

WAIVER REQUESTS

Pursuant to Section 1.3 of the Commission’s rules, the Commission may waive its rules for good cause shown.¹ “Waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the general rule,” including “more effective implementation of overall policy.”² In determining whether waiver is appropriate, the Commission should “take into account considerations of hardship, equity, or more effective implementation of overall policy.”³ As shown below, there is good cause for the Commission to grant a waiver, to the extent necessary, to the *Ka-band Plan* and various limitations in the Commission’s Schedule S, and to grant a waiver of Section 2.106 and certain subsections of Section 25 of the Commission’s rules.

1. Waiver of Section 2.106 and the *Ka-band Plan*: Feeder Links

As feeder links for its proposed Mobile-Satellite Service (“MSS”) system, SpaceX intends to use the gateway links in the Ka-band spectrum already authorized as part of its second-generation non-geostationary (“NGSO”) Fixed-Satellite Service (“FSS”) system (“Gen2 system”), as well as future E-band links, which SpaceX has requested but remain pending.⁴ Some of the Ka-band spectrum is allocated internationally and domestically for FSS, as well as MSS (i.e., 19.7-20.2 GHz (downlink) and 29.5-30.0 GHz (uplink)).⁵ Domestically, however, the *Ka-band Plan* adopted by the Commission does not include an MSS allocation for these bands,⁶

¹ 47 C.F.R. § 1.3. *See also* *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969); *Ne. Cellular Tel. Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990).

² *GE American Communications, Inc.*, 16 FCC Rcd. 11038, ¶ 9 (IB 2001) (quoting *WAIT Radio*, 418 F.2d at 1159).

³ *WAIT Radio*, 418 F.2d at 1159.

⁴ *See Space Exploration Holdings, LLC*, FCC 22-91 (rel. Dec. 1, 2022).

⁵ *See* 47 C.F.R. § 2.106.

⁶ *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, 32 FCC Rcd. 7809, Appendix B (2017) (“*Ka-band Plan*”).

and the remainder of the Ka-band spectrum licensed to SpaceX is allocated to FSS only. Accordingly, to the extent necessary, SpaceX requests that the Commission waive Section 2.106 and the *Ka-band Plan* to allow designation of these bands for use as MSS feeder links.

Waivers of Commission allocations are generally granted “when there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized services.”⁷ Although in this case the allocation in much of this spectrum is consistent with SpaceX’s proposed use, the same approach could be used for waiver of the *Ka-band Plan*—and SpaceX’s request would satisfy its requirements. As a practical matter, there will be no distinction between FSS and MSS operations in these bands, as they will have the same characteristics and SpaceX will use directional gateway antennas in both cases. From a technical perspective, the use of this spectrum for NGSO MSS operations would not be distinguishable from its use for NGSO FSS operations and thus there would be no potential for interference.

The Commission has previously granted a similar waiver for the NGSO system operated by O3b Limited (“O3b”), finding that the waiver would serve the public interest in light of the lack of distinction between MSS and FSS operations in the band.⁸ However, the Commission imposed two conditions with this waiver. First, although there are no equivalent power flux-density (“EPFD”) limits that apply to NGSO MSS systems, the Commission conditioned O3b’s waiver on complying with the applicable EPFD limits for FSS operations in the United States in the 19.7-

⁷ *The Boeing Company*, 16 FCC Rcd. 22645, ¶ 12 & n.48 (IB & OET 2001) (citations omitted) (“*Boeing Authorization*”) (quoting *Fugro-Chance, Inc.*, 10 FCC Rcd. 2860, ¶ 2 (IB 1995)); *Letter from Jose P. Albuquerque & Mark Settle to Suzanne Malloy*, 30 FCC Rcd. 4841, 4842 (IB & OET 2015).

⁸ *See O3b Limited*, 33 FCC Rcd. 5508, ¶¶ 21-22 (2018) (“*O3b Authorization*”), *recon. den.*, 35 FCC Rcd. 1631 (2020) (“*O3b Recon. Order*”).

20.2 GHz and 29.5-30.0 GHz bands, even when these operations are conducted within the MSS.⁹ Second, the Commission noted that it has not adopted sharing criteria between NGSO FSS and NGSO MSS systems in the 19.7-20.2 GHz and 29.5-30.0 GHz bands, and accordingly required O3b's NGSO MSS operations in these bands in the United States to be conducted on a non-interference, non-protected basis with respect to other NGSO FSS operations in these bands.¹⁰ In addition, O3b's authorization was "subject to change as the result of future Commission rulemaking decisions, including any that address technical and/or service rules for MSS or MSS feeder link bands."¹¹

2. Waiver of Sections 2.106, 25.112(a)(3), and 25.202(a)(1): Table of Frequency Allocations

The 2020-2025 MHz band currently does not have an MSS allocation under the U.S. Table of Frequency Allocations. The Commission will grant waivers to permit non-conforming spectrum uses "when there is little potential for interference into any service authorized under the [U.S.] Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized services."¹²

Under these circumstances, waiving rules that require conformity with existing frequency allocations would be consistent with Commission precedent. The Commission frequently grants waivers to provide greater flexibility in the use of a licensee's already assigned spectrum, where doing so would not unduly affect other licensees and would improve the efficient use of

⁹ *O3b Authorization* ¶ 21.

¹⁰ *See id.* ¶¶ 21-22.

¹¹ *O3b Recon. Order* ¶ 6.

¹² *See Boeing Authorization* ¶ 12 & n.48.

spectrum. Accordingly, the Commission should waive requirements prohibiting MSS operations in these frequencies pending the outcome of the Kepler/Spire Petition.¹³

3. Waiver of Sections 25.156(d) and 25.157: Processing Round Procedures

Under Section 25.156 and 25.157 of the Commission's rules, applications for authority to launch and operate an NGSO-like system are ordinarily processed under a "modified processing round" framework, which would use a band splitting mechanism to share spectrum among competing applicants.¹⁴ The primary purpose of the processing round procedure is to prevent one applicant from unreasonably precluding additional entry by other satellite operators in the requested frequency band.¹⁵ The Commission, however, has waived the processing round requirement and allowed NGSO systems access to the entire frequency band when doing so will not preclude additional entry.¹⁶ The Commission should do so here in the 1610-1617.775 MHz and 2483.5-2500 MHz bands (together, the "1.6/2.4 GHz band") and the 2000-2020 MHz and 2180-2200 MHz bands (together, the "2 GHz band").

The Commission has departed from its processing round and band-splitting requirements where previously authorized applicants have failed to deploy or provide service and, as a result, spectral resources remain underutilized.¹⁷ Notably, the Commission has waived these

¹³ SPIRE GLOBAL, INC. & KEPLER COMMUNICATIONS INC., *Petition to Revise Sections 2.106 and 25.142 of the Commission's Rules to Expand Spectrum Availability for Small Satellites by adding Mobile-Satellite Service Allocation in the Frequency Band 2020-2025 MHz*, RM-11869 (filed Oct. 30, 2020) (pending).

¹⁴ See 47 C.F.R. § 25.157.

¹⁵ *Amendment of the Commission's Space Station Licensing Rules and Policies*, 18 FCC Rcd. 10760, ¶ 25 (2003); see also *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, 32 FCC Rcd. 7829, ¶ 61 (2017).

¹⁶ See, e.g., *Iridium Constellation LLC*, 31 FCC Rcd. 8675, ¶ 41 (IB & OET 2016) (waiving processing round requirements for an NGSO system because access will not preclude additional entry); *O3b Limited*, 30 FCC Rcd. 6115 (IB 2015); *Northrop Grumman Space & Mission Systems Corporation*, 24 FCC Rcd. 2330, ¶¶ 23-34 (IB 2009) ("*Northrop Grumman*") (same); *Space Imaging, LLC*, 20 FCC Rcd. 11964, ¶ 10 (IB 2005) ("*Space Imaging*") (same); *Lockheed Martin Corporation*, 20 FCC Rcd. 11023, ¶ 15 (IB 2005) ("*Digital Globe*") (same).

¹⁷ See *Northrop Grumman*, ¶¶ 23-34; see also *Swarm Technologies, Inc.*, 34 FCC Rcd. 9469 (IB 2019) ("*Swarm*").

requirements for applicants where systems authorized in prior processing rounds have failed to materialize, leaving few or no service offerings for consumers within a frequency band.¹⁸ In these circumstances, the Commission has treated NGSO applications on a first-come, first-served basis and declined to initiate a new processing round. So long as a proposed system can demonstrate that it neither causes harmful interference to existing systems nor precludes future applicants from seeking authorization for the same spectrum, a waiver is warranted,¹⁹ here to allow SpaceX to make productive use of underutilized MSS spectrum.

SpaceX's proposed MSS system will operate in the 1.6/2.4 GHz band, 2 GHz band, and the 2020-2025 MHz band (collectively, with the 1.6/2.4 GHz band and the 2 GHz band, the "MSS bands"), each of which have either no current MSS service or have been held by a single operator for several years. SpaceX's proposed MSS system is designed to be robust and capable of sharing in a variety of ways with MSS systems currently operating within one or more frequencies of the MSS bands, as well as future networks. Thus, SpaceX will not prevent future entry by other parties that may seek to provide MSS in the MSS bands and will help realize the multi-operator ecosystem originally intended for MSS allocations, including the 1.6/2.4 GHz band and the 2 GHz band.

Moreover, a waiver of the processing round rule advances important public interests—namely, the efficient use of spectrum and provision of new and valuable services to the public—in unique and important ways. The 1.6/2.4 GHz band has been used by a single MSS operator for nearly thirty years, despite the band being allocated for multiple operator entry. Similarly, little productive use has been made of the 2 GHz band since the Commission first authorized satellite

¹⁸ *Id.*; see also *Leo One Worldwide, Inc.*, 19 FCC Rcd. 5368 (IB 2004) (cancelling the license of Leo One and specifying that "[n]ew applications for this spectrum will be processed under the first-come, first-served procedure").

¹⁹ See note 16, *supra*.

operators to provide MSS over twenty years ago, with a single operator squatting on its spectrum rights for the last decade without any evidence of providing MSS in the band. This staggering lack of competition and productive use of spectrum resources contradicts significant advances in satellite technology and the ability to share valuable satellite spectrum between multiple operators. Additionally, MSS operations have the capability to address the connectivity needs of Americans throughout the United States, including in areas that are underserved or unserved by terrestrial services. Accordingly, the public interest in promoting an efficient use of the MSS bands and enabling a competitive marketplace for MSS operations is especially substantial.

SpaceX's network will allow new users and businesses to share the benefits of mobile connectivity where previously it was unavailable or economically infeasible. As a result, prompt licensing will enable SpaceX to provide another option for many critical mobile applications, including those that serve rural America and polar regions. And SpaceX's demonstrated commitment to launching new NGSO satellite services at an accelerated cadence makes these benefits practical rather than speculative, promising the realization of a mobile satellite service that provides robust and innovative services to all Americans. In short, the sooner the SpaceX MSS system is licensed, the sooner this spectrum can be put to greater use and consumers can benefit from newly available satellite connectivity.

Commission precedent also supports waiving the processing round and band-splitting requirements²⁰ for NGSO-like systems that employ technology that allows spectrum sharing, as SpaceX's MSS system does. The Commission previously waived such requirements for NGSO systems in the Earth Exploration Satellite Service in which multiple antennas can discriminate

²⁰ See 47 C.F.R. § 25.157.

between target satellites and potentially interfering satellites.²¹ The Commission has also waived such requirements for NGSO FSS systems in the Ka- and V-bands where a proposed system can limit the number of in-line interference events between NGSO systems to accommodate multiple NGSO operators in the same spectrum.²² And the Commission has waived such requirements for NGSO-like systems in MSS bands that utilize channel access protocols for sharing spectrum.²³ As demonstrated in the Technical Attachment and SpaceX's Gen2 system application, SpaceX employs each of these previously recognized techniques to enable sharing with MSS systems, and therefore warrants a waiver of the Commission's processing round and band-splitting rules.

In the alternative, should the Commission decide not to waive the processing round rule entirely given the possibility of future applications for the same frequencies, the Commission still should issue a waiver that authorizes SpaceX's MSS system without delay. This authorization would subject SpaceX to being included as the first member of a new processing round, should the Commission initiate one. The Commission has done this before under similar circumstances. When granting Swarm Technologies a waiver of the processing round rule in authorizing access to Very High Frequency ("VHF") bands for non-voice, non-geostationary MSS service, the Commission acknowledged the possibility of future applications for the same frequencies.²⁴ The Commission stated that, in the event that additional requests for future entry and sharing of this spectrum justify a processing round, the Commission would consider Swarm on a co-equal basis

²¹ See *Space Imaging*, ¶¶ 10, 11; *Digital Globe*, ¶ 8.

²² See *Northrop Grumman*, ¶ 33; see also O3b Limited, Application to Operate a Gateway Earth Station and a Non-U.S. Licensed Non-Geostationary Orbit Ka-band Space State System, IBFS File Nos. SAT-LOI-20141029-00118, SAT-AMD-20150115-00004, at 9 (filed Oct. 28, 2014) (citing the Northrop Grumman authorization and use of similar techniques in seeking a waiver of the processing round rule for accessing Ka-band frequencies). The Commission granted O3b's waiver request on the basis of its demonstrations. See *O3b Limited*, 30 FCC Rcd. 6115 (IB 2015).

²³ *Swarm*, ¶ 17.

²⁴ *Id.* ¶¶ 16-17.

with these competing NGSO applications in the processing round.²⁵ In the meantime, the Commission authorized Swarm to construct, deploy, and operate its constellation without delay, to provide services to consumers while other operators evaluated and considered the possibility of seeking authorization for the same spectrum.²⁶

Under a more limited alternative waiver, the public interest would certainly be best served by authorizing SpaceX's MSS system, without any delay, subject only to a processing round that involves other potential MSS operators with whom SpaceX will share these bands. As SpaceX has made clear, it is ready, willing, and able to share the 1.6/2.4 GHz band and the 2 GHz band, with incumbents and new entrants. Moreover, with Commission approval, SpaceX can deploy its MSS system as a modular payload on its authorized Gen2 system, bringing the benefits of a next generation mobile satellite service using these frequencies to Americans, no matter where they are, as quickly as possible. Thus, any Commission decision to start a new processing round for the 1.6/2.4 GHz band or the 2 GHz band should be unaffected by, and should not delay, the Commission's decision to authorize SpaceX's MSS system now, and include SpaceX as the first member of that putative processing round.

4. Waiver of Section 25.143(b)(2): Geographic Coverage

Section 25.143(b)(2) of the Commission rules establish geographic coverage requirements for 1.6/2.4 GHz and 2 GHz MSS systems. Specifically, the rule requires that an NGSO MSS provide coverage to all locations as far north as 70 North latitude and as far south as 55 South latitude for at least 75% of every 24-hour period; and on a continuous basis throughout the fifty

²⁵ *Id.* ¶ 17 (“[D]epending on the number of any such [future] applications and their ability to effectively share spectrum, a processing round, including Swarm, may be initiated in the future to resolve mutual exclusivity concerns.”).

²⁶ *Id.* ¶ 18.

states, Puerto Rico, and the U.S. Virgin Islands. The MSS payloads on the initial 7,500 satellites within the Gen2 system will be capable of providing MSS service across the latitudes specified and throughout continental United States, Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands. And once fully deployed, the Gen2 system will provide coverage of the entire Earth on a continuous basis, satisfying the Commission's continuity requirement of eighteen hours each day.

Accordingly, to the extent necessary, SpaceX requests a waiver so that it can deploy and operate 1.6/2.4 GHz and 2 GHz capability on the initially authorized satellites within the orbital shells at 525 km, 530 km, and 535 km altitudes while it awaits authorization for the remainder of its proposed constellation. Even with the initial deployment, SpaceX's MSS system will continuously cover all but the northernmost portion of the United States, which will still receive coverage during parts of the day. At full deployment, the SpaceX MSS system will satisfy all coverage requirements for MSS service in the 1.6/2.4 GHz and 2 GHz bands.

5. Waiver of Section 25.114(a)(1): Limitations in Schedule S

As required by the Commission's rules,²⁷ SpaceX has submitted with this application a completed Schedule S, which contains certain technical information in a prescribed form. However, SpaceX has found that it cannot accurately describe its system in certain respects due to limitations in Schedule S itself. Below we discuss three aspects of the MSS system and how the Schedule S was completed under these constraints. To the extent necessary, SpaceX requests that the Commission waive these aspects of Schedule S in light of these limitations.²⁸

²⁷ See 47 C.F.R. § 25.114(a)(1).

²⁸ The Commission has previously granted a similar request where SpaceX implemented a workaround for each of the limitations it identified in Schedule S. See *Space Exploration Holdings, LLC*, 34 FCC Rcd. 12307, ¶ 17 (IB 2019).

First, because SpaceX does not seek to change the orbital characteristics of the satellites subject to this modification, SpaceX is not required to re-submit orbital characteristics in this application.²⁹ However, Schedule S requires the submission of orbital information. Accordingly, SpaceX has provided a sample of its information in the electronic version of Schedule S merely to satisfy the validation requirements of the form, but—for the avoidance of doubt—does not seek to alter these already-authorized orbital parameters. In addition, because the Commission granted SpaceX authority to launch and operate 7,500 satellites in the orbital shells at 525 km, 530 km, and 535 km, SpaceX has included the full complement of satellites requested in these three shells for purposes of the Schedule S.³⁰ SpaceX will operate MSS payloads on up to 7,500 satellites within the Gen2 system, as initially authorized by the Commission, while awaiting deferred consideration by the Commission on the additional satellites originally proposed.³¹ As a result, not all aspects of the system will be accurately captured in Schedule S. For example, the “Total Number of Satellites in the Active Constellation” will reflect the number provided in the sample rather than the total number in the SpaceX MSS system.

Second, Section 25.114(c)(4)(v) requires both the minimum and maximum saturation flux density (“SFD”) values for each space station receive antenna that is connected to transponders. The concept of SFD only applies to “bent pipe” satellite systems, and thus is not relevant to the MSS system. However, the Schedule S software does not allow an entry of “not applicable.” Instead, it requires a numerical entry for SFD, which must be different for the maximum and

²⁹ See 47 C.F.R. § 25.117(c).

³⁰ See *Space Exploration Holdings, LLC*, FCC 22-91, ¶ 19 (rel. Dec. 1, 2022).

³¹ *Id.*; see also Application for Approval of Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System, IBFS File No. SAT-LOA-20200526-00055 (filed May 26, 2020); Amendment, IBFS File No. SAT-AMD-20210818-00105 (filed, Aug. 18, 2021).

minimum values. In order to accommodate this requirement, SpaceX has entered values of “0” and “-0.1” in Schedule S with respect to these parameters.

Third, beams used by SpaceX satellites will be divided into small channels that, depending on utilization and other factors, may be bonded into larger channels. However, Schedule S only permits entry of a single, static channel plan. Accordingly, SpaceX has provided an example of one possible channel plan on Schedule S.