

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

In the Matter of)	
)	
Kuiper Systems LLC)	ICFS File Nos.:
)	SAT-MOD-20230228-00043
Request for Modification of the Authorization for)	SAT-AMD-20230613-00140
the Kuiper NGSO Satellite System)	
)	Call Sign: S3051

ORDER AND AUTHORIZATION

Adopted: March 8, 2024

Released: March 8, 2024

By the Chief, Space Bureau:

I. INTRODUCTION

1. In this Order and Authorization (Order), we grant Kuiper Systems LLC's (Kuiper) application, as amended,¹ for modification of the license for its constellation of non-geostationary orbit (NGSO) satellites. Kuiper plans to use frequencies allocated to the fixed-satellite service (FSS) and mobile-satellite service (MSS) in the Ka-band. The license modification reduces the total number of satellites specified in its constellation from 3,236 to 3,232; modifies the specified orbital parameters of its constellation; and authorizes radiofrequency communications necessary for Kuiper to conduct launch and early-orbit phase (LEOP) operations, payload testing, and deorbit operations on a non-interference basis. In connection with grant of this modification, we deny the Petition to Deny filed by Space Exploration Holdings, LLC (SpaceX).² Grant of Kuiper's application will serve the public interest by allowing Kuiper to accelerate the deployment of its constellation and improve customer coverage once deployed, thereby bringing affordable broadband connectivity to unserved and underserved areas of the United States.

II. BACKGROUND

2. *Kuiper's authorization.* On July 30, 2020, the International Bureau³ granted, with conditions, Kuiper's application to construct, deploy, and operate a constellation of 3,236 NGSO FSS

¹ Kuiper Systems LLC, Application for Modification of the Authorization for the Kuiper System, ICFS File No. SAT-MOD-20230228-00043 (filed Feb. 28, 2023) (Kuiper Modification Application); Kuiper Systems LLC, Application to Amend Modification of the Authorization of the Kuiper System, ICFS File No. SAT-AMD-20230613-00140 (filed Jun. 13, 2023) (Kuiper Amendment).

² Petition to Deny and Comments of Space Exploration Holdings LLC, ICFS File Nos. SAT-MOD-20230228-00043 and SAT-AMD-20230613-00140 (filed Jul. 31, 2023) (SpaceX Petition).

³ 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 eliminated. *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, FCC 23-1, paras. 1-2 (adopted Jan. 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 and the Satellite Division refer to filings made with, or actions taken by, the International Bureau prior to the establishment of the Space Bureau.

satellites operating in the Ka-band (*Kuiper Authorization*).⁴ Kuiper's constellation was authorized as part of the 2020 Ku/Ka-band processing round.⁵

3. *Orbital Debris Modification.* On February 8, 2023, the International Bureau granted Kuiper's application to modify its constellation (*Kuiper Orbital Debris Modification Order*), fulfilling a condition on its authorization to provide updated orbital debris mitigation information to the Commission before it could begin deployment of its satellites.⁶ The *Kuiper Orbital Debris Modification Order* included a number of conditions to protect space safety and optical astronomy, including requirements to coordinate with the National Aeronautics and Space Administration (NASA) and National Science Foundation (NSF), reporting requirements on collision risk and satellite failures, and establishment of the number of satellite disposal failures that may trigger additional conditions on Kuiper's license, possibly up to and including a limitation on additional deployments.⁷ SpaceX has filed an application for review of the *Kuiper Orbital Debris Modification Order*, which remains pending.⁸

4. *Modification Application.* On February 28, 2023, Kuiper filed the instant application.⁹ Kuiper proposes to modify its currently-authorized constellation to slightly reduce the total number of satellites, from 3,236 satellites to 3,232 satellites, and to restructure the distribution of satellites within its orbital planes.¹⁰ Specifically, Kuiper now proposes to operate seven hundred eighty-two satellites at 590 km altitude and 33 degrees inclination, operating in seven hundred eighty-two orbital planes with one satellite per plane; two satellites at 590 km altitude and 30 degrees inclination, operating in one orbital plane with two satellites per plane; one thousand two hundred ninety-two satellites at 610 km altitude and 42 degrees inclination, operating in one thousand two hundred ninety-two orbital planes with one satellite per plane; and one thousand one hundred fifty-six satellites at 630 km altitude and 51.9 degree inclination, operating in two hundred eighty-nine orbital planes with four satellites per plane.¹¹ Kuiper does not seek to modify the orbital altitudes of any of its satellites or the frequencies with which it is authorized to

⁴ See *Kuiper Systems, LLC, Application for Authority to Deploy and Operate a Ka-band Non-Geostationary Satellite Orbit System*, Order and Authorization, 35 FCC Rcd 8324 (Jul. 30, 2020) (*Kuiper Authorization*).

⁵ *Id.*, 35 FCC Rcd at 8324, 8334, 8337-38, Paras. 2, 34, 40-43; *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, Satellite Policy Branch Information*, Report No. SPB-279, DA 20-325 (rel. March 24, 2020) (2020 Ku/Ka-band Processing Round Public Notice).

⁶ See *Kuiper Systems, LLC, Request for Modification of the Authorization for the Kuiper Systems LLC NGSO Satellite System*, Order and Authorization, 38 FCC Rcd 1112 (2023) (*Kuiper Orbital Debris Modification Order*). See Application for Review of Space Exploration Holdings, LLC, ICFS File No. SAT-MOD-20211207-00186 (filed Feb. 21, 2023). In addition to the present modification application, Kuiper has filed two additional modification applications which remain pending. See *Kuiper Systems LLC, Request for Modification of the Authorization for the Kuiper System*, ICFS File No. SAT-MOD-20210806-00095 (filed Aug. 6, 2021); *Kuiper Systems LLC, Application for Minor Amendment of Pending Modification of the Kuiper System*, ICFS File No. SAT-AMD-20230329-00067 (filed Mar. 29, 2023); *Kuiper Systems LLC, Request for Modification of the Authorization for the Kuiper System*, ICFS File No. SAT-MOD-20230201-00013 (filed Feb. 1, 2023).

⁷ *Kuiper Orbital Debris Modification Order*, 38 FCC Rcd at 1123-24, paras. 50-51, 53-56.

⁸ See Application for Review of Space Exploration Holdings, LLC, ICFS File No. SAT-MOD-20211207-00186 (filed Feb. 21, 2023). Our action herein to grant the Kuiper Modification Application, as amended, is without prejudice to Commission action on the SpaceX application for review of the *Kuiper Orbital Debris Modification Order*.

⁹ See generally Kuiper Modification Application.

¹⁰ *Id.*, Legal Narrative at 1, 3.

¹¹ *Id.* at 3.

communicate.¹² On June 13, 2023, Kuiper amended its application to include a request for authorization to conduct LEOP operations, payload testing, and deorbit operations.¹³

5. *Public notice.* The Kuiper modification and amendment were placed on public notice on June 30, 2023.¹⁴ SpaceX filed a petition to deny and comments, raising several concerns with Kuiper's proposed modification. First, SpaceX raises concerns regarding Kuiper's compliance with the requirement that it coordinate operations with systems authorized in previous processing rounds and also argues that Kuiper's request to include its two satellites previously licensed for experimental operations as part of its overall part 25-authorized system will allow Kuiper to "skirt[] build-out requirements" and claim regulatory benefits of having a "built" system.¹⁵ Second, SpaceX maintains that the Commission cannot grant Kuiper the same authority as SpaceX to conduct LEOP, testing, and deorbit operations unless the Commission also imposes the additional orbital debris mitigation conditions SpaceX has previously requested the Commission add to Kuiper's authorization.¹⁶ Third, SpaceX alleges that Kuiper must explain how its reconfigured system can avoid collisions with objects in similar orbits, particularly a new Chinese satellite constellation.¹⁷ Kuiper opposed SpaceX's petition,¹⁸ and SpaceX filed a reply.¹⁹

III. DISCUSSION

6. After our review of the record, we conclude that granting Kuiper's application for modification, as amended, subject to the requirements and conditions specified herein, will serve the public interest. Under section 25.117 of the Commission's rules, we will grant Kuiper's modification request unless doing so would make Kuiper unqualified to operate a space station or granting the modification request would not serve the public interest, convenience, and necessity.²⁰ We find that this modification will not make Kuiper unqualified to operate a space station and it will serve the public interest, convenience, and necessity, and therefore we grant Kuiper's request with respect to reconfiguration of orbital parameters as described in its application and subject to the conditions set forth in this Order. Below, we address the various outstanding issues raised by SpaceX on Kuiper's application.

A. Satellite Reconfiguration

7. *Interference into Other Systems and Processing Round Status.* Kuiper's constellation was originally authorized as part of the 2020 Ku/Ka-band processing round.²¹ Our rule governing the modification of space station licenses states that "applications for modifications of space station

¹² *Id.*

¹³ Kuiper Amendment, Narrative at 1.

¹⁴ *Satellite Licensing Division and Satellite Programs and Policy Division Information, Space Station Applications Accepted for Filing*, Report No. 01-738 (Jun. 30, 2023).

¹⁵ SpaceX Petition at 3.

¹⁶ *Id.* at 6-7. Specifically, SpaceX asks the Commission to impose all of the space sustainability conditions that it included as part of SpaceX's second-generation license. See *Space Exploration Holdings, LLC, Request for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System*, Order and Authorization, 37 FCC Rcd 14882 (2022) (*SpaceX Gen2 Order*).

¹⁷ SpaceX Petition at 5-6.

¹⁸ Opposition of Kuiper Systems LLC, ICFS File Nos. SAT-MOD-20230228-00043 and SAT-AMD-20230613-00140 (filed Aug. 15, 2023) (Kuiper Opposition).

¹⁹ Reply of Space Exploration Holdings LLC, ICFS File Nos. SAT-MOD-20230228-00043 and SAT-AMD-20230613-00140 (filed Aug. 25, 2023) (SpaceX Reply).

²⁰ 47 CFR § 25.117(d)(2)(i)-(ii).

²¹ *Kuiper Authorization*, 35 FCC Rcd at 8324, 8334, 8337-38, Paras. 2, 34, 40-43.

authorizations will be granted,” unless one of several enumerated exceptions applies, none of which are potentially relevant here except for the provisions stating that the modification will not be granted if it “would make the applicant unqualified to operate a space station under the Commission’s rules” or “would not serve the public interest, convenience, and necessity.”²² No concerns have been raised in the record that grant of Kuiper’s modification application would make Kuiper unqualified to operate a space station, and we find there is no basis to make such a determination here. With respect to the public interest requirement, in the context of applications to modify authorized NGSO systems that were originally subject to modified processing round procedures, the Commission has interpreted this provision to include the following determination: “[i]f the proposed modification does not present any significant interference problems and is otherwise consistent with Commission policies, it is generally granted[,]” but if the modification “presents significant interference problems, [the Bureau] would treat the modification as a newly filed application and would consider the modification application in a subsequent satellite processing round.”²³ Kuiper provided an analysis that demonstrates that its proposed modification will not cause any additional interference into fixed-service stations,²⁴ geostationary orbit satellites,²⁵ or other NGSO constellations.²⁶ Additionally, Kuiper states that its modification will not increase interference into its own system, but it nonetheless is willing to accept any additional interference caused by this modification.²⁷ We note that SpaceX did not raise concerns regarding interference when objecting to Kuiper’s proposed modification. We have reviewed Kuiper’s analysis and find that this proposed modification will not increase interference into other participants in the 2020 processing round.²⁸ Though Kuiper proposes to redistribute satellites in its constellation, the redistribution will be within previously authorized orbital planes. Moreover, the frequency use, beam footprints, power flux density and equivalent power flux density levels, minimum antenna elevation angles, equivalent isotropic radiated power (EIRP) levels, and service area associated with its constellation will remain unchanged from the parameters previously authorized.²⁹ Therefore under our rules, grant of this modification application does not change Kuiper’s status in the 2020 processing round.

8. We decline to adopt SpaceX’s request that prior to our action on Kuiper’s modification, we require Kuiper to comply with the condition to complete coordination with earlier-round systems before it may deploy its two prototype satellites.³⁰ Kuiper’s license, as modified, continues to require that it may deploy spacecraft prior to completion of coordination, but may not operate in the frequencies for which coordination is required until coordination is completed.³¹ First, we note that Kuiper’s two

²² 47 CFR § 25.117(d)(2)(i)-(ii). None of the other exceptions in section 25.117(d)(2) appear to be relevant, and none have been raised in connection with Kuiper’s modification application, as amended.

²³ See *Space Exploration Holdings, LLC, Request for Modification of the Authorization for the SpaceX NGSO Satellite System*, Order and Authorization and Order on Reconsideration, 36 FCC Rcd 7995, 8006-07, para. 16 (2021) (affirming the approach in *Teledesic LLC*, Order and Authorization, 14 FCC Rcd 2261, 2264, para. 5 (IB 1999), regarding satellite modification applications).

²⁴ Kuiper Modification Application, Technical Appendix at 4.

²⁵ *Id.* at 4-5. Kuiper certifies once again that its constellation, as modified, will comply with International Telecommunication Union (ITU) EPFD limits. *Id.* at 5.

²⁶ *Id.* at 5-6.

²⁷ *Id.* at 6.

²⁸ *Id.*, Legal Narrative at 5-6, Technical Appendix at Annex A.

²⁹ *Id.*, Technical Appendix at 3-6.

³⁰ SpaceX Reply at 2, 4-5.

³¹ Kuiper has requested modification of this condition pursuant to a separate pending modification request. See Kuiper Systems LLC, Request for Modification of the Authorization for the Kuiper Systems LLC NGSO System,

prototype satellites have now been deployed, and these satellites are operating on an unprotected, non-interference basis pursuant to experimental authorization—in other words, Kuiper must accept interference from, and not cause interference to, other authorized systems and must cease operations immediately upon notification of such an event. Since Kuiper has agreed to continue to operate those two satellites on an unprotected, non-interference basis consistent with the conditions on its experimental license, we see no reason to alter that status for continued operations of these two satellites at this time. Additionally, we note that Kuiper has completed coordination with Telesat Canada, Space Norway AS, and O3b Limited that Kuiper states are not affected by this modification because this modification will not alter the interference environment, and Kuiper states that it is also engaged in ongoing good-faith coordination with other participants in the prior Ku/Ka-band processing rounds.³² Therefore, we conclude that while coordination remains pending, Kuiper may operate its two prototype satellites consistent with the conditions on its experimental authorization, but may not operate any additional satellites in the relevant frequency bands prior to the completion of coordination, where such coordination is required. We condition this authorization accordingly.

9. SpaceX objects to Kuiper’s plan to add its prototype satellites, originally licensed under the Commission’s part 5 rules, to its part 25 license, arguing that it will allow Kuiper to evade International Telecommunication Union (ITU) requirements³³ to bring its constellation into use and the Commission’s since-modified unbuilt system rule,³⁴ allowing Kuiper to in fact further delay deployment.³⁵ We disagree with these claims. First, SpaceX argues that by adding its experimental satellites to its main constellation, Kuiper will be able to avoid ITU rules which require Kuiper to bring its system into use by launching one satellite by 2026.³⁶ But Kuiper’s experimental satellites are already included in Kuiper’s ITU filings for its constellation,³⁷ so adding them to Kuiper’s part 25 authorization has no impact on Kuiper’s compliance with the ITU “build-out” requirements. SpaceX argues that grant of this modification will allow Kuiper to delay its service because Kuiper will be able to claim that it has brought its commercial system into use when it launches its two experimental satellites rather than when its commercial system is actually deployed.³⁸ However, Kuiper will still be subject to the Commission’s build-out milestones for its commercial system, and as a result, the inclusion of the two experimental satellites in its part 25 authorization will have no impact on when Kuiper is required to launch, place into assigned orbits, and operate 50 percent of its part 25 system.³⁹ SpaceX also argues that by adding its prototype satellites to its part 25 license, Kuiper will be able to skirt the Commission’s unbuilt system

ICFS File No. SAT-MOD-20230201-00013 (filed Feb. 1, 2023). Our action herein to grant the Kuiper Modification Application, as amended, is without prejudice to action on this separate modification request.

³² Kuiper Modification Application, Technical Appendix at 6-7.

³³ See ITU R.R. No. 11.4, 11.44C (“A frequency assignment to a space station in a non-geostationary-satellite orbit network or system in the fixed-satellite service . . . shall be considered as having been brought into use when a space station with the capability of transmitting or receiving that frequency assignment has been deployed and maintained on one of the orbital plane(s) of the non-geostationary satellite network or system for a continuous period of 90 days, irrespective of the notified number of orbital planes and satellites per orbital plane in the network or system.”).

³⁴ 47 CFR § 25.159(b) (2023).

³⁵ SpaceX Petition at 2-4; SpaceX Reply at 3-4.

³⁶ SpaceX Petition at 3; SpaceX Reply at 3-4.

³⁷ Kuiper’s constellation is described in the ITU filings USASAT-NGSO-8A, 8B, and 8C. USASAT-NGSO-8C contains the two prototype satellites authorized under the Commission’s part 5 experimental rules, along with a subset of Kuiper’s commercial satellites.

³⁸ SpaceX Petition at 3.

³⁹ 47 CFR § 25.164(b); *infra* at para. 52.

rule, which since the time SpaceX filed its petition has been modified to eliminate the prohibition on a licensee applying for an additional NGSO satellite system license in a particular frequency band if that licensee already has a licensed-but-unbuilt NGSO satellite system in the band.⁴⁰ The Commission recently adopted a report and order modifying the unbuilt system rule and thus this objection is moot.⁴¹ Additionally, SpaceX references a build-out requirement on Kuiper's gateway earth stations authorization.⁴² If the gateway stations communicate with the satellite(s) specified as a point of communication in their license, whether the satellites are licensed under a part 5 experimental authorization or part 25 does not determine completion of the earth station requirement. We find that grant of this modification will not slow Kuiper's deployment or reduce Kuiper's service, because the Commission's milestones will continue to apply to Kuiper's system.⁴³

B. LEOP Operations, Payload Testing, and Deorbit Operations

10. We authorize Kuiper to conduct communications while orbit-raising its satellites to their operational altitudes and during deorbit of its satellites, subject to the conditions set forth herein. This includes authorization to conduct tracking, telemetry, and command (TT&C) operations during orbit raising and deorbit of its satellites, as well as testing of communications equipment performance during the orbit-raising process, which would be conducted on an unprotected, non-interference basis.⁴⁴ Testing satellites at lower altitudes allows Kuiper to deorbit any failed satellites and minimize the risk of satellites experiencing a disposal failure at their operational altitudes, which lessens the collision risk posed by the constellation. Kuiper commits to conduct these operations on an unprotected, non-harmful interference basis and to "take all practicable steps to ensure safe operation of its spacecraft and avoid causing harmful interference."⁴⁵

11. We find that granting Kuiper authority for transition phase operations is in the public interest with the conditions adopted herein. Kuiper's practice of testing its satellites at injection altitude, before orbit-raising, will allow it to deorbit any non-functional satellites in a matter of days or weeks, helping to ensure that non-maneuverable satellites do not reach operational orbit.⁴⁶ A single blanket authorization for these operations, rather than a continuous stream of requests for special temporary authority, will also support administrative efficiency and preserve Commission resources.⁴⁷ We conclude

⁴⁰ SpaceX Petition at 3; SpaceX Reply at 3-4.

⁴¹ *Space Innovation; Expediting Initial Processing of Satellite and Earth Station Applications*, Report and Order and Further Notice of Proposed Rulemaking, FCC 23-73, para. 31 (Sept. 22, 2023); *Expediting Initial Processing of Satellite and Earth Station Applications*, 88 FR 84737 (Dec. 6, 2023) (establishing January 5, 2024, as the effective date for the modification of the unbuilt system rule); see also Comments of Space Exploration Holdings, LLC, IB Docket Nos. 22-411, 22-271, at 21-22 (filed Mar. 3, 2023).

⁴² See Kuiper Systems LLC, Radio Station Authorization, SES-LIC-20210409-00634, Callsign E210070 (granted Dec. 14, 2022); Kuiper Systems LLC, Radio Station Authorization, SES-LIC-20210409-00635, Callsign E210071 (granted Dec. 14, 2022).

⁴³ Kuiper Opposition at 5; SpaceX Petition at 3. We will also require Kuiper to comply with conditions placed on its experimental licenses for its two prototype satellites. See Kuiper Systems LLC, ELS File No. 0956-EX-CN-2021 (Granted June 9, 2022); Kuiper Systems LLC, ELS File No. 0234-EX-CN-2022 (granted Jan. 27, 2023).

⁴⁴ Kuiper Amendment, Narrative at 2. Kuiper notes that a condition in the *Kuiper Orbital Debris Modification Order* requires Kuiper to conduct these operations on a non-interference basis, but the Bureau did not explicitly grant Kuiper authority for these operations at that time. *Id.* (citing *Kuiper Orbital Debris Modification Order*, 38 FCC Rcd at 1123, para. 49).

⁴⁵ *Id.* at 3.

⁴⁶ *Id.* at 3-4.

⁴⁷ *Id.* at 4.

that granting Kuiper authority for the enumerated operations under this license, with the conditions set forth herein, will ensure that other operators do not encounter harmful interference resulting from these operations. Kuiper must therefore conduct TT&C operations during LEOP and deorbit operations and testing of communications equipment on an unprotected, non-interference basis. We also condition this authorization such that Kuiper may not deploy any of its 3,232 satellites authorized in this grant directly to their operational altitudes.

C. Orbital Debris Mitigation

12. SpaceX agrees that the proposed reconfiguration of Kuiper's satellites could improve service for Kuiper's customers but contends that Kuiper has not satisfactorily explained how its constellation will avoid collisions operating in the same orbital altitude range, including "thousands of Chinese satellites planned to share these same orbits."⁴⁸

13. First, we note that in Kuiper's original license grant, the Commission conditioned the authorization on Kuiper coordinating its physical operations with space stations of NGSO systems operating at similar orbital altitudes.⁴⁹ This condition continues to apply. In the prior modification addressing Kuiper's orbital debris mitigation plan, the International Bureau considered arguments regarding the likelihood of additional satellites being deployed in low-Earth orbit at overlapping altitudes, including non-U.S. authorized systems.⁵⁰ At the time, SpaceX argued that the Commission should limit Kuiper to deployments only to its 630 kilometer altitude orbital shell, and defer action regarding the remainder of the constellation to allow for "continued monitoring" of deployment.⁵¹ The International Bureau rejected these arguments.⁵²

14. SpaceX renews these arguments in its filings regarding the instant application, now with a reference to a Chinese satellite constellation.⁵³ SpaceX notes that Kuiper raised concerns regarding overlap with SpaceX's satellites during the authorization process for both SpaceX's first generation and second generation constellations and argues that these concerns point to Kuiper being unable to share orbits with other satellite operators.⁵⁴ We once again reject this argument. Nothing in this modification changes Kuiper's already approved space safety and orbital debris mitigation plans.⁵⁵ Kuiper's authorization continues to be conditioned on Kuiper coordinating the physical operations of its 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 continue to be subject to change based on such coordination, and we will continue to monitor the deployment of Kuiper's system, including satellite failures and collision avoidance system outages or unavailability based on Kuiper's existing reporting conditions. Kuiper must review and take all possible steps to assess the collision risk, with any other space stations, including a Chinese satellite constellation, and mitigate the collision risk if necessary.⁵⁶

⁴⁸ SpaceX Petition at 5; SpaceX Reply at 6-7.

⁴⁹ *Kuiper Orbital Debris Modification Order*, 38 FCC Rcd at 1122, para. 47.

⁵⁰ *Id.* at 1116, para. 15.

⁵¹ *Id.* at 1116-17, para. 16.

⁵² *Id.*

⁵³ SpaceX Petition at 5-6; SpaceX Reply at 6-7.

⁵⁴ See SpaceX Petition at 2; *SpaceX Gen2 Order*, 37 FCC Rcd at 14923-24, paras. 80-82; *Space Exploration Holdings, LLC, Request for Modification of the Authorization for the SpaceX NGSO Satellite System*, Order and Authorization and Order on Reconsideration, 36 FCC Rcd 7995, 8032-33, para. 66 (2021).

⁵⁵ Kuiper Opposition at 6-7.

⁵⁶ See *infra*, para. 40.

15. SpaceX further argues that if the Commission grants Kuiper the authority to conduct LEOP operations in the same manner that it has permitted SpaceX to do, the Commission must also impose the same “space sustainability conditions” that were included on SpaceX’s Gen2 license, including a condition that includes a 100 object-year metric to help assess satellite reliability.⁵⁷

16. We find, however, that the conditions previously applied to Kuiper’s authorization, and the conditions we impose today regarding Kuiper’s transition phase operations, are sufficient at this time to address concerns regarding satellite failures. Specifically, we maintain the existing reporting requirements already placed on Kuiper’s license.⁵⁸ These conditions give the Commission the ability to monitor Kuiper’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. For example, Kuiper is required to provide a report if during any continuous one-year period there are two or more satellite disposal failures. This report must be filed within 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. We also encourage Kuiper to provide information and collaborate with the Commission in the event of even a single satellite disposal failure. Based on our review of a report filed by Kuiper or in response to other information provided during the course of Kuiper’s initial deployment, and pursuant to the conditions on Kuiper’s authorization,⁵⁹ we will act swiftly to modify Kuiper’s license to add terms and conditions—including additional reporting obligations, limitations on additional deployments, requirements for early removal of satellites from orbit, or any other appropriate conditions—in order to limit collision risk.

17. Regarding the condition that includes the 100 object year metric, the Commission already had a record of the SpaceX satellites’ past performance through previous reporting requirements applied to its first generation constellation. Based on that record, the 100 object year metric was applied to its second generation constellation as part of an incremental approach to monitoring and maintaining space safety.⁶⁰ Kuiper, on the other hand, with only two prototype satellites launched out of a planned constellation of 3,232 satellites, does not yet have the type of satellite reliability data regarding its overall system that it will have at a later date. Instead, Kuiper’s system is more like SpaceX’s first generation system in terms of being early in the deployment phase and to which the Commission did not impose an object year metric.⁶¹

18. Accordingly, we reject SpaceX’s request that we apply additional “space sustainability” conditions to Kuiper’s authorization in this modification, including a condition specifying the 100 object year metric, but instead maintain the existing reporting requirements that will allow us to monitor and address any satellite reliability issues associated with Kuiper’s system. Kuiper’s orbital debris conditions are consistent with, and in fact exceed, the orbital debris conditions placed on the first generation SpaceX constellation.⁶² Finally, as with SpaceX, Kuiper’s authorization will also be subject to any alternative

⁵⁷ SpaceX Petition at 6-7; *see also* *SpaceX Gen2 Order*, 37 FCC Rcd at 14952, para. 135z.

⁵⁸ *Kuiper Orbital Debris Modification Order*, 38 FCC Rcd at 1123, paras. 50-51.

⁵⁹ *Id.* at 1123, paras. 50-51.

⁶⁰ *See* *SpaceX Gen2 Order*, 37 FCC Rcd at 14924-14925.

⁶¹ *Space Exploration Holdings, LLC, Request for Modification of the Authorization for the SpaceX NGSO Satellite System*, Order and Authorization and Order on Reconsideration, 36 FCC Rcd 7995, 8049, para. 97u (2021).

⁶² *See id.*; *Kuiper Orbital Debris Modification Order*, 38 FCC Rcd at 1123-24, paras. 50-51, 53-56. For example, Kuiper must submit a report within 10 days of two satellite failures within a continuous one-year period whereas the condition on SpaceX’s first generation constellation required a report after three satellite failures. Additionally, Kuiper’s authorization has a condition that requires Kuiper to monitor its satellites’ propellant reserves to ensure sufficient amounts to perform collision avoidance and end-of-life maneuvers.

approaches developed in the context of the ongoing rulemaking proceeding to identify and address adverse trends in satellite failures before they begin to have a potentially significant effect on the orbital environment.⁶³

IV. CONCLUSION AND ORDERING CLAUSES

19. Accordingly, IT IS ORDERED, that the Kuiper Modification Application, as amended, filed by Kuiper Systems LLC (Kuiper), is GRANTED, pursuant to section 309(a) of the Communications Act of 1934, as amended, 47 USC § 309(a).

20. IT IS FURTHER ORDERED that this authorization is subject to the following requirements and conditions:⁶⁴

21. Prior to commencing operations in the 17.8-18.6 GHz and 18.8-20.2 GHz and 27.5-30 GHz bands, Kuiper must certify that it has completed a coordination agreement with or make a showing that it will not cause harmful interference to any operational system licensed or granted U.S. market access in the NGSO FSS processing rounds referred to in Public Notices DA 16-804, 31 FCC Rcd 7666 (IB 2016) and DA 17-525, 32 FCC Rcd 4180 (IB 2017).⁶⁵

22. Kuiper's operations must comply with spectrum sharing procedures among NGSO FSS space stations specified in 47 CFR § 25.261 with respect to any NGSO system licensed or granted U.S. market access pursuant to the March 2020 Processing Round initiated by Public Notice, DA 20-325. Spectrum sharing between Kuiper's operations and operations of NGSO systems granted U.S. market access, where such operations do not include communications to or from the U.S. territory, are governed only by the ITU Radio Regulations and are not subject to section 25.261.

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

24. Kuiper must accept any additional interference resulting from this modification compared to its current authorization, from licensees or market access grantees authorized in the Commission's NGSO 2020 Processing Round.

25. Kuiper must comply with all conditions on its experimental licenses, except as modified in this Order, for operations of its two prototype satellites.

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

27. Operations in portions of the 17.8-18.6 GHz, 18.8-20.2 GHz, and 27.5-30 GHz bands, including MSS operations in the 19.7-20.2 GHz and 29.5-30 GHz bands, are authorized up to the applicable power flux-density and equivalent power-flux density limits contained in Articles 21 and 22, as well as Resolution 76 of the ITU Radio Regulations. In addition, operations must comply with the out-of-

⁶³ *See Mitigation of Orbital Debris in the New Space Age*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 4156 (2020) (*Orbital Debris R&O and FNPRM*).

⁶⁴ The conditions here replicate the full set of conditions applicable to Kuiper operations as specified in prior orders, except that new conditions have been added at paragraphs 24, 25, and 43 as discussed above, and a new condition has been added at paragraph 23 consistent with other satellite authorizations.

⁶⁵ Kuiper has filed a request for modification of this condition. The request is currently pending. *See* Kuiper Systems LLC, Request for Modification of the Authorization for the Kuiper NGSO Satellite System, ICFS File No. SAT-MOD-20230201-00013 (filed Feb. 1, 2023).

band emissions limits in 25.202(f), 47 CFR § 25.202(f).

28. Operations in the 19.3-19.4 GHz and 19.6-19.7 GHz (space-to-Earth) frequency bands are authorized up to the power flux-density limits in Article 21 of the ITU Radio Regulations that govern NGSO FSS systems in the 17.7-19.3 GHz (space-to-Earth) frequency band. Operations in the band 19.3-19.4 GHz and 19.6-19.7 GHz are on a secondary basis with respect to the GSO FSS. Blanket authorized earth stations in the 19.3-19.4 GHz and 19.6-19.7 GHz bands operate on a secondary basis with respect to the fixed service.

29. Kuiper must cooperate with other NGSO FSS operators in order to ensure that all authorized operations jointly comport with the applicable limits for aggregate equivalent power flux density in the space-to-Earth direction contained in Article 22 of the ITU Radio Regulations, as well as Resolution 76 (WRC-03) of the ITU Radio Regulations.

30. Operations in the 17.7-17.8 GHz band are limited to service outside of the United States and must not cause harmful interference to nor claim protection from assignments in the broadcasting-satellite service operating in conformity with the Radio Regulations, pursuant to 5.517 of the U.S. Table of Frequency Allocations.

31. Operations in the 17.8-18.3 GHz frequency band are on a secondary basis with respect to the fixed service.

32. Operations in the 19.3-19.7 GHz and 29.1-29.5 GHz bands must be coordinated with any previously authorized NGSO MSS systems not included in the March 2020 Processing Round over the bands designated for use by NGSO MSS feeder links. Until any coordination agreement required is obtained, operations shall not be conducted in these frequency bands. Sharing of the 19.3-19.7 GHz and 29.1-29.5 GHz bands with other systems authorized within the March 2020 Processing Round will be subject to section 25.261.

33. MSS operations in the 19.7-20.2 GHz and 29.5-30 GHz bands shall be conducted on a non-interference, non-protected basis with respect to other FSS operations in these bands.

34. Operations in the 27.5-28.35 GHz band are secondary with respect to Upper Microwave Flexible Use Service (UMFUS) operations, except for FSS operations associated with earth stations authorized pursuant to 47 CFR § 25.136.

35. In accordance with footnote NG62 to 47 CFR § 2.106, in the 28.5-29.1 GHz and 29.25-29.5 GHz bands, Kuiper shall not cause harmful interference to, or claim protection from, stations in the fixed service listed in that footnote.

36. Space-to-Earth operations in the 17.8-18.6 GHz, 18.8-19.3 GHz, and 19.7-20.2 GHz bands must complete coordination with U.S. Federal systems, in accordance with footnote US334 to the United States Table of Frequency Allocations, 47 CFR § 2.106, prior to being used. The use of space-to-Earth operations in the 17.8-18.6 GHz, 18.8-19.3 GHz, and 19.7-20.2 GHz bands must be in accordance with any signed coordination agreement between Kuiper and U.S. Federal operators. Two weeks prior to the start of any operations in the 17.8-18.6 GHz, 18.8-19.3 GHz, and 19.7-20.2 GHz bands, Kuiper must provide contact information for a 24/7 point of contact for the resolution of any harmful interference to Jimmy Nguyen, Email: Jimmy.Nguyen@us.af.mil.

37. IT IS FURTHER ORDERED that prior to initiation of service, Kuiper must receive a favorable or “qualified favorable” finding in accordance with Resolution 85 with respect to its compliance with applicable EPFD limits in Article 22 of the ITU Radio Regulations as per paragraph 26 of the original grant document. Kuiper must communicate the ITU finding to the Commission and, in case of an

unfavorable finding, adjust its operation to satisfy the ITU requirements. *See also* 47 CFR § 25.146(c).⁶⁶

38. IT IS FURTHER ORDERED that Kuiper must make available to any requesting party the data used as input to the ITU approved validation software to demonstrate compliance with applicable EPFD limits.

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

40. IT IS FURTHER ORDERED that Kuiper 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.

41. IT IS FURTHER ORDERED that this authorization and any earth station licenses granted in the future are subject to modification to bring them into conformance with any rules or policies adopted by the Commission in the future.

42. During launch and early orbit phase operations, payload testing, and deorbit of its satellites, Kuiper must operate on a non-harmful interference basis, i.e. Kuiper must not cause harmful interference and must accept any interference received. In the event of any harmful interference under this grant, Kuiper must immediately cease operations upon notification of such interference and inform the Commission, in writing, of such an event.

43. Kuiper may not deploy any of its 3,232 satellites authorized in this grant directly to their operational altitudes.

44. Kuiper 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 Kuiper 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 after being raised from its injection, including a discussion of any assessed cause of the failure and remedial actions,
 - 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.
45. Kuiper must also provide a report if during any continuous one-year period there are two

⁶⁶ Kuiper has filed a request for modification of this condition. The request is currently pending. *See* Kuiper Systems LLC, Request for Modification of the Authorization for the Kuiper NGSO Satellite System, ICFS File No. SAT-MOD-20210806-00095 (filed Aug. 6, 2021); Kuiper Systems LLC, Application for Minor Amendment of Pending Modification of the Kuiper System, ICFS File No. SAT-AMD-20230329-00067 (filed Mar. 29, 2023).

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.

46. Upon receipt of a conjunction warning from the 18th Space Control Squadron or other source, Kuiper 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.

47. Kuiper 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 Kuiper and NASA assets and missions, and preserves long-term sustainable space-based communications services. Kuiper must report on the progress of its communications and collaboration efforts to the Commission in its regular reports specified in condition para. 44.⁶⁷

48. Kuiper 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.

49. Kuiper must monitor its satellites' propellant reserves to ensure that the Kuiper 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 a Kuiper satellite engage in more maneuvers than originally projected or otherwise consume propellant more rapidly than anticipated, Kuiper must initiate deorbit operations early in order to ensure that sufficient propellant remains to complete deorbit maneuvers. Kuiper 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.

50. Kuiper must coordinate with NSF to achieve a mutually acceptable agreement to mitigate the impact of its satellites on optical ground-based astronomy. Kuiper 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 Kuiper 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 observations around satellites' locations.

51. This authorization is subject to modification to bring it into conformance with any rules or policies adopted by the Commission in the future. Accordingly, any investments made toward operations in the bands authorized in this Order by Kuiper in the United States assume the risk that operations 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

⁶⁷ Language change from the prior version of this ordering clause is to avoid any confusion with respect to the Federal Aviation Administration's role in launch collision avoidance.

the proceedings associated with IB docket 22-271 and IB Docket 18-818,⁶⁸ WT Docket 20-443,⁶⁹ WT docket 20-133,⁷⁰ IB docket 21-456,⁷¹ and GN Docket 22-352.⁷²

52. IT IS FURTHER ORDERED that this authorization is also subject to the following requirements:

- a. Kuiper must post a surety bond in satisfaction of 47 CFR §§ 25.165(a)(1) & (b) no later than August 30, 2020, and thereafter maintain on file a surety bond requiring payment in the event of a default in an amount, at minimum, determined according to the formula set forth in 47 CFR § 25.165(a)(1); and
- b. Kuiper must launch 50% of the maximum number of proposed space stations, place them in the assigned orbits, and operate them in accordance with the station authorization no later than July 30, 2026, and Kuiper must launch the remaining space stations necessary to complete its authorized service constellation, place them in their assigned orbits, and operate each of them in accordance with the authorization no later than July 20, 2029. 47 CFR § 25.164(b).⁷³

53. Failure to post and maintain a surety bond will render this grant null and void automatically, without further Commission action. Failure to meet the milestone requirements of 47 CFR § 25.164(b) may result in Kuiper's authorization being reduced to the number of satellites in use on the milestone date. Failure to comply with the milestone requirement of 47 CFR § 25.164(b) will also result in forfeiture of Kuiper's surety bond. By August 14, 2026, Kuiper must either demonstrate compliance with its milestone requirement or notify the Commission in writing that the requirement was not met. 47 CFR § 25.164(f).

⁶⁸ See generally *Orbital Debris R&O & FNPRM*.

⁶⁹ See generally *Expanding Flexible Use of the 12.2-12.7 GHz Band, et. al.*, WT Docket No. 20-443, Notice of Proposed Rulemaking, 36 FCC Rcd 606 (2021).

⁷⁰ See generally *Modernizing and Expanding Access to the 70/80/90 GHz Bands, et al.*, WT Docket No. 20-133, Report and Order and Notice of Proposed Rulemaking, 35 FCC Rcd 6039 (2020).

⁷¹ See generally *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 NGSO FSS Systems*, IB Docket No. 21-456, Order and Notice of Proposed Rulemaking, 36 FCC Rcd 17871 (2021).

⁷² See generally *Expanding Use of the 12.7-13.25 GHz Band for Mobile Broadband or Other Expanded Use*, GN Docket No. 22-352, Notice of Inquiry and Order, 37 FCC Rcd 13427 (2022).

⁷³ We note that the *NGSO FSS Order* modified section 25.164(b) to offer additional flexibility and requires launch and operation of 50% of an authorized system within six years of grant and the remaining satellites within nine years of grant.

54. IT IS FURTHER ORDERED that the Petition to Deny of Space Exploration Holdings LLC is DENIED.

FEDERAL COMMUNICATIONS COMMISSION

Julie M. Kearney
Chief
Space Bureau