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

In the Matter of	)	
	)	ICFS File Nos.: SAT-LOA-20200413-00034
AST&Science LLC	)	SAT-AMD-20200727-00088
	)	SAT-AMD-20201028-00126
Application to Launch and Operate a Non-Geostationary Orbit V-band System	)	SAT-AMD-20230717-00172
	)	SAT-AMD-20240311-00053
	)	
	)	Call Sign: S3065
	)	

ORDER AND AUTHORIZATION

Adopted: August 2, 2024 **Released: August 2, 2024**

By the Deputy Chief and Chief of Staff, Space Bureau:

I. INTRODUCTION

1. In this Order and Authorization, we grant in part, with conditions, the request of AST&Science LLC (AST) to launch and operate its planned constellation of non-geostationary orbit (NGSO) satellites in low-Earth orbit (LEO).[1] Specifically, we grant, with conditions, operations for five satellites which would operate feeder links and nominal telemetry, tracking, and command (TT&C) operations using frequencies in the 37.5-42 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space), and 50.4-51.4 GHz (Earth-to-space) bands. We further grant AST authority to conduct TT&C with its authorized satellites in the 430-440 MHz (space-to-Earth and Earth-to-space), 2025-2110 MHz (Earth-to-space), and 2200-2290 MHz (space-to-Earth) bands. In connection with this grant, we address three Petitions to Deny filed by CTIA, T-Mobile USA, Inc. (T-Mobile), and Verizon, the informal objection filed by Hughes Network Systems, LLC, EchoStar Mobile Limited, and EchoStar Global Australia Pty Ltd (collectively, EchoStar), and the various comments and letters filed regarding this application. We defer consideration of AST's request for authority to AST to deploy and operate the other 243 requested satellites and also defer grant of authority to operate on any additional frequencies, including any bands allocated to terrestrial services that it would ultimately seek to utilize for the provision of Supplemental Coverage from Space (SCS).[2]

[1] This application, as amended in the first instance, was placed on public notice on October 2, 2020. *Satellite Policy Branch Information, Space Station Applications Accepted for Filing*, Public Notice, Report No. SAT-01501 (Oct. 2, 2020). This application, as amended in the second instance, was placed on public notice on November 6, 2020. *Satellite Policy Branch Information, Space Station Applications Accepted for Filing*, Public Notice, Report No. SAT-01509 (Nov. 6, 2020). This application, as amended in the third and fourth instances, was placed on public notice and was accepted for filing in part on April 5, 2024. *Satellite Licensing Division and Satellite Programs and Policy Division Information, Space Station Applications Accepted for Filing*, Report No. SAT-01812 (Apr. 5, 2024). This application, as amended, has also been designated as "permit but disclose." *Satellite Policy Branch Information, Actions Taken*, Public Notice, Report No. SAT-01497 (Sept. 11, 2020); *Satellite Policy Branch Information, Actions Taken*, Public Notice, Report No. SAT-01511 (Nov. 13, 2020); *Satellite Licensing Division and Satellite Programs and Policy Division Information, Actions Taken*, Report No. SAT-01812 (Apr. 5, 2024).

[2] AST has requested to operate in the 617.0-960.0 MHz (space-to-Earth), 663.0-915.0 MHz (Earth-to-space), 1805.0 MHz-2200.0 MHz (space-to-Earth), and 1710.0-2010.0 MHz (Earth-to-space) bands. *See* ICFS File No. SAT-AMD-20240311-00053, Schedule S at 3; *see generally Single Network Future: Supplemental Coverage from Space*,

(continued….)

II. BACKGROUND

2. *Petition*. On April 13, 2020, AST filed an application for addition to the Permitted List of its planned constellation of 243 satellites, operating in LEO paths,[3] licensed by the administration of Papua New Guinea and providing service to mobile telephones and other personal devices such as tablets connected through the mobile-phone system using frequencies in the 37.5-42.5 GHz (space-to-Earth), 45.5-47.0 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz (Earth-to-space) (collectively, the V-band) bands for communications with gateway earth stations and the 617-960 MHz and 1805-2200 MHz (space-to-Earth) and 663-915 MHz and 1710-2010 MHz (Earth-to-space) bands for direct communications with consumer devices.[4]

3. *Acceptance for Filing in Part and Processing Round*. On October 2, 2020, the International Bureau, Satellite Policy Branch,[5] accepted AST's application for filing.[6] On August 4, 2021, the International Bureau initiated the second V-band processing round, which specifically included AST's application, for additional NGSO-like applications and petitions in the 37.5-40.0 GHz, 40-42 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz bands, with a cut-off date of November 4, 2021.[7]

4. *Amendments to Petition.* On August 27, 2020, AST filed an amendment to its application in response to an inquiry from the Commission.[8] In the amendment, AST clarified that it intended to provide direct communications between its space stations and consumer devices in the 1930-1990 MHz, 2110-2180 MHz, and 2350-2360 MHz bands (space-to-Earth) and the 1710-1780 MHz, 1850-1910 MHz,

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Report and Order and Further Notice of Proposed Rulemaking, FCC 24-28 (Mar. 14, 2024) (*SCS R&O*). Although some of the bands authorized for operation herein may include a terrestrial wireless allocation, nothing in this limited grant of authority provides SCS authority to AST.

[3] ICFS File No. SAT-LOA-20200413-00034, Narrative at 3, Schedule S.

[4] ICFS File No. SAT-LOA-20200413-00034, Schedule S.

[5] On January 4, 2023, the Commission adopted an Order that established the Space Bureau to handle the policy and licensing matters related to satellite communications and other in-space activities formerly handled by the International Bureau, which the Order dissolved. *See Establishment of the Space Bureau and the Office of International Affairs and Reorganization of the Consumer and Governmental Affairs Bureau and the Office of the Managing Director*, MD Docket No. 23-12, Order, 38 FCC Rcd 608, 609, para. 4 (2023). The Space Bureau officially launched on April 11, 2023. *See* Press Release, FCC, FCC Space Bureau & Office of International Affairs to Launch Next Week (April 7, 2023), https://docs.fcc.gov/public/attachments/DOC-392418A1.pdf. All references in this document to the International Bureau refer to filings made with, or actions taken by, the International Bureau prior to the establishment of the Space Bureau.

[6] *Satellite Policy Branch Information, Space Station Applications Accepted for Filing*, Public Notice, Report No. SAT-01501 (Oct. 2, 2020).

[7] *IB Opens New V-band Processing Round for NGSO FSS Systems*, Public Notice, 36 FCC Rcd 12148 (IB 2021). This processing round is separate from the processing rounds for NGSO-like satellite applications or petitions for operations in frequencies in the Ku- and Ka-band. *See Cut-Off Established for Additional NGSO-Like Satellite Applications or Petitions for Operations in the 10.7-12.7 GHz, 14.0-14.5 GHz, 17.8-18.6 GHz, 18.8-19.3 GHz, 27.5-28.35 GHz, 28.35-29.1 GHz, and 29.5-30.0 GHz Bands*, Public Notice, 31 FCC Rcd 7666 (IB 2016); *Applications Accepted for Filing; Cut-off Established for Additional NGSO-like Satellite Applications or Petitions for Operations in the 12.75-13.25 GHz, 13.85-14.0 GHz, 18.6-18.8 GHz, 19.3-20.2 GHz, and 29.1-29.5 GHz Band*s, Public Notice, 32 FCC Rcd 4180 (IB 2017); *Cut-Off Established for Additional NGSO FSS Applications or Petitions for Operations in the 10.7-12.7 GHz, 12.75-13.25 GHz, 13.8-14.5 GHz, 17.7-18.6 GHz, 18.8-20.2 GHz, and 27.5-30 GHz Bands*, Public Notice, 35 FCC Rcd 2881 (IB 2020). This processing round is also separate from the first V-band processing round, which was initiated on November 1, 2016, by the International Bureau and had a cut-off date of March 1, 2017. *See Cut-Off 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).

[8] ICFS File No. SAT-AMD-20200727-00088.

and 2305-2320 MHz (Earth-to-space) bands.[9] On October 28, 2020, AST filed an amendment to its application withdrawing its previous amendment and clarifying that it sought authorization only for satellite operations in the V-band.[10] AST stated that it would conduct all communications with consumer devices through lease arrangements with licensed mobile service providers.[11] On July 17, 2023, AST filed an amendment seeking authorization to utilize bands allocated to terrestrial services in certain 850 MHz cellular A and B block spectrum and certain Lower 700 MHz B and C block spectrum in the United States to offer SCS pursuant to its partnership and corresponding lease agreement with AT&T.[12]

5. *Application for U.S. License.* On March 11, 2024, AST filed an amendment seeking to change its previously filed request for U.S. market access to a request for a U.S. license that would authorize deployment and operations of the SpaceMobile system.[13] AST specified that five satellites would be those first launched as part of the planned commercial SpaceMobile system.[14] AST also requested authority for its satellites to conduct TT&C operations during LEOP and TT&C in the S-band and UHF band with earth stations outside the United States.[15] AST further clarified the frequencies on which AST requests to provide SCS and specified the bands which AST seeks to use for direct-to-cell operations outside the United States, but AST requested that the Commission defer action on the portion of the request related to use of bands allocated to terrestrial services for SCS.[16]

III. DISCUSSION

6. After review of the record, we conclude that a limited grant in part of AST's application, authorizing AST to deploy and operate five satellites, as conditioned, will serve the public interest.[17] These satellites will operate on one plane with mean anomalies of 216 degrees, 126 degrees, 40 degrees, 32 degrees, and 306 degrees with an apogee altitude of 525 kilometers (+/- 25 kilometers), a perigee altitude of 515 kilometers (+/- 25 kilometers), and an inclination of 53.0 degrees (+/- 1 degrees) and may operate down to an altitude of 425 kilometers.[18] We defer consideration of AST's request to operate an additional 243 satellites and to operate in bands allocated to terrestrial services for SCS. Below we discuss the various issues raised by AST's application – including the Petitions to Deny filed by CTIA, T-Mobile, and Verizon,[19] orbital debris considerations, and the informal objections and comments filed in

[9] *Id.*

[10] ICFS File No. SAT-AMD 20201028-00126.

[11] *Id.*

[12] ICFS File No. SAT-AMD-20230717-00172; *see also* ULS File No. 0010538493 (lease application).

[13] ICFS File No. SAT-AMD-20240311-00053.

[14] *See* ICFS File No. SAT-AMD-20240311-00053, Narrative at 6.

[15] *See* ICFS File No. SAT-AMD-20240311-00053, Narrative at 7-8.

[16] *See id.* at 7.

[17] In this document, the term "United States" refers to the contiguous United States, as well as Alaska, Hawaii, Puerto Rico, the U.S. Virgin Islands and all U.S. territories.

[18] AST specified in its fourth amendment to the application that these five satellites would be deployed to an altitude of 520 km (+/- 7 km) and inclination of 53 degrees (+/- 0.1 degrees) and would be operated at an altitude of 515-525 km and with an inclination angle of 53 degrees. *See* ICFS File No. SAT-AMD-20240311-00053, Narrative at 6; Letter from Timothy Bransford, Counsel, AST, to Marlene H. Dortch, Secretary, FCC at 1 (dated Mar. 29, 2024) (AST March 29 Letter). These orbital parameters have been finalized following coordination with Federal operators.

[19] CTIA, Petition to Deny (CTIA Petition); T-Mobile, Petition to Deny (T-Mobile Petition); Verizon, Petition to Deny (Verizon Petition). AST argues that we should dismiss the various Petitions to Deny for lack of standing and mootness. *See* AST Consolidated Response at 12. However, we consider all comments and petitions filed on part

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the proceeding. We also discuss potential interference concerns and adopt related conditions.

7. *Public Interest Benefits.* We conclude that it is in the public interest for AST to begin deploying its satellites with the ultimate goal of testing an SCS-capable system, subject to additional approvals. AST aspires in the future to provide nationwide connectivity, including in rural areas and in areas where geographic and economic challenges have made it difficult, costly, and at times, physically impossible to install cell towers or fiber.[20] AST states that its goal for such operations is to ultimately expand our nation's ability to provide critical communications services to Americans and our first responders during times of national emergency and natural disasters.[21] While this grant does not authorize any operations or testing for SCS,[22] we believe that the deployment of five satellites under this limited grant, subject to additional approvals, will enable AST to request authority to further test this still-emerging technology.[23] Furthermore, we are not merely relying on the future "promise" of AST to provide mobile service as the basis to satisfy its obligation under the public interest standard.[24] AST has

25 applications without the need for petitioners to address injury. AST further submits that the Hughes Objection regarding the Lynk application fails to meet the requirements of section 25.154(a)(4) because it does not contain facts related to AST. *See* ICFS File No. SAT-LOA-20200413-00034, Response and Opposition to Petition to Deny at 5 (filed Oct. 22, 2020) (AST Response and Opposition); Hughes Objection (filed Oct. 12, 2020). Since most of the facts contained within the informal objection to the Lynk application are not relevant to the AST application, we consider only facts specific to AST in review of AST's application. AST also argues that the Hughes Objection is untimely and should be considered an informal objection. *See* AST Response and Opposition at 4. We have found the Hughes Objection to be an informal objection, due to the lack of affidavit, other factors aside. *See Lynk Order*, para. 4, n.14.

[20] *See* ICFS File No. SAT-LOA-20200413-00034, Narrative at iv; Letter from Wesley Bownds, Chairman, Midland Development Corporation, to Marlene H. Dortch, Secretary, FCC at 1 (dated Oct. 7, 2020); Letter from Eric W. Stallmer, President, Commercial Spaceflight Federation, to Marlene H. Dortch, Secretary, FCC at 1 (dated Oct. 19, 2020); Letter from Brendon Kim, Head, Samsung NEXT Fund LLC (Samsung NEXT), to Marlene H. Dortch, Secretary, FCC at 1 (dated Oct. 14, 2020); Letter from Azita Arvani, General Manager, Rakuten Mobile Americas, to Marlene H. Dortch, Secretary, FCC at 1 (dated Nov. 1, 2020); Letter from Chris Van Hollen, United States Senator, to Ajit V. Pai, Chairman, FCC at 1 (dated Nov. 16, 2020); Letter from K. Michael Conaway, Member of Congress, to Ajit V. Pai, Chairman, FCC at 1 (dated Oct. 13, 2020) (Conaway Letter); Letter from Ted Cruz, United States Senator, to Ajit Pai, Chairman, FCC at 1 (dated Oct. 21, 2020) (Cruz Letter); Letter from Benjamin L. Cardin, United States Senator, to Ajit V. Pai, Chairman, FCC at 1 (dated Oct. 30, 2020); Letter from Michael P. Goggin, AT&T Services, Inc. (AT&T), to Marlene H. Dortch, Secretary, FCC at 1 (dated Feb. 22, 2021) (AT&T Letter).

[21] *See* ICFS File No. SAT-LOA-20200413-00034, Narrative at iv; Conaway Letter at 1; Cruz Letter at 1; AT&T Letter at 1.

[22] While we acknowledge some parties have objected to the public interest implications of AST providing direct-to-cell service, we are not authorizing such service in the instant grant. *See, e.g.*, T-Mobile Petition at 12; *see also* Letter from J.G. Harrington, Counsel, Hughes, to Marlene H. Dortch, Secretary, FCC, Attachment at 2 (dated Mar. 9, 2022) (Hughes March 9 Ex Parte); CTIA Petition at 9-10; Verizon Petition at 3, 11-12; T-Mobile Petition at 11-12; Comments of Kuiper Systems LLC at 2-3 (Kuiper Comments). As discussed below, AST, in coordination with its terrestrial partner(s), must file additional information before the Commission can consider a request for SCS authority. *See infra* para. 15.

[23] For example, we note that SpaceX is currently authorized under the Commission's experimental framework to conduct limited testing with "direct-to-cell" capabilities on a subset of its satellites. *See, e.g.*, ELS File No. 0519-EX-ST-2024 (granted Mar. 29, 2024).

[24] *See* Reply in Support of Verizon's Petition to Deny at 6 (Verizon Reply); *see also* Hughes March 9 Ex Parte, Attachment at 2 ("AST has not shown that its proposed constellation would be sufficient to provide meaningful service"); Letter from Jennifer A. Manner, Senior Vice President, Regulatory Affairs, EchoStar, to Marlene H. Dortch, Secretary, FCC, Attachment at 1 (dated Jan. 8, 2021) (EchoStar January 8 Ex Parte) ("Absent a viable plan to access additional spectrum for service to end users, AST's proposal for V-band FSS gateway operations is insufficient and fatally defective.").

provided information that demonstrates that, with the operations authorized by this limited grant of authority, in combination with potential future experimental authority that we do not consider today, it would be able to provide some experimental connectivity,[25] and that AST has a legitimate business interest in using the V-band to support such operations with five satellites, as well as use of the other authorized frequencies for TT&C.[26]

8. *V-band.* We have had the opportunity to review AST's application as part of the second V-band processing round alongside other applications for systems seeking to operate in the V-band.[27] We grant AST authority to perform fixed-satellite service (FSS) operations in each requested V-band frequency with the five satellites authorized in this grant.[28] We first grant AST's request to operate in the 37.5-40.0 GHz (space-to-Earth) band. The 37.5-40.0 GHz band is currently allocated to the terrestrial fixed and mobile services and to FSS on a primary basis. It is shared with the terrestrial Upper Microwave Flexible Use Service (UMFUS) authorized under part 30 of the Commission's rules.[29] We also grant AST's request to operate in the 40-42 GHz portion of the V-band. The entirety of the band is currently allocated in the U.S. Table of Allocations and internationally for FSS, and parts of the band are shared with fixed service, mobile service, mobile-satellite service (MSS), broadcasting service, and broadcasting-satellite service. Unlike in the 37.5-40 GHz band, terrestrial operations are not authorized in the 40-42 GHz band.[30] In accordance with the U.S. Table of Frequency Allocations, in the 40.5-42 GHz portion of the band, AST must take all practicable steps to protect radio astronomy observations in the adjacent bands from harmful interference.[31] Furthermore, we grant AST's request to operate in the 47.2-50.2 GHz (Earth-to-space) 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.

[25] *See* Letter from Timothy Bransford and Denise Wood, Counsel, AST, to Marlene H. Dortch, Secretary, FCC at 1-2 (dated Aug. 1, 2024) (AST August 1 Letter); Letter from Timothy Bransford and Denise Wood, Counsel, AST, to Marlene H. Dortch, Secretary, FCC at 2 (dated May 21, 2024); Letter from Timothy Bransford and Denise Wood, Counsel, AST, to Marlene H. Dortch, Secretary, FCC at 2 (dated May 13, 2024).

[26] *See, e.g.*, Letter from Timothy Bransford and Denise Wood, Counsel, AST, to Marlene H. Dortch, Secretary, FCC (dated May 13, 2024); Letter from Vikram Ravel, Head of Global Regulatory Affairs, AST, to Marlene H. Dortch, Secretary, FCC at 1 (dated Mar. 24, 2022) (AST March 24 Ex Parte).

[27] AST initially submitted a waiver request of the Commission's processing round rules, 47 CFR § 25.157(c), for its proposed V-band operations. *See* ICFS File No. SAT-LOA-20200413-00034, Narrative at 11-14. Various parties requested that AST's V-band application undergo a processing round, and some suggested limitations on AST's V-band operations in the alternative. Because AST's application ultimately was included in the second V-band processing round, we find AST's waiver request moot and those comments not relevant. Relatedly, AST's request for waiver of the Commission's mutual exclusivity rule, 47 CFR § 25.155(b), is also moot. *See* ICFS File No. SAT-LOA-20200413-00034, Narrative at 14.

[28] Although AST initially requested authority to also operate in the 42.0-42.5 GHz and 45.5-47.0 GHz bands, which were outside of the scope of the 2021 V-band processing round, AST confirms that it no longer seeks authority to operate in those bands. *See* AST March 29 Letter at 1. As a result, we also dismiss as moot AST's request for a waiver of the U.S. Table of Frequency Allocations, 47 CFR § 2.106(a), to operate on those frequencies. *See* ICFS File No. SAT-LOA-20200413-00034, Narrative at 7-8.

[29] 47 CFR pt. 30.

[30] *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; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations*, Second Report and Order, 18 FCC Rcd 25428, 25432, 25433-25434, paras. 8, 12-14 (2003).

[31] *See* 47 CFR § 2.106(a), (c)(211).

Like the 37.5-40.0 GHz band, the 47.2-48.2 GHz band is also authorized for UMFUS.[32] We additionally grant AST's request to operate in the 50.4-51.4 GHz (Earth-to-space) band. This band is allocated to FSS, fixed service, and mobile service, and MSS for both Federal and non-Federal stations in the United States and for those same services internationally, with MSS allocated on a secondary basis.

9. We find that AST's feeder link and nominal TT&C operations in the V-band can be classified as FSS. CTIA and Verizon question AST's characterization of its V-band operations as FSS rather than MSS, given that AST seeks for SpaceMobile to eventually operate in the MSS.[33] Verizon argues that FSS allocations are separate from MSS and other satellite allocations to ensure that interference is not caused among disparate uses.[34] Verizon adds that the service AST proposes to offer is a fundamentally different use case than that intended by the Commission for parts 22, 24, 27, and 30.[35] However, we find AST's proposed operations in the V-band can be categorized as FSS, since AST's satellites will be communicating directly with fixed earth stations when performing feeder link and nominal TT&C operations.[36] Similarly, the Commission's rules clarify that TT&C signals may be transmitted in frequencies within the assigned bands that are at a band edge, and here AST will be performing TT&C on the same frequencies authorized for feeder link operations.[37] As such, AST's proposed V-band operations will conform with the Commission's rules, including the U.S. Table of Frequency Allocations.[38]

10. Some commenters claim that AST's proposed use of the 37.5-40.0 GHz band appears to exceed the power flux-density (PFD) limits for the band.[39] CTIA further argues that AST should provide an updated Schedule S that is consistent with the Commission's PFD restrictions.[40] However, AST responded that commenters incorrectly analyzed AST's PFD emissions.[41] AST also filed an updated Schedule S and Technical Annex with updated PFD and maximum EIRP density values for V-band operations, and no parties have commented on this matter as it relates to the recently updated filings.[42] AST further certifies in its more recent filings that its PFD emissions will not exceed the limits in section 25.208(r) of the Commission's rules, and we are satisfied with AST's showing that it will not exceed the PFD limits in section 25.208(r) of the Commission's rules.[43]

11. Some commenters argue that we should require AST to comply with the UMFUS framework for sharing between AST's earth stations and UMFUS[44] and further argue that AST has not

[32] 47 CFR § 30.4(g).

[33] *See* CTIA Petition at 9; Verizon Petition at 11.

[34] *See* Verizon Petition at 12-13.

[35] *See id.* at 13.

[36] 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. *See* 47 CFR § 2.1.

[37] *See* 47 CFR § 25.202(g).

[38] *But see* CTIA Petition at 9; Verizon Petition at 12-13.

[39] *See* Verizon Petition at 11; CTIA Petition at 10-11; T-Mobile Petition at 9.

[40] *See* CTIA Reply at 10.

[41] *See* AST Consolidated Response at 15-16.

[42] *See* ICFS File No. SAT-LOA-20200413-00034, Schedule S.

[43] *See* ICFS File No. SAT-AMD-20240311-00053, Attach. A at 7.

[44] *See* 47 CFR § 25.136.

complied with all related procedures.[45] The fact that AST has not yet completed certain procedures consistent with the UMFUS sharing framework does not preclude grant of a space station license.[46] We defer consideration of arguments related to earth station siting until such time as we are reviewing individual earth station applications.

12. Also, we decline to impose a condition requiring that AST successfully complete international coordination, as EchoStar requests.[47] First, we note that EchoStar argued in favor of an international coordination requirement alongside concerns regarding AST's initial licensing application and related International Telecommunication Union (ITU) filing that was submitted through a foreign administration. However, as discussed, AST has since applied for, and is granted in part, a U.S. license, and AST has submitted materials supporting an accompanying ITU filing to the United States, which in turn we have found acceptable under our rules to submit to the ITU. Likewise, in 2023, the Commission adopted rules for satellite spectrum sharing among NGSO FSS systems[48] requiring good-faith coordination among all NGSO FSS grantees.[49] This grant includes a condition that AST's operations must be conducted in accordance with our updated NGSO FSS spectrum sharing rules.[50]

13. *S-band.* We grant AST authority to conduct TT&C in the 2025-2110 MHz (Earth-to-space) and 2200-2290 MHz (space-to-Earth) bands with earth stations outside the United States, including for LEOP, with five satellites authorized in this grant.[51] In the International Table of Frequency Allocations, the 2025-2110 MHz band is allocated to the space operation service (Earth-to-space), *inter alia*, on a primary basis. Similarly, in the International Table of Frequency Allocations, the 2200-2290 MHz (space-to-Earth) band is allocated to the space operation service (Earth-to-space), *inter alia*, on a primary basis. AST will only conduct such operations with earth stations outside of the United Statesunder terms of an agreement with a teleport company that holds S-band authorizations in relevant foreign jurisdictions.[52] We authorize AST to operate in the S-band for TT&C, subject to the laws, regulations, and requirements applicable to any such operations in foreign jurisdictions.

14. *UHF Band.* AST also seeks to conduct TT&C in the 430-440 MHz (space-to-Earth and Earth-to-space) band outside the United States, including for LEOP, with five satellites authorized in this grant. AST plans to perform such operations pursuant to agreements with authorized third-party teleport operators.[53] The International Table of Frequency Allocations has allocations for amateur, radiolocation,

[45] *See Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 (2016); CTIA Petition at 8; Verizon Petition at 10-11; T-Mobile Petition at 14-16.

[46] *See also* AST Consolidated Response at 7.

[47] *See* Objection of EchoStar at 7 (EchoStar Objection); Reply Comments of EchoStar at 5 (EchoStar Reply). Although EchoStar's pleading was titled "Petition to Dismiss or Deny," we will consider it an informal objection because it lacks an affidavit required by our rules. 47 CFR § 25.154(a)(4), (b)(1).

[48] *Revising Spectrum Sharing Rules for Non-Geostationary Orbit, Fixed-Satellite Service Systems*, Report and Order and Further Notice of Proposed Rulemaking, 38 FCC Rcd 3699 (2023).

[49] *See* 47 CFR § 25.261(b); *id.* at 3709.

[50] *See* 47 CFR § 25.261; *see also* Kuiper Comments at 4; Telesat Comments at 2.

[51] A few satellite operators address the prospect of SpaceMobile MSS operations in S-band frequencies. *See* EchoStar Objection at 4, 17-18; Letter from Stephen J. Berman, Counsel, Globalstar, Inc., to Marlene H. Dortch, Secretary, FCC at 1-2 (dated Nov. 2, 2020); Letter from Karis A. Hastings, Counsel, Sirius XM Radio Inc. (Sirius XM), to Marlene H. Dortch, Secretary, FCC at 2 (dated Nov. 2, 2022); *see also* Letter from Mindel De La Torre, Chief Regulatory and International Strategy Officer, Omnispace, to Marlene H. Dortch, Secretary, FCC at 1 (dated Jul, 8, 2022). However, this grant is only limited to TT&C operations in the S-band.

[52] *See* ICFS File No. SAT-AMD-20240311-00053, Narrative at 8; AST Consolidated Response at 17.

[53] *See* ICFS File No. SAT-AMD-20240311-00053, Narrative at 8.

and Earth exploration-satellite services in the 430-440 MHz band. However, there is no relevant service classification for AST's TT&C operations. Accordingly, AST submitted an interference analysis to demonstrate that it will not cause harmful interference to other operations in conformance with the ITU Radio Regulations.[54] When operating in the 430-440 MHz band, AST shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the ITU Radio Regulations. Furthermore, in the unforeseen and unlikely case that harmful interference occurs, AST confirms that it is capable of ceasing transmissions from its satellites as required under section 25.207 of the Commission's rules, and consistent with notification of a non-conforming frequency use, which requires that any harmful interference be eliminated immediately.[55] We conclude that AST's demonstrations are sufficient to authorize a limited, non-conforming use, and therefore grant AST authority to conduct TT&C operations in the 430-440 MHz band with earth stations outside the United States, including during LEOP, subject to the laws, regulations, and requirements applicable to such operations in any foreign jurisdictions.

15. *Other Bands Allocated to Terrestrial Services for SCS.* In accordance with AST's request,[56] we defer consideration of AST's request to operate in 704-710 MHz, 710-716 MHz, 824-835 and 845-846.5 MHz, 835-845 MHz and 846.5-849 MHz Service Links (Earth-to-space) and 734-740 MHz, 740-746 MHz, 869-880 and 890-891.5 MHz, and 880-890 and 891.5-894 MHz Service Links (space to Earth),[57] and we emphasize that this grant does not include any authority to transmit or receive in the 617.0-960.0 MHz or 1805.0 MHz-2200.0 MHz bands inside or outside of the United States other than for TT&C operations in the 2025-2110 MHz band (Earth-to-space) outside the United States as specified herein.[58] With respect to the pending request for SCS, AST shall file all required information outlined in the *SCS R&O* and any additional information requested by the Commission.[59] Moreover, this grant is limited to five satellites only, and no further grant-in-part will be considered for deployment of any future AST satellites with direct-to-cell capabilities before AST's request for such capabilities, and any associated lease arrangement(s) or agreements, have been accepted for filing by the Commission under the framework established in the Commission's *SCS R&O*.[60] Likewise, while we do not grant authority with respect to AST's service band operations, for the feeder link gateways and TT&C earth stations, AST must coordinate with the National Radio Quiet Zone (NRQZ) for all new or modified,

[54] *See, e.g.*, ITU Radio Regulation No. 4.4.

[55] 47 CFR § 25.207; *see id.* at 12; ITU Radio Regulation No. 4.4.

[56] *See* ICFS File No. SAT-AMD-20240311-00053, Narrative at 7.

[57] We likewise defer consideration of AST's waiver requests specific to use of certain bands allocated to terrestrial services for SCS, which includes waiver requests of the U.S. Table of Frequency Allocations, 47 CFR § 2.106, and sections 25.156(d)(1), 25.157, 25.102(a) and 25.115(a)(1)(i) of the Commission's rules, 47 CFR §§ 25.156(d)(1), 25.157, 25.102(a), 25.115(a)(1)(i), as well as waiver requests of Parts 22 and 27 of the Commission's rules. *See* ICFS File No. SAT-AMD-20230717-00172, Exh. B at 1-5, 7-8.

[58] This portion of the application has not yet been accepted for filing and placed on public notice. *Satellite Licensing Division and Satellite Programs and Policy Division Information, Actions Taken*, Report No. SAT-01812 (Apr. 5, 2024) ("This application, as amended, is accepted for filing in part and the Satellite Programs and Policy Division does not at this time accept for filing AST's request to provide supplemental coverage from space, or otherwise operate in frequencies between 617 MHz and 2200.0 MHz except for the above-specified TT&C."). Until the deficiencies in ICFS File Nos. SAT-AMD-20230717-00172 and SAT-AMD-20240311-00053 are cured, we are not in a position to place the remainder of those applications on public notice. Further, the Commission will not authorize additional deployment authority for any satellites capable of operating on these frequency bands until an SCS application and any associated lease arrangement(s) or agreement have been placed on public notice.

[59] Should the Commission grant part or all of this request or any amendments thereto in the future, the Commission may adopt additional conditions beyond those specified in the *SCS R&O*.

[60] *See SCS R&O*, paras. 88-139; *infra* condition 27nn.

permanent, fixed, licensed transmitters inside the NRQZ.[61] We note that this grant does not provide AST any reliance interest with respect to deployment of additional AST satellites with direct-to-cell capabilities or service link operations within the United States in the future.[62] Any investment AST makes pursuant to this authorization is at its own risk.

16. *Optical Astronomy.* NRAO expresses concerns regarding the size of the AST satellites,[63] stating that AST's constellation would carry by far the majority of the light-reflecting surface area of all LEO satellites for the foreseeable future, with the potential to vastly magnify the burgeoning disturbance of the appearance of the night sky.[64] We also acknowledge various comments filed in the docket for the SCS proceeding expressing concerns over the size of AST's satellites and the impact of the brightness of AST's satellites on the night sky.[65]

17. AST has specified its actions to mitigate any impact of its satellites on optical astronomy, which will include making available accurate satellite ephemeris data to astronomy stakeholders, incorporating deployable antenna elements that reduce brightness, and operationally rolling or tilting spacecraft to avoid direct illumination of optical telescopes.[66] Furthermore, AST has engaged in extensive coordination efforts with the U.S. National Science Foundation (NSF) to negotiate a draft Memorandum of Understanding (MOU) memorializing mutual coordination commitments in order to mitigate optical astronomy interference.[67] This grant includes specific conditions associated with that coordination. AST must make a good faith effort to demonstrate an optical brightness with an initial aim of 6th magnitude and progress toward 7th magnitude or fainter, report on this progress annually, choose lower orbital elevations when feasible, design its constellation to minimize the number of satellites necessary, provide orbital information to astronomy sites and astronomers, and continue to evaluate ways to mitigate impacts on optical astronomy interests.[68] AST must also file a copy of the MOU with the Commission. Based on the information reported in connection with these conditions, the license may be subject to additional terms and conditions. We similarly condition this grant on this continued coordination with NSF and compliance with any terms contained in the resulting coordination agreement.[69] AST must also file a copy of the agreement with the Commission prior to commencing operations. Under these circumstances, we conclude that the concerns raised have been addressed with respect to this limited grant authorizing deployment of five satellites only.

[61] *See* 47 CFR § 1.924.

[62] *See* Omnispace August 29 Ex Parte.

[63] *See* NRAO Comments at 5. NRAO also expresses concern about the effect of AST's requested operations in the 42-42.5 GHz band on radio astronomy. NRAO Comments at 2-4. However, as discussed above, AST no longer seeks to operate in the 4242.5 GHz band.

[64] *See id.* at 5.

[65] *See* ECFS Docket No. 23-65.

[66] *See* Letter from Timothy Bransford, Counsel, AST, to Marlene H. Dortch, Secretary, FCC (dated Jul. 24, 2024), Attach. 2 at 2.

[67] *See id.* at 1-2.

[68] *See* AST August 1 Letter at 3; *see also id.* (noting that the optical brightness of the Block 1 Bluebirds is estimated on average to be of a visual magnitude of approximately 5.83). AST shall address in this continued coordination with NSF the locations of earth stations to preferentially avoid key U.S. radio observatories, and AST is encouraged to minimize the impact on astronomical laser closure windows.

[69] *See id.* at 3. We also note that operations have been coordinated with Federal spectrum users. As a result, we have also included conditions that AST shall address, in continued coordination with NSF, the locations of earth stations to preferentially avoid key U.S. radio observatories, and AST is encouraged to minimize the impact on astronomical laser closure windows.

18. *Orbital Debris Mitigation.* We find that AST has provided an orbital debris mitigation plan in conformance with our rules. AST has submitted an updated debris mitigation plan which complies with the Commission's more recently adopted debris mitigation rule revisions and provides an estimate of the amount of fuel reserved for post-mission disposal maneuvers.[70] AST has also committed to 1) employing a launch and on-orbit conjunction analysis and mitigation process, and associated thresholds; and 2) working with National Aeronautics and Space Administration (NASA) and other users of space on orbital debris mitigation best practices.[71]

19. In connection with AST's earlier filings with the Commission, NASA and TechFreedom express concern that the size and orbital regime of the satellites heighten the collision danger for any failed AST spacecraft, creating a threat to considerable assets from resulting debris.[72] NASA recommended that AST consider an orbit below NASA's A-Train Constellation.[73] NASA further suggested that AST works with the Commission to conduct a detailed analysis to identify and achieve the necessary propellant management device (PMD) reliability for the proposed constellation to mitigate potential negative effects from the constellation to the environment.[74] In connection with its updated debris mitigation plan that AST subsequently filed, we are persuaded that AST has addressed these concerns to the extent necessary to issue this limited grant. AST and NASA have signed a joint Space Act Agreement to improve flight safety and have begun collaborating since NASA submitted these comments.[75] NASA has since clarified that, while technical concerns still exist, this need not preclude the issuance of the requested license.[76] As a result, we concurrently find AST has satisfied instant concerns about the size of the satellites that were raised by NASA and echoed by TechFreedom.[77] We also note that the five satellites which are authorized in this Order will operate in the 515-525 kilometer altitude range, which is well below the altitude of the A-Train satellites about which NASA expresses concern.

20. To further reduce the possibility of debris generated by AST's satellites, we adopt two additional conditions suggested by NASA. First, we require AST to have a conjunction assessment (CA) and mitigation process of the same sophistication and risk aversion as the NASA satellites with which they will be collocated.[78] Second, we require AST to create a robust arrangement for direct contact and sharing of ephemerides and maneuver plans with NASA/USGS/partner during routine operations to

[70] ICFS File No. SAT-AMD-20240311-00053, Exh. B at 7; EchoStar Objection at 7; EchoStar Reply at 5.

[71] *See* AST Consolidated Response at 13.

[72] *See* Letter from Samantha Founder, Representative to the Commercial Space Transportation Interagency Group Human Exploration and Operations Mission Directorate, Launch Services Office, NASA, to Marlene H. Dortch, Secretary, FCC at 2 (dated Oct. 29, 2020) (NASA Letter); *see also* Letter from James E. Dunstan, General Counsel, TechFreedom, to Marlene H. Dortch, Secretary, FCC at 2 (dated Nov. 2, 2020) (TechFreedom Letter) ("TechFreedom shares the concerns expressed by NASA in its October 29, 2020, letter, filed in this docket…").

[73] *See* NASA Letter at 2.

[74] *See id.* at 4.

[75] *See* Letter from Samantha Founder, Representative to the Commercial Space Transportation Interagency Group Human Exploration and Operations Mission Directorate, Launch Services Office, National Aeronautics and Space Administration (NASA), to Marlene H. Dortch, Secretary, FCC at 1 (dated Nov. 17, 2020) (NASA Response); ICFS File No. SAT-AMD-20240311-00053, Exh. B at 4-6; Letter from Timothy Bransford, Counsel to AST, to Marlene H. Dortch, Secretary, FCC at 2 (dated Dec. 19, 2022).

[76] *See* NASA Response at 1.

[77] AST also explains that TechFreedom's assessment of the satellite size is incorrect because the satellite will fly on edge, and that the satellites will have a cross-section of about 3 meters squared rather than the 900 meters squared cross-section that TechFreedom claims. *See* AST Consolidated Response at 13-14; TechFreedom Letter at 2.

[78] *See* NASA Letter at 2.

prevent collisions and simultaneous maneuvers.[79]

21. In addition, SpaceX argues that the Commission should impose, as conditions on any authorization granted to AST in this proceeding, the space sustainability requirements it recently determined were in the public interest when authorizing SpaceX's second-generation NGSO system.[80] Although we issue a limited grant of five satellites, given the size of the satellites and AST's plans to expand its constellations, we agree that such conditions remain an important means to mitigate orbital debris and adopt a similar set of conditions for AST. Such conditions will give the Commission the ability to monitor AST's operations continuously to address satellite reliability issues as they arise, with additional flexibilities to account for a system that is in the early stages of what is ultimately planned to be a larger-scale deployment. We also encourage AST to provide information and collaborate with the Commission in the event of even a single satellite disposal failure. Regarding the condition that includes the 100 object year metric, we find the facts for AST similar to those of Kuiper, another licensee whose system is more like SpaceX's first generation system in terms of being early in the deployment phase and to which the Space Bureau did not impose an object year metric, and we similarly do not adopt a 100 object year metric here.[81]

22. We do not find that TechFreedom has sufficiently demonstrated additional orbital debris concerns that would prohibit this grant.[82] This grant is for a limited number of satellites, only five compared to the 243 to which TechFreedom objects.[83] Moreover, while TechFreedom requests that the Commission defer action on AST's application until we complete the proceeding and issue rules pursuant to the Further Notice of Proposed Rulemaking contained in the Commission's proceeding on *Mitigation Orbital Debris in the New Space Age*,[84] there is nothing to prevent consideration of specific applications for satellite constellations during the pendency of the proceeding, and here we authorize deployment of five satellites only.[85]

23. *Waiver Requests.* In connection with its request, AST seeks waivers of the various Commission rules. A waiver is appropriate only if both (1) special circumstances warrant a deviation

[79] *See id.*

[80] *See* Letter from David Goldman, Senior Director of Satellite Policy, to Marlene H. Dortch, Secretary, FCC (dated Jan. 17, 2023) (SpaceX January 17 Letter); *see also Space Exploration Holdings, LLC, Request for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System*, Order and Authorization, FCC 22-91 (2022). SpaceX argues that the Commission should not rely on other agencies to raise orbital debris concerns, that small constellations can be create risk at certain altitudes, that satellites at higher altitudes can carry higher collision risk, that newer operators require more oversight, and that exempting operators from the Gen2 Order requirements perpetuates an uneven competitive playing field. *See* Letter from David Goldman, Director of Satellite Policy, SpaceX, to Marlene H. Dortch, Secretary, FCC at 2-4 (dated Mar. 31, 2023).

[81] *See Kuiper Systems LLC Request for Modification of the Authorization for the Kuiper NGSO Satellite System*, Order Authorization, DA 24-224, para. 17 (Mar. 8, 2024).

[82] TechFreedom expresses a few additional concerns about potential orbital debris generated by AST satellites due to their number and design by a start-up entity. *See* TechFreedom Letter at 2-4. TechFreedom also raised orbital debris concerns related to AST seeking a license through Papua New Guinea, an authority which TechFreedom posits does not have significant expertise in orbital debris analysis. *See id.* at 3-4. However, this argument is now moot given AST seeks a U.S. license.

[83] *See id.* at 1.

[84] *Space Innovation: Orbital Debris in the New Space Age*, IB Docket Nos. 22-271 and 18-313, Second Report and Order, FCC 22-74 (Sept. 30, 2022); Tech Freedom Letter at 4 (citing *Orbital Debris in the New Space Age*, IB Docket No. 18-313, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 4156 (2020)).

[85] *See Orbital Debris in the New Space Age*, 35 FCC Rcd at 4227-4250, paras. 154-205.

from the general rule, and (2) such deviation better serves the public interest.[86] Generally, the Commission may waive any rule if there is good cause to do so and, in making this determination, may take into account considerations such as hardship, equity, or more effective implementation of overall policy on an individual basis.[87] Here, we only address waivers related to the limited operations authorized herein and defer consideration of AST's remaining relevant waiver requests.[88]

24. AST seeks waiver of section 25.156(d)(4) of the Commission's rules, which provides that the Commission will consider applications for authority to operate feeder links separately from applications to provide service.[89] We dismiss AST's request to waive section 25.156(d)(4) as unnecessary. Section 25.156(d)(4) does not prohibit consideration of applications with requesting both feeder link and service link operation, but was intended to expedite application processing in light of the updated modified processing round rules.[90] In any event, AST now requests that the Commission defer authority to operate on the requested service bands allocated to terrestrial services for SCS and in the interim only requests authority to operate feeder links, in addition to TT&C operations, and we accordingly only issue authority for feeder link and not service link operations.[91]

25. In addition, AST argues that its most recent amendment should not be considered "major" because none of the changes in the instant application increase the potential for interference or otherwise implicate the elements of section 25.116(b) of the Commission's rules.[92] However, to the extent the Commission considers this a major amendment that does not fall within the exception, AST requests waiver of section 25.116(c) of the Commission's rules and argues that the amendment does not create increased interference risk as demonstrated in the updated technical annex and interference analysis.[93] In its most recent amendment, AST requests to operate five additional satellites at a lower altitude and added requests to operate in the S-band and UHF band for TT&C during LEOP and emergency TT&C.[94] Although submitting these additional requests could be considered a "major"

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[86] *NetworkIP, LLC v. FCC*, 548 F.3d 116, 125-128 (D.C. Cir. 2008) (citing *Northeast Cellular Telephone Co.*, 897 F.2d 1164, 1166 (1990)).

[87] 47 CFR § 1.3. *See Northeast Cellular*, 897 F.2d at 1166 ("[A] waiver is appropriate only if special circumstances warrant a deviation from the general rule and such deviation will serve the public interest. The agency must explain why deviation better serves the public interest and articulate the nature of the special circumstances to prevent discriminatory application and to put future parties on notice as to its operation"); *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969) ("The agency's discretion to proceed in difficult areas through general rules is intimately linked to the existence of a safety valve procedure for consideration of an application for exemption based on special circumstances.").

[88] AST also requested waivers of section 25.112(a)(3) of the Commission's rules, which provided that the Commission will dismiss applications that request authority to operate space stations in bands not allocated internationally for the requested operations under the ITU Radio Regulations, and relatedly of section 25.112(b) of the Commission's rules, which formerly cited to section 25.112(a)(3). *See* ICFS File No. SAT-AMD-20240311-00053, Narrative at 14; ICFS File No. SAT-AMD-20230717-00172, Exh. B at 6-7. However, section 25.112(a)(3) has since been removed from the Commission's rules, and these waiver requests are thus dismissed as moot. *See Expediting Initial Processing of Satellite and Earth Station Applications; Space Innovation*, Report and Order and Further Notice of Proposed Rulemaking, FCC 23-73, para. 27 (Sept. 21, 2023).

[89] 47 CFR § 25.156(d)(4).

[90] *See id.*; *Amendment of the Commission's Space Station Licensing Rules and Policies*, First Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 10760, 10811-10812, para. 127 (2003).

[91] *See* ICFS File No. SAT-AMD-20240311-00053, Narrative at 7.

[92] 47 CFR § 25.116(b); s*ee* ICFS File No. SAT-AMD-20240311-00053, Narrative at 13.

[93] *See* ICFS File No. SAT-AMD-20240311-00053, Narrative at 12-13.

[94] *See id.* at iii-iv.

amendment under our rules,[95] these requests do not create the potential for new or increased frequency conflicts, and AST does not seek to make any changes to its previously requested V-band operations.[96] Also, no other processing round participants commented or expressed concern on AST's request for an additional five satellites or TT&C frequencies. We accordingly find that it would not serve the public interest to demote the status of AST's timely filed V-band application and dismiss AST's request for waiver as unnecessary.

26. *Lack of Deficiencies in Application.* In issuing this grant in part of AST's application, we find that AST's application is complete and consistent for the operations covered by the grant. T-Mobile argued that aspects of AST's Form 312 and Schedule S were incomplete.[97] However, since AST filed its most recent amendment, which includes an updated Form 312 and Schedule S,[98] T-Mobile has not commented further on the completeness of AST's application. Thus, we consider T-Mobile's concerns moot.

IV. ORDERING CLAUSES

27. Accordingly, IT IS ORDERED that the application filed by AST&Science LLC is GRANTED IN PART AND DEFERRED IN PART, with conditions, as set forth in this Order, pursuant to section 309(a) of the Communications Act of 1934, as amended, 47 U.S.C. § 309(a). AST&Science LLC is AUTHORIZED to operate up to five non-geostationary orbit satellites in accordance with the technical specifications set forth in its application and in compliance with the Commission's rules, unless waived herein, and subject to the following conditions:

a. AST is authorized to operate in the following bands: 37.5-42.0 GHz (center frequency of 38.75 GHz with bandwidth of 2.5 GHz; center frequency of 39.75 GHz with bandwidths of 0.5 GHz and 4.5 GHz; center frequency of 40.25 GHz with bandwidth of 0.5 GHz, center frequency of 41.0 GHz with bandwidth of 2.0 GHz) (space-to-Earth), 47.2-50.2 GHz (center frequency of 48.7 GHz with bandwidth of 3.0 GHz) (Earth-to-space), 50.4-51.4 GHz (center frequency of 50.9 GHz with bandwidth of 1.0 GHz) (Earth-to-space), 2025-2110 MHz (center frequencies of 2047.0 MHz, 2057.0 MHz, and 2077.0 MHz, each with bandwidths of 192 kHz) (Earth-to-space), 2200-2290 MHz (center frequencies of 2225 MHz and 2235 MHz, each with bandwidths of 768 kHz) (space-to-Earth), and 430-440 MHz (center frequencies of 430.5 MHz, 432.3 MHz, 434.1 MHz, 435.9 MHz, and 439.5 MHz, each with bandwidths of 50 kHz) (space-to-Earth and Earth-to-space).[99]

b. AST's request to conduct SCS or direct-to-cell operations in the 617.0-960.0 MHz or 1805.0 MHz-2200.0 MHz bands IS DEFERRED, and AST may not transmit or receive in those bands, other than to perform the TT&C operations in the 2025-2110 MHz band granted herein with earth stations outside of the United States. With respect to any request to conduct SCS, AST shall file all required information as outlined in the *SCS R&O* and any additional information requested by the Commission.

c. AST must prepare the necessary information, as may be required, for submission to the ITU to initiate and complete the advance publication, coordination, due diligence, and notification process for these space stations, in accordance with the ITU Radio

[95] 47 CFR § 25.116(b)(1).

[96] 47 CFR § 25.116(c)(1).

[97] *See* T-Mobile Petition at 9-10; *see also* EchoStar Reply at 3.

[98] *See* ICFS File No. SAT-AMD-20240311-00053.

[99] These center frequencies and bandwidths are the result of coordination with Federal operators. With respect to those frequency bands shared with Federal spectrum users, Federal operators have indicated that Federal missions brought into use after issuance of this grant may prevent future modification or renewal.

Regulations. AST shall be held responsible for all cost-recovery fees associated with the ITU filings. No protection from interference caused by radio stations authorized by other administrations is guaranteed unless coordination and notification procedures are timely completed or, with respect to individual administrations, by successfully completing coordination agreements. Any radio station authorization for which coordination has not been completed may be subject to additional terms and conditions as required to effect coordination with the frequency assignments of other administrations. *See* 47 CFR § 25.111(b).

d. In connection with the provision of service in any particular country, AST is obliged to comply with the applicable laws, regulations, rules, and licensing procedures of that country.

e. AST shall be aware that space-to-Earth and Earth-to-space operations shall be strictly limited to durations when the AST space stations referenced within this license request are visible to the corresponding earth station locations listed in Appendix A of this grant, noting any additional restrictions within this grant.

f. Transmissions in the 430-440 MHz, 2025-2110 MHz, and 2200-2290 MHz frequency bands may only be made using specific frequencies and earth stations coordinated with NASA, the Air Force Spectrum Management Office (AFSMO), Department of Commerce (DOC)/National Oceanic and Atmospheric Administration (NOAA), and the Department of the Navy (DON). Any use of Federal or government-sponsored ground stations shall be coordinated by AST's federal government customers with AFSMO (jimmy.nguyen@us.af.mil), NASA (HQ-SatCoord@mail.nasa.gov), and DOC (edna.prado@noaa.gov). A list of coordinated non-Federal earth stations is attached as Appendix A.[100] AST SpaceMobile shall successfully coordinate any changes to the list of Federal or non-Federal earth stations, which must be located outside the United States, prior to requesting license modification to add these station locations.

g. AST may only conduct backup TT&C operations in the 2025-2110 MHz band using the center frequencies and bandwidths coordinated with Federal users set forth in condition 27a of this grant and only during LEOP and emergency (non-earth pointing) situations. AST shall notify NASA (HQ-SatCoord@mail.nasa.gov) and AFSMO (jimmy.nguyen@us.af.mil) within 5 days after completion of LEOP and within 5 days after any emergency event requiring use of this band for emergency operations. AST's operations pursuant to this authorization under the International Table of Frequency Allocations must not cause harmful interference to stations operating in the 2025-2110 MHz band in accordance with the U.S. Table of Frequency Allocations, 47 CFR § 2.106(a).

h. In the 2025-2110 MHz band (Earth-to-space), AST shall cease uplink transmissions (which are limited to TT&C during LEOP and for emergency TT&C in the 2025-2110 MHz (Earth-to-space) band with specified earth stations outside the United States) centered at 2057 MHz with 192 kHz bandwidth when the NASA OSAM-1 satellite (also known as RESTORE-L) is within radio line of sight (RLOS) to AST earth stations identified in Appendix A. This condition shall be applied after OSAM-1 is brought into use.

i. In the 2025-2110 MHz band (Earth-to-space), AST shall cease uplink transmissions (which are limited to TT&C during LEOP and for emergency TT&C in the 2025-2110 MHz (Earth-to-space) band with specified earth stations outside the United States)

[100] ICFS File No. SAT-AMD-20240311-00053, Tech Annex at 10.

centered at 2077 MHz during NASA's Artemis missions, beginning with Artemis IV, from Launch to Launch + 24 hours.

j. AST may only conduct backup TT&C operations in the 2200-2290 MHz band using the center frequencies and bandwidth coordinated with Federal users set forth in condition 27a of this grant and only during LEOP and emergency (non-earth pointing) situations. AST shall notify NASA (HQ-SatCoord@mail.nasa.gov) and AFSMO (jimmy.nguyen@us.af.mil) within 5 days after completion of LEOP and within 5 days after any emergency event requiring use of this band for emergency operations. AST is required to successfully coordinate with NTIA prior to any operations in the 2200-2290 MHz frequency band. No operations in the 2200-2290 MHz frequency band are permitted with earth stations in the United States and Possessions (US&P). AST is required to successfully coordinate with NTIA prior to submitting any ITU filing involving any ground stations outside of the US&P that operate in the frequency band 2200-2290 MHz. The 2200-2290 MHz band is allocated to Space Operations (space-to-Earth) and EESS (space-to-Earth) in all ITU Regions, but in the United States the band is only allocated for Federal use (except as provided for in 47 CFR section 2.106(c)(96), (303) (footnotes US96 and US303), which are not applicable here). Operations in the 2200-2290 MHz frequency band are permitted for use only outside of the US&P. NTIA will consider the request by AST for access to the 2200-2290 MHz band for earth stations located outside of the US&P on a case-by-case coordinated basis with appropriate EMC analysis to NTIA (ravery@ntia.gov), AFSMO (jimmy.nguyen@us.af.mil), NASA (HQ-SatCoord@mail.nasa.gov), and DOC (edna.prado@noaa.gov) to ensure compatibility of operations with the Federal government.

k. In the 2200-2290 MHz band (space-to-Earth), AST shall cease downlink transmissions from any of its satellites:

   i. For the center frequency of 2225 MHz with 768 kHz bandwidth, when both an AST satellite and either of the two NASA TRACERS satellites is within radio line of sight (RLOS) to the TRACERS's earth stations located at Santiago, Chile; Dongara, Australia; South Point, HI; Punta Arenas, Chile; North Pole, AK; Kiruna, Sweden. This condition shall be applied after TRACERS is brought into use.

   ii. For the center frequency at 2235 MHz during NASA's Artemis missions, beginning with Artemis IV, from Launch to Launch + 48 hours.

l. PFD levels from operation in the 2200-2290 MHz band must not exceed the limits in Table 21-4 of the ITU Radio Regulations and must meet the limits/protection criteria in Recommendation ITU-R SA.1157-1 and Recommendation ITU-R SA.609-2.

m. AST may only conduct backup TT&C operations in the 430-440 MHz band using the center frequencies and bandwidths coordinated with Federal users set forth in condition 27a of this grant and only during LEOP and emergency (non-earth pointing) situations. AST shall notify NASA (HQ-SatCoord@mail.nasa.gov) within 5 days after completion of LEOP and within 5 days after any emergency event requiring use of this band for emergency operations. When operating in the 430-440 MHz band, AST shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the ITU Radio Regulations.[101]

n. To accommodate Federal use of the 430-440 MHz, 2025-2110 MHz, and/or 2200-2290 MHz bands for future Federal missions, AST agrees to implement further restrictions to

[101] *See* ITU Radio Regulation No. 4.4.

the authorized center frequencies and bandwidths identified in this grant upon notification from one or more of the Federal agencies (including potential operational duty cycle limitations). AST shall notify the FCC of further restrictions imposed by a Federal agency within 10 days of notification and shall operationally implement the restriction within 30 days.

o. AST operations in V-band frequencies shall not cause interference to, and shall not claim protection from, geostationary orbit (GSO) networks operating in the FSS and Broadcasting-Satellite Service (BSS) in accordance with section 25.289 of the Commission's rules, 47 CFR § 25.289. In the event that relevant EPFD limits or procedures related to sharing between GSO and NGSO networks are adopted by the Commission or the ITU, operations must be in conformance with such limits and procedures.

p. Operations in the 37.5-40.0 GHz band must comply with the PFD limits in section 25.208(r).

q. 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."

r. Operations in the 37.5-42 GHz band (space-to-Earth) must not cause unacceptable interference to, or claim protection from, a GSO FSS or BSS network. These operations must comply with ITU Radio Regulations 22.5L and 22.5M.

s. Operations in the 40-42 GHz band are authorized up to the PFD limits in 47 CFR § 25.208(s) and (t).

t. In accordance with footnote US211 to the U.S. Table of Frequency Allocations, 47 CFR § 2.106(a), (c)(211), AST is urged to take all practicable steps to protect radio astronomy observations in the adjacent bands from harmful interference from its operations in the 40.5-42.0 GHz band (*see* ITU-R Recommendation RA.1513-2 and ITU-R RA.769-2).

u. In accordance with Footnote 5.550CA of the Radio Regulations, all space-to-Earth transmissions at angles greater than 65.0° from nadir relative to each AST satellite shall not exceed an unwanted emission EIRP density of −21 dB(W/100 MHz) in the 36-37 GHz band.

v. Space stations receiving in the 47.2-48.2 GHz and the 50.4-51.4 GHz band may not claim interference protection from the fixed and mobile services.

w. Operations in the 50.4-51.4 GHz band are subject to rules that may be adopted in the Spectrum Frontiers Proceeding, GN Docket 14-177.

x. Operations in the 47.2-50.2 GHz and 50.4-51.4 GHz bands (Earth-to-space) must not cause unacceptable interference to, or claim protection from, a GSO FSS or BSS network. These operations must comply with ITU Radio Regulations 22.5L and 22.5M.

y. In accordance with footnote US342 to the U.S. Table of Frequency Allocations, 47 CFR § 2.106(a), (c)(342), AST 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. In addition, any future grant of earth station licenses for operations with the AST system will be subject to the following condition: 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.

z. In accordance with Resolution 750 of the Radio Regulations, and with footnote US156, all Earth-to-space transmissions shall not exceed an unwanted emission power, as measured at the antenna port, of –42 dBW in the frequency band 50.2-50.4 GHz. For earth stations that employ uplink power control (free-space path loss compensation), the unwanted emission power shall be limited to −42 dBW at zenith and may increase to a maximum level of −35 dBW at a minimum elevation angle of 15°. Prior to launch, AST shall provide measured spectrum plots to NASA (HQ-SatCoord@mail.nasa.gov) to ensure conformance with unwanted emission limits.

aa. AST must coordinate with NSF prior to commencing operations to ensure a mutually acceptable agreement to mitigate the impact of its satellites on ground-based radio, optical and infrared astronomy sites.[102] This coordination shall include locations of earth stations to preferentially avoid key U.S. radio observatories, and AST is encouraged to minimize the impact on astronomical laser closure windows (NSF ESM office: esm@nsf.gov).

bb. For any feeder link gateways or TT&C earth stations, NRQZ coordination is required for all new or modified, permanent, fixed, licensed transmitters inside the NRQZ, as specified for non-federal transmitters in 47 CFR § 1.924.

cc. AST must coordinate in good faith the use of commonly authorized frequencies with all authorized NGSO FSS grantees.

dd. Operations must comply with the spectrum sharing procedures among NGSO FSS space stations specified in 47 CFR § 25.261(c) with respect to any NGSO system licensed or granted U.S. market access pursuant to the 2021 V-band processing round initiated in Public Notice, DA 21-941, 36 FCC Rcd 12148 (IB 2021).

ee. Prior to commencing operations, AST must either certify that it has completed a coordination agreement with any operational NGSO FSS system licensed or granted U.S. market access pursuant to the 2016 V-band processing round initiated in Public Notice, DA 16-1244, 31 FCC Rcd 11957 (IB 2016), or submit for Commission approval a compatibility showing which demonstrates by use of a degraded throughput methodology that it will not cause harmful interference to any such system with which coordination has not been completed. If an earlier-round system becomes operational after AST has commenced operations, AST must submit a certification of coordination or a compatibility showing with respect to the earlier-round system no later than 60 days after the earlier-round system commences operations. AST may commence operations at its own risk, on a non-interference, unprotected basis with respect to any operations authorized pursuant to the 2016 V-band processing round for which coordination has not been completed, prior to the approval of its showing by the Commission. Protection of the earlier round systems by AST will sunset pursuant to section 25.261(e).

ff. AST must comply with the sharing of ephemeris data procedures described in section 25.146 of the Commission's rules, 47 CFR § 25.146(e).

gg. AST 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.

hh. AST's operations must comply with the emission limitations set forth in section 25.202(f)

[102] *See infra* condition 33.

of the Commission's rules.

ii. Prior to commencing operations with the space stations authorized herein, AST must file with the Commission the information required by section 25.172 of the Commission's rules, 47 CFR § 25.172.

jj. AST shall notify the Commission, and other federal agencies, the initial orbital parameters (e.g., operating altitudes, inclination angle) for each satellite within 30 days following deployment. Notification shall be provided to AFSMO (jimmy.nguyen@us.af.mil), NASA (HQ-SatCoord@mail.nasa.gov), and DOC/NOAA (edna.prado@noaa.gov).

kk. Unless extended by the Commission for good cause shown, this authorization will become null and void in the event the AST space stations are not constructed and launched in accordance with the schedule set forth in section 25.164 of the Commission's rules, as follows:

i. AST must post a surety bond in satisfaction of 47 CFR §§ 25.165(a)(1) & (b) no later than **September 1, 2024**, 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

ii. AST 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 **August 2, 2030** 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 **August 2, 2033**. 47 CFR § 25.164(b).

iii. 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 AST'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 AST's surety bond. By **August 17, 2030**, AST 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).

ll. The license term for the constellation is 15 years and will begin on 3 a.m. EST on the date that AST certifies to the Commission that its initial space station has been successfully placed into orbit and its operations fully conform to the terms and conditions of this authorization. AST must file such certification within five business days of placing its initial satellite into operation

mm. AST satellites must operate consistent with all technical specifications provided to the Commission. Should AST wish to alter any other technical specifications, including but not limited to any information presented in its orbital debris mitigation plan for the AST system, it must apply for further license modification from the Commission.

nn. Any action taken or expense incurred as a result of operations pursuant to this grant is solely at AST's own risk. This grant is limited to five satellites only, and no further grant-in-part will be considered for deployment of any future AST satellites capable of operating in the 617-960 MHz or 1805 MHz-2200 MHz bands before AST's request for such operations, and any associated lease arrangement(s) or agreement(s) have been accepted for filing by the Commission under the framework established in the

Commission's *SCS R&O*.[103]

oo. This authorization is subject to modification to bring it into conformance with any rules or policies adopted by the Commission in the future. Accordingly, in making any investments relating to operations authorized in this Order, AST assumes the risk that it may be subject to additional conditions or requirements as a result of any future Commission actions. This includes, but is not limited to, any conditions or requirements resulting from any action in the proceedings associated with IB Docket 22-271 and GN Docket 23-65,[104] IB Docket 18-313,[105] and IB docket 21-456.[106]

pp. This grant is without prejudice to any future action taken in connection with any other pending requests before the Commission by AST, including but not limited to requests included within ICFS File Nos. SAT-AMD-20230717-00172 and SAT-AMD-20240311-00053.

qq. This grant-in-part is without prejudice to any action on the remainder of the requests in AST's application, including with respect to the issues raised in the record of this proceeding not otherwise addressed herein.

28. IT IS FURTHER ORDERED that this grant is subject to modification to bring the AST space stations into conformance with any rules or policies adopted by the Commission in the future.

29. AST must provide a semi-annual report, by January 1 and July 1 each year, covering the preceding six-month period, respectively, from June 1 to November 30 and December 1 to May 31. The report should include the following information:

a. The number of conjunction events identified for AST satellites during the reporting period, and the number of events that resulted in an action (maneuver or coordination with another operator), as well as any difficulties encountered in connection with the collision avoidance process and any measures taken to address those difficulties,

b. Satellites that, for purposes of disposal, were removed from operation or screened from further deployment at any time following initial deployment, and identifying whether this occurred less than five years after the satellite began regular operations or were available for use as an on-orbit replacement satellite,

c. Satellites that re-entered the atmosphere,

d. Satellites for which there was a disposal failure, i.e. a satellite that loses the capability to maneuver effectively, including a discussion of any assessed cause of the failure and remedial actions, and

[103] *See SCS R&O*, paras. 88-139.

[104] *See generally Single Network Future: Supplemental Coverage from Space, Space Innovation*, Report and Order and Further Notice of Proposed Rulemaking, FCC 24-28 (Mar. 14, 2024); *Single Network Future: Supplemental Coverage from Space, Space Innovation*, Notice of Proposed Rulemaking, FCC 23-22 (Mar. 17, 2023).

[105] *See generally Space Innovation Mitigation of Orbital Debris in the New Space Age*, Report and Order, 37 FCC Rcd 11818 (2022); *Mitigation of Orbital Debris in the New Space Age*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 4156 (2020).

[106] *See generally Revising Spectrum Sharing Rules for Non-Geostationary Orbit, Fixed-Satellite Service Systems*, Report and Order and Further Notice of Proposed Rulemaking, FCC 23-29 (Apr. 21, 2023); *Revising Spectrum Sharing Rules for Non-Geostationary Orbit, Fixed-Satellite Service Systems; Revision of Section 25.261 of the Commission's Rules to Increase Certainty in Spectrum Sharing Obligations Among NGO FSS Systems*, Order and Notice of Proposed Rulemaking, 36 FCC Rcd 17871 (2021).

e. Identification of any collision avoidance system outages or unavailability, either on a system-wide basis or for individual satellites. An "outage" would include any individual satellite anomaly that results in a satellite not achieving targeted risk mitigation via maneuver.

30. AST must also provide a report if during any continuous one-year period there are two or more satellite disposal failures. Such report shall be filed not later than 10 days following the second disposal failure and must either state the assessed cause of the failure and remedial actions for each of the disposal failures during the period, if available, or provide a schedule for completion of a process for doing so. Based on the information reported, the license may be subject to additional terms and conditions, including additional reporting obligations, limitations on additional deployments, requirements for early removal of satellites from orbit, or any other appropriate conditions to limit collision risk.

Upon receipt of a conjunction warning from the 18th Space Control Squadron or other source, AST must review and take all possible steps to assess the collision risk and mitigate collision risk if necessary. As appropriate, steps to assess and mitigate should include, but are not limited to: contacting the operator of any active spacecraft involved in such warning; sharing ephemeris data and other appropriate operational information with any such operator; modifying spacecraft attitude and/or operations. AST must communicate and collaborate with NASA to ensure that deployment and operation of its satellites does not unduly constrain deployment and operation of NASA assets and missions, supports safety of both AST and NASA assets and missions, and preserves long-term sustainable space-based communications services. AST must report on the progress of its communications and collaboration efforts to the Commission in its regular reports specified in condition 29 of this grant.

AST must have a collision avoidance and mitigation process of the same sophistication and risk aversion as any NASA satellites with which AST's satellites would be collocated. AST must create a robust arrangement for direct contact and sharing of ephemerides and maneuver plans with NASA or USGS partners during routine operations to prevent collisions and simultaneous maneuvers.

31. AST must continue to coordinate and collaborate with NASA to promote a mutually beneficial space environment that would minimize impacts to NASA's science missions involving astronomy.

32. AST must monitor its satellites' propellant reserves to ensure that the AST satellites are able to fully perform collision avoidance maneuvers during operations at the relevant altitudes specified in its application as well as complete maneuvers to lower the apogee to below any inhabitable space stations. Should an AST satellite engage in more maneuvers than originally projected or otherwise consume propellant more rapidly than anticipated, AST must initiate deorbit operations early in order to ensure that sufficient propellant remains to complete deorbit maneuvers. AST must make available to other operators supplemental information, based on GPS readings or other supplemental sources, such as third-party observations, sufficient to reduce covariance of predicted trajectories to a level that facilitates collision avoidance procedures, as coordinated with other operators.

33. AST must coordinate with NSF to achieve a mutually acceptable agreement to mitigate the impact of its satellites on optical ground-based astronomy and comply with any terms contained therein. A copy of such agreement must be filed with the Commission before AST commences operations.[107] AST must submit an annual report to the Commission, by January 1st each year covering the preceding year containing the following information: (1) whether it has reached a coordination agreement with NSF addressing optical astronomy; and (2) any steps AST has taken to reduce the impact of its satellites on optical astronomy, including but not limited to darkening, deflecting light away from the Earth, attitude maneuvering, and provision of orbital information to astronomers for scheduling

[107] *See supra* condition 27aa.

observations around satellites' locations.

In coordinating operations with NSF, AST must make a good faith effort to adopt or work towards the following recommendations: 1) demonstrate via modeling and sky measurements an optical brightness with an initial aim of 6th magnitude and a goal of 7th magnitude or fainter, 2) report on progress annually to the Commission, 3) choose orbital elevations of ~700 km or lower when feasible and design its constellation to minimize the number of satellites necessary to provide service, and 4) provide real-time high-fidelity orbital information for dissemination to astronomy sites and astronomers developing scheduling algorithms.

34. IT IS FURTHER ORDERED that the request of AST for a waiver of the Commission's processing round rules IS DISMISSED AS MOOT regarding the 37.5-42.0 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space), and 50.4-51.4 GHz (Earth-to-space) frequency bands.

35. IT IS FURTHER ORDERED that the request of AST for a waiver of the Commission's mutual exclusivity rule IS DISMISSED AS MOOT regarding the 37.5-42.0 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space), and 50.4-51.4 GHz (Earth-to-space) frequency bands.

36. IT IS FURTHER ORDERED that the request of AST for a waiver of section 25.156(d)(4), which requires consideration of applications for feeder link and service band authority to be made separately, IS DISMISSED.

37. IT IS FURTHER ORDERED that the request of AST for waivers of sections 25.112(a)(3) and 25.112(b), which provided that we dismiss applications that request authority to operate space stations in bands not allocated internationally for the requested operations, IS DISMISSED AS MOOT.

38. IT IS FURTHER ORDERED that the request of AST for a waiver of section 25.116(c), which requires that an NGSO-like satellite license be considered to be a newly filed application if it is amended by a major amendment after a "cut-off" date applicable to the application, IS DISMISSED.

39. IT IS FURTHER ORDERED that the request of AST for a waiver of the U.S. Table of Frequency Allocations, section 2.106, for operations in the 617-960 MHz and 1805 MHz-2200 MHz bands IS DEFERRED.

40. IT IS FURTHER ORDERED that the request of AST for a waiver of sections 25.102(a) and 25.115(a)(1)(i) regarding blanket earth station licensing IS DEFERRED.

41. IT IS FURTHER ORDERED that the request of AST for a waiver of the Commission's processing round rules IS DEFERRED regarding the 617-960 MHz and 1805 MHz-2200 MHz bands.

42. IT IS FURTHER ORDERED that the Petitions to Deny filed by CTIA, T-Mobile, and Verizon ARE DENIED IN PART AND DEFERRED IN PART.

43. IT IS FURTHER ORDERED that AST is afforded 30 days from the date of release of this Order to decline this authorization as conditioned. Failure to respond within that period will constitute formal acceptance of the authorization as conditioned.

44. IT IS FURTHER ORDERED that this Order is issued pursuant to section 0.261 of the Commission's Rules, 47 CFR § 0.261. Petitions for reconsideration under section 1.106 or applications for review under section 1.115 of the Commission's Rules, 47 CFR §§ 1.106 and 1.115, may be filed within 30 days of the date of public notice of this Order.

FEDERAL COMMUNICATIONS COMMISSION

Kerry E. Murray
Deputy Chief and Chief of Staff
Space Bureau

APPENDIX A

Earth Station Locations[108] Coordinated with Federal Agencies

S-band: 2025-2110 MHz (Earth-to-space) and 2200-2290 (space-to-Earth)

1. Punta Arenas, Chile
2. Awarua, New Zealand
3. Hartebeesthoek, South Africa
4. Puertollano, Spain
5. Mingenew, Australia
6. Jeju, South Korea
7. Port Louis, Mauritius
8. Vimercate, Italy
9. Santa Maria, Azores, Portugal
10. Shetland, UK
11. Peterborough – Australia
12. Nangetty – Australia[109]
13. Kandy, Sri Lanka
14. Absheron, Azerbaijan
15. Plana, Bulgaria
16. Blönduós, Iceland
17. Wilde, Argentina
18. Perth, Australia
19. Vinogradets, Bulgary
20. Knoll Fort, St. Helena
21. Juju, South Korea

Q-band: 37.5-42.0 GHz (space-to-Earth); V-band: 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space)

1. Catawissa, PA
2. Midland, TX
3. Brewster, WA
4. Kapolei, HI
5. Thomaston, GA

UHF band: 430-440 MHz (Earth-to-space) (space-to-Earth)

1. Wilde, Argentina
2. Perth, Australia
3. Vinogradets, Bulgary
4. Knoll Fort, St. Helena
5. Juju, South Korea

[108] *See* ICFS File No. SAT-AMD-20240311-00053, Tech Annex at 10. This list of earth stations is the result of coordination with Federal operators.

[109] We encourage AST to coordinate with the Commonwealth Scientific and Industrial Research Organisation in Australia prior to commencing operations with Australian earth stations.