special condition on this grant. Pursuant to our rules, NGSO FSS operators must coordinate in good faith the use of commonly authorized frequencies.¹¹¹ When there is potential for interference, the parties involved must agree on measures to eliminate this interference (*i.e.*, satellite diversity) or, in the absence of an agreement, be subject to certain default procedures.¹¹² Accordingly, NGSO FSS operators must agree on measures to eliminate the risk of interference by taking into account each system's power levels and design.

C. Inter-Satellite Links

33. As previously discussed, we dismiss Boeing's request to operate ISLs in certain portions of the V-band and in the Ka-band because such operations are not consistent with an existing international allocation in the ITU Radio Regulations. Boeing also seeks to operate ISLs in the 65-71 GHz band, which is currently allocated to the ISS on a primary basis.¹¹³ Boeing states that its ISL operations will occur between its LEO satellites in the 65-71 GHz band.¹¹⁴

34. We find that Boeing's use of this band for inter-satellite links is consistent with use of the band permitted under our rules and grant Boeing's request for ISS operations in the 65-71 GHz band. As discussed above, Boeing's operations are conditioned on coordination with any existing permittees or licensees in the ISS whose facilities could be affected by Boeing's proposed ISS operations, in terms of frequency interference or restricted capacity.¹¹⁵ Furthermore, Boeing must cooperate fully with other future co-frequency systems in coordinating its 65-71 GHz ISS usage.¹¹⁶ In addition, as set forth in section 25.279 of the Commission's rules, we have coordinated Boeing's proposed ISS operations in the 65-71 GHz band with NTIA, since Boeing's proposed ISS links are in frequency bands that are also authorized for use by agencies of the federal government.¹¹⁷

35. Hughes raises a concern related to adjacent-band interference from Boeing's requested ISL operations at 65-71 GHz to Hughes' "authorized and proposed GSO V-band" operations.¹¹⁸ Boeing responds that its ISLs in the 65-71 GHz band could not create interference into the V-band receiver of Hughes' satellite, because the lower edge of the 65-71 GHz band is more than 10 gigahertz away from the upper-most frequencies allocated for V-band satellite services.¹¹⁹ Hughes counters that Boeing has not provided any technical analysis supporting this assumption, and that "[g]iven the unique propagation characteristics of ISL transmissions in space and the relative proximity in distance between LEO and GSO satellites, it is unclear whether the amount of spectrum separating the two satellite operations will be sufficient to protect against any adjacent-channel interference."¹²⁰ We agree with Boeing that 10 gigahertz should be a sufficient guard band between the Boeing ISLs and the Hughes V-band operations.

¹¹¹ 47 CFR § 25.261(b).

¹¹² 47 CFR § 25.261(c).

¹¹³ 47 CFR §§ 2.106, 25.202(a)(5).

¹¹⁴ *January 2018 Letter* at 2; Boeing 2018 Amendment at 3-4.

¹¹⁵ 47 CFR § 25.279(b)(2). We note that, as discussed above, one other NGSO system, Audacy Corporation, is licensed to operate in this band. *See generally, Audacy Order.*

¹¹⁶ 47 CFR § 25.279(b)(2) (stating that "All affected applicants, permittees, and licensees, shall at the direction of the Commission, cooperate fully and make every reasonable effort to resolve technical problems and conflicts that may inhibit effective and efficient use of the radio spectrum").

¹¹⁷ 47 CFR § 2.106.

¹¹⁸ *See Hughes Reply* at 2, n.11. *See also Hughes V-Band Grant.* The satellite has not yet been launched.

¹¹⁹ Boeing Opposition at 21.

¹²⁰ Hughes Reply at 2, n.11.

Most guard bands in satellite services are on the order of several megahertz, not gigahertz. In addition, Boeing has requested to use the 65-71 GHz band only for communication between LEO satellites, operating at an orbital altitude of 1056 kilometers. GSO satellites operate at an altitude of approximately 35,786 kilometers. Thus there does not appear to be a “relative proximity” between the LEO and GEO satellites. We find Hughes’ vague argument to be without merit, including the assertion that there are “unique propagation characteristics of signals in space.” The main propagation difference between ISLs and Earth-to-space and space-to-Earth transmissions are the additional path losses caused by atmospheric absorption experienced by Earth-to-space and space-to-Earth transmissions. While the propagation path of an ISL at the limb of the earth may illuminate the Hughes satellite, the additional path loss to GSO, likely off-axis arrival angle to the Hughes satellite’s receiving antenna, and the 10 gigahertz guard band makes it extremely unlikely that interference will occur.

D. Orbital Debris Mitigation

36. *Orbital Debris Mitigation.* An applicant for a space station authorization must submit a description of the design and operational strategies that it will use to mitigate orbital debris, including a statement detailing post-mission disposal plans for space stations at the end of their operating life.¹²¹ Boeing has provided a preliminary orbital debris mitigation analysis as part of its application¹²² and subsequently provided additional details about its plans,¹²³ but indicates that the orbital debris mitigation plan is a preliminary assessment pending the final constellation design.¹²⁴ Accordingly, we condition grant of Boeing’s application on Boeing presenting, and the Commission granting, a modification of this license grant to include a final orbital debris mitigation plan.¹²⁵ This grant is conditioned upon a favorable finding, based on the information to be submitted, that Boeing’s debris mitigation plans are suitable under the Commission’s rules. We also note that the Commission recently updated its orbital debris rules and initiated a Further Notice of Proposed Rulemaking.¹²⁶ The V-band Constellation will be subject to any applicable rules adopted in that proceeding.

37. Additionally, Boeing will be subject to the same orbital debris mitigation conditions as other authorized NGSO systems, including a requirement that it coordinate its physical operations with space stations of NGSO systems operating at similar orbital altitudes.¹²⁷ To the extent that Boeing and other NGSO operators fail to come to an agreement regarding physical coordination, the Commission may intervene as appropriate.

¹²¹ *Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567, 11619 (2004); 47 CFR §25.114(d)(14).

¹²² See Boeing Narrative at 23-26.

¹²³ See July 2017 Letter at 10-14.

¹²⁴ See *id.* at 12-14 (stating that Boeing is studying the long-term stability of different disposal orbits for highly inclined space stations and, for its LEO space stations, and Boeing is continuing to change the space station design in order to reduce the casualty risk).

¹²⁵ The International Bureau has previously required applicants to file a modification application including updated orbital debris mitigation information in some instances. See *Telesat Canada Petition for Declaratory Ruling to Grant Access to the U.S. Market for Telesat's NGSO Constellation*, 32 FCC Rcd 9663, 9668-69, 9675, paras. 13, 29(d) (2017) (*Telesat Ka-band Order*) *Space Exploration Holdings, LLC, Application for Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System*, 33 FCC Rcd 3391, 3398, and 3407, paras. 15 and 40(p) (2018); *ViaSat, Inc. Petition for Declaratory Ruling Granting Access for a Non-U.S. Licensed Non-Geostationary Orbit Satellite Network*, 35 FCC Rcd 4324, 4335 and 4342, paras. 30, 52(d) (2020).

¹²⁶ *Mitigation of Orbital Debris in the New Space Age*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 4156 (2020).

¹²⁷ See, e.g., *Telesat Ka-band Order*, 32 FCC Rcd at 9675, para 29c.

E. Additional Waivers

38. *Waiver Standard.* In addition to those waivers discussed above in the section regarding preliminary procedural matters, Boeing seeks waivers of several of the Commission's rules.¹²⁸ Generally, the Commission may waive any rule for good cause shown.¹²⁹ Waiver is appropriate where the particular facts make strict compliance inconsistent with the public interest.¹³⁰ In making this determination, we may take into account considerations of hardship, equity, or more effective implementation of overall policy on an individual basis.¹³¹ Waiver is therefore appropriate if special circumstances warrant a deviation from the general rule, such deviation will serve the public interest, and the waiver does not undermine the validity of the general rule.¹³² We address the specific requests for waivers below.

39. *Waiver of V-Band Frequency-Use Restrictions.* Boeing seeks a waiver of the Commission's rules in order to use the 37.5-40.0 GHz spectrum for downlink communications to both user terminals and gateways, *i.e.*, ubiquitously deployed earth stations in a band shared with terrestrial operations.¹³³ However, Boeing also stated that it would accept this waiver subject to the eventual outcome on this issue in the *Spectrum Frontiers* proceeding.¹³⁴ Subsequently, in the *Spectrum Frontiers MO&O*, the Commission declined to allow satellite user equipment in the 37.5-40 GHz band on a ubiquitous basis because of a concern that allowing satellite user equipment in the band could result in a negative consumer experience for satellite broadband consumers.¹³⁵ Therefore, consistent with our determinations in the *Spectrum Frontiers MO&O* and the rationale underlying those determinations, we deny Boeing's request for waiver.

40. Boeing also seeks a waiver of the Commission's rules to operate uplinks in the 50.4-51.4 GHz band.¹³⁶ This band is allocated in the U.S. Table of Frequency Allocations to the FSS, but at the time Boeing filed its application, the 50.4-51.4 GHz band was not listed among the available frequencies for FSS in part 25 of the Commission's rules. Boeing requested a waiver of that list of available frequencies for FSS.¹³⁷ Subsequently, the Commission decided to remove the list of frequencies in part 25 as unnecessary,¹³⁸ thereby eliminating this barrier against applying for FSS use of the frequencies in the 50.4-51.4 GHz band. Accordingly, Boeing's request for a waiver of that provision is dismissed as

¹²⁸ Boeing requests waivers of sections 2.106, 25.202(a)(1), 25.156(d)(4), 25.156(d)(5), 25.157(e), 25.159(b) and 25.164(b) of the Commission's rules. Boeing Narrative at 31-44; *July 2017 Letter* at 7-8; Boeing Opposition at 24. Boeing also requests waivers of sections 25.116 and 25.157 as part of its amendment to operate ISLs in the 65-71 GHz band. *See generally*, Boeing 2018 Amendment.

¹²⁹ 47 CFR § 1.3.

¹³⁰ *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

¹³¹ *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969), *cert. denied*, 409 U.S. 1027 (1972); *Northeast Cellular*, 897 F.2d at 1166.

¹³² *NetworkIP, LLC v. FCC*, 548 F.3d 116, 125-28 (D.C. Cir. 2008); *Northeast Cellular*, 897 F.2d at 1166; *WAIT Radio*, 418 F.2d at 1158.

¹³³ Boeing Narrative at 33-34. Boeing requested a waiver of section 25.202(a)(1) note 3, but apparently meant note 1, which specifically refers to the type of operations requested. In any case, as the substance of the rule was moved to section 25.202(a)(1)(ii), we will treat Boeing as having requested a waiver of that section.

¹³⁴ Boeing Narrative at 34.

¹³⁵ *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11061, paras. 219-220.

¹³⁶ Boeing Narrative at 34-35 (citing 47 CFR § 25.202(a)(1)).

¹³⁷ *Id.* at 34-35.

¹³⁸ *NGSO FSS Report and Order*, 32 FCC Rcd at 7817-18, para. 27.

moot.¹³⁹

41. *Sharing with NGSO Systems and Waiver of Band-Splitting Procedure.* Until recently, the Commission's rules provided that "available spectrum" be "divided equally" among the applications granted as the result of an NGSO processing round.¹⁴⁰ This rule presumed that NGSO operators could not use the same frequencies without causing harmful interference to each other, and therefore must be assigned discrete segments of the requested band. Boeing requests a waiver of this former rule stating that its system can share spectrum with other NGSO FSS systems.¹⁴¹

42. We include a condition requiring Boeing, like all other NGSO FSS operators, to comply with the spectrum sharing requirements specified in part 25 of the Commission's rules with respect to any other NGSO system licensed or granted U.S. market access pursuant to the processing rounds in which Boeing participated.¹⁴² The *NGSO FSS Report and Order* adopted rule changes that replaced the avoidance of in-line interference methodology for triggering spectrum division (absent coordination) with a default spectrum splitting sharing mechanism that is triggered when the change in system noise temperature caused by interference, or $\Delta T/T$, exceeds a threshold of 6 percent, and Boeing is required to comply with this mechanism.¹⁴³ However, we note that outside the United States (*i.e.*, when communications to or from the U.S. territory are not involved) the coexistence between Boeing's operations and operations of a system that has been licensed by the Commission or has received a grant for access to the U.S. market is governed only by the ITU Radio Regulations. Accordingly, Boeing's request for waiver of the previous rule is no longer needed and is dismissed as moot.

43. *Waiver of Milestone Requirement.* Boeing requests, to the extent necessary, a waiver of the milestone requirements for NGSOs in the Commission's rules, which require NGSO system licensees to launch the space stations, place them into the assigned orbits, and operate them in accordance with the station authorization within six years of grant of the license.¹⁴⁴ Boeing seeks to launch the first five highly inclined satellites within six years after license grant, which, Boeing argues, would satisfy the (now-eliminated) domestic geographic coverage requirement in the Commission's rules.¹⁴⁵ Boeing seeks to launch the remaining ten highly inclined satellites and 132 LEO satellites within 12 years of grant, which, Boeing argues, would satisfy the (now-eliminated) international coverage requirement in the Commission's rules.¹⁴⁶ Boeing states that its revised milestone schedule would allow it to introduce

¹³⁹ Boeing also requested a waiver of section 25.202(a)(1) in connection with its request for ISL operations in the 17.8-18.3 GHz band. *See July 2017 Letter* at 7-8. This waiver request is also dismissed as moot.

¹⁴⁰ 47 CFR § 25.157(e).

¹⁴¹ Boeing Narrative at 38-39.

¹⁴² 47 CFR § 25.261. *See, e.g., WorldVu Satellites Limited, Petition for Declaratory Ruling Granting Access to the U.S. Market for the OneWeb NGSO FSS System*, Order and Declaratory Ruling, 32 FCC Rcd 5366, 5377, para. 23(k) (2017) (*OneWeb Order*); *Space Norway AS*, Order and Declaratory Ruling, 32 FCC Rcd 9649, 9659-60, para. 24(i) (2017) (*Space Norway Order*); *Telesat Ka-band Order*, 32 FCC Rcd at 9675, para. 27(h).

¹⁴³ *NGSO FSS Report and Order* at 7825, para. 49.

¹⁴⁴ Boeing Opposition at 24; 47 CFR § 25.164(b).

¹⁴⁵ Boeing Narrative at 28-29. *See also July 2017 Letter* at 2. Boeing cited to section 25.143(b)(iii), but apparently meant to refer to the NGSO FSS geographic coverage requirements. In any event, the domestic geographic coverage requirements for NGSO FSS systems were removed by the Commission in 2020. *See generally, Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Second Report and Order, 35 FCC Rcd 10168 (2020).

¹⁴⁶ Boeing Narrative at 29 (citing 47 CFR § 25.143(b)(2)(ii)). *See also July 2017 Letter* at 2. The international geographic coverage requirements for NGSO FSS systems were removed by the Commission in 2017. *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809, 7831-32, paras. 69-70 (2017).

service into new geographic regions on a phased basis.¹⁴⁷ Boeing also states that it would accept a Commission decision, as it has made recently for other NGSO FSS licensees, to allow Boeing to submit a request for a revised milestone schedule again, when there is more progress on construction of its satellite system.¹⁴⁸ SES/O3b opposes Boeing's request, arguing, among other things, that it is contrary to the objective of the milestone requirements to prevent spectrum warehousing.¹⁴⁹

44. We agree with SES/O3b that Boeing has not provided sufficient grounds for a waiver of the Commission's milestone requirements. We note that this issue was addressed in the *NGSO FSS* rulemaking,¹⁵⁰ and this grant is subject to those rules. Under the updated rules, Boeing's deployment of five satellites falls far short of the six-year milestone requirement that requires 50 percent of the total number of satellites in the constellation to be launched and operated no later than six years after grant of the authorization. Although these five satellites would allegedly provide domestic coverage of the United States, with its representation that it would only launch five satellites of its 132 within six years, we conclude that waiver would undermine the purpose of the rule. In particular, Boeing does not explain why it cannot deploy a greater number of satellites, a figure closer to 50 percent, within the requisite timeframe in order to prevent warehousing concerns. Moreover, Boeing's representation at this point that it would launch and deploy the full system in 12 years, rather than the nine required by our rule is not supported by sufficient justification for us to grant waiver at this time, again, noting the underlying concern of spectrum warehousing. Accordingly, we deny Boeing's waiver request at this time. Boeing can resubmit this request or part of this request in the future, however, when it will have more information about the progress of the construction and launching of its satellites and will therefore be in a better position to assess the need and justification for a waiver.

45. *Waiver of Rule Regarding Applications for Feeder Links.* Boeing requests a waiver of the Commission's rules because the V-band Constellation will operate both service links and feeder links in the same frequency bands, which it claims will be more spectrally efficient.¹⁵¹ Part 25 provides that the Commission will consider applications for authority to operate feeder links separately from applications to provide service.¹⁵² However, Boeing's V-band Constellation is an FSS system and by definition does not have feeder links,¹⁵³ making waiver of this provision unnecessary for this issue. We, therefore, dismiss Boeing's request as moot.

46. *Waiver of Band-Specific Service Rules Requirement.* Boeing requests a waiver of a previous section of the Commission's rules that stated that in frequency bands where the Commission has not adopted band specific service rules it will not consider applications for NGSO-like operation after it has granted an application for GSO-like operation, and vice-versa, unless and until the Commission establishes NGSO/GSO sharing criteria for that frequency band.¹⁵⁴ The Commission eliminated this section in the *NGSO FSS Report and Order*.¹⁵⁵ Consequently, Boeing's request for a waiver of this requirement is moot.

¹⁴⁷ Boeing Opposition at 24.

¹⁴⁸ *Id.*

¹⁴⁹ SES/O3b Petition at 6-7; SES/ O3b Reply at 5-6.

¹⁵⁰ *NGSO FSS Report and Order*, 32 FCC Rcd at 7830-31, para. 67.

¹⁵¹ Boeing Narrative at 35-36 (citing 47 CFR § 25.156(d)(4)).

¹⁵² 47 CFR § 25.156(d)(4).

¹⁵³ 47 CFR § 25.103 (defining a feeder link as a "radio link from a fixed earth station at a given location to a space station, or vice versa, conveying information for a space radiocommunication service other than the Fixed-Satellite Service").

¹⁵⁴ Boeing Narrative at 36-37 (citing 47 CFR § 25.156(d)(5)).

¹⁵⁵ *NGSO FSS Report and Order*, 32 FCC Rcd at 7821-22, para. 39.

47. For the reasons discussed above, we find that grant of the Boeing application in part, and as amended, will serve the public interest, subject to the requirements and conditions discussed in this decision.

IV. ORDERING CLAUSES

48. Accordingly, IT IS ORDERED, that the Application filed by The Boeing Company (Boeing) IS GRANTED IN PART, and DISMISSED IN PART, as set forth in this Order and Authorization, pursuant to section 309(a) of the Communications Act of 1934, as amended, 47 U.S.C. § 309(a).

49. IT IS FURTHER ORDERED that this authorization is subject to the following requirements and conditions:

- a. Operations in the 37.5-40.0 GHz band (space-to-Earth) must comply with power-flux density limits in 25.208(r) and are unprotected with respect to the non-federal fixed and mobile services, except as authorized pursuant to 47 CFR § 25.136.
- b. Operations in the 37.5-40.0 GHz band (space-to-Earth) are authorized up to the power flux-density limits in 47 CFR § 25.208(r)(1). These limits cannot be exceeded even during rain fade.
- c. Operations in the 37.5-38.0 GHz and 40.0-40.5 GHz bands must be successfully coordinated with Federal Space Research Service (SRS) facilities, pursuant to Recommendation ITU-R SA.1396, "Protection Criteria for the Space Research Service in the 37-38 GHz and 40.0-40.5 GHz Bands."
- d. Operations in the 40-42 GHz band (space-to-Earth) are authorized up to the power-flux density limits in 47 CFR § 25.208(s) and (t).
- e. Operations in the 37.5-42 GHz (space-to-Earth), and 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) frequency bands must not cause unacceptable interference to, or claim protection from, a GSO FSS or Broadcasting-Satellite Service network. These operations must comply with ITU Radio Regulations No. 22.5L and 22.5M, or relevant provisions adopted as part of a future Commission rulemaking proceeding.
- f. In accordance with footnote US211 to 47 CFR § 2.106, Boeing is urged to take all practicable steps to protect radio astronomy observations in the adjacent bands from harmful interference from its operations in the 40.5-42 GHz band (space-to-Earth).
- g. Operations in the 47.2-48.2 GHz and the 50.4-51.4 GHz bands (Earth-to-space) must provide interference protection to the fixed and mobile services, except as authorized pursuant to 47 CFR § 25.136.
- h. Any future grant of earth station licenses for operations with the Boeing V-band system will be subject to the following condition, unless the condition is satisfied prior to such license grant: in the 48.94-49.04 GHz band, operations must be coordinated with radio astronomy stations operating on a co-primary basis in this band.
- i. In accordance with footnote US342 to 47 CFR § 2.106, Boeing is urged to take all practicable steps to protect radio astronomy observations from harmful interference from its operations in the 48.94-49.04 GHz band.
- j. Earth station emissions into the 50.2-50.4 GHz band must comport with the limits contained in ITU-R Resolution 750 (REV. WRC-19), or limits adopted as a result of a future Commission rulemaking proceeding.
- k. Boeing must coordinate its proposed frequency use for inter-satellite service operations in the 65-71 GHz band with any existing permittees and licensees in the inter-satellite service whose facilities could be affected by Boeing's new proposal, in terms of

frequency interference or restricted capacity, and must cooperate fully with other future co-frequency systems in coordinating inter-satellite service usage.

50. IT IS FURTHER ORDERED that this authorization IS SUBJECT to the following requirements and conditions:

- a. Boeing must coordinate physical operations of spacecraft with any operator using similar orbits, for the purpose of eliminating collision risk and minimizing operational impacts. The orbital parameters specified in this grant are subject to change based on such coordination.
- b. Upon finalization of its space station design and prior to initiation of service, Boeing must seek and obtain the Commission's approval of a modification containing an updated description of the orbital debris mitigation plans for its system, as discussed in paragraph 36 above.
- c. This authorization and any earth station licenses granted in the future are subject to modification to bring them into conformance with any rules or policies adopted by the Commission in the future.

51. IT IS FURTHER ORDERED that Boeing must comply with the sharing of ephemeris data procedures described in section 25.146(e) of the Commission's rules, 47 CFR § 25.146(e).

52. IT IS FURTHER ORDERED that operations must comply with spectrum sharing procedures among NGSO FSS space stations specified in 47 CFR § 25.261 with respect to any NGSO system licensed or granted U.S. market access pursuant to the processing round initiated in Public Notice DA 16-1244. Spectrum sharing between Boeing's operations and operations of other U.S. licensed NGSO systems, or NGSO systems granted U.S. market access, where such operations do not include communications to or from U.S. territory, are governed only by the ITU Radio Regulations and are not subject to section 25.261.

53. IT IS FURTHER ORDERED that Boeing must timely provide the Commission with the information required for Advance Publication, Coordination, and Notification of the frequency assignment(s) for this constellation, including due diligence information, pursuant to Articles 9 and 11 of the ITU Radio Regulations. This authorization may be modified, without prior notice, consistent with the coordination of the frequency assignment(s) with other Administrations. *See* 47 CFR § 25.111(b). Boeing is responsible for all cost-recovery fees associated with the ITU filings. 47 CFR § 25.111(d).

54. IT IS FURTHER ORDERED that the request for suspension of the 47 CFR § 25.164(b) satellite construction milestones for final deployment IS DENIED, and this authorization is also subject to the following requirements:

- a. Boeing must post a surety bond in satisfaction of 47 CFR §§ 25.165(a)(1) & (b) no later than December 2, 2021, and thereafter maintain on file a surety bond requiring payment in the event of a default in an amount, at minimum, determined according to the formula set forth in 47 CFR § 25.165(a)(1); and
- b. Boeing must launch 50 percent of the maximum number of proposed space stations, place them in the assigned orbits, and operate them in accordance with this grant no later than November 2, 2027, and must launch the remaining space stations necessary to complete its authorized service constellation, place them in their assigned orbits, and operate them in accordance with the authorization no later than November 2, 2030. 47 CFR § 25.164(b).

Failure to post and maintain a surety bond will render this grant null and void automatically, without further Commission action. Failure to meet the milestone requirements of 47 CFR § 25.164(b) may result in Boeing's authorization being reduced to the number of satellites in use at the milestone date. Failure to comply with the milestone requirements of 47 CFR § 25.164(b)

will also result in forfeiture of Boeing's surety bond. By November 17, 2027, Boeing must either demonstrate compliance with this milestone requirement or notify the Commission in writing that the requirement was not met. 47 CFR § 25.164(f).

55. IT IS FURTHER ORDERED that the request for waiver of 47 CFR § 25.159(b) concerning limits on pending applications is GRANTED on alternative and independent grounds for the reasons set forth herein.

56. IT IS FURTHER ORDERED that the request for waiver of 47 CFR § 2.106 is DENIED for the reasons set forth herein.

57. IT IS FURTHER ORDERED that the request for waiver of 47 CFR §§ 25.112(a)(3) and (b) is DENIED for the reasons set forth herein.

58. IT IS FURTHER ORDERED that the request for waiver of 47 CFR § 25.202(a)(1), concerning the availability of the 17.8-18.3 GHz band and the 50.4-51.4 GHz band for FSS, IS DISMISSED as MOOT for the reasons set forth herein.

59. IT IS FURTHER ORDERED that the request for waiver of 47 CFR § 25.202(a)(1)(ii) regarding the use of user terminals in the 37.5-40.0 GHz band IS DENIED.

60. IT IS FURTHER ORDERED that, based on the condition above requiring spectrum sharing consistent with 47 CFR § 25.261, the request for a waiver of 47 CFR § 25.157(e) IS DISMISSED as MOOT for the reasons set forth herein.

61. IT IS FURTHER ORDERED that the request for waiver of 47 CFR § 25.156(d)(4), concerning processing of applications for authority to operate feeder links separately from applications to provide service, IS DISMISSED as MOOT for the reasons set forth herein.

62. IT IS FURTHER ORDERED that the request for waiver of 47 CFR § 25.156(d)(5), concerning processing of NGSO applications, IS DISMISSED as MOOT for the reasons set forth herein.

63. IT IS FURTHER ORDERED that the requests for waiver of 47 CFR §§ 25.116 and 25.157, concerning major amendments and the processing of NGSO applications in processing rounds, are DISMISSED as MOOT for the reasons set forth herein.

64. IT IS FURTHER ORDERED that the Petitions to Dismiss of Hughes and SES/O3b are GRANTED IN PART AND DENIED IN PART for the reasons set forth herein.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary