Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

Application of Kuiper Systems LLC for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in Ka-band Frequencies	))))	File No. SAT-LOA- _____ Call Sign_____

APPLICATION FOR AUTHORITY TO LAUNCH AND OPERATE A NON-GEOSTATIONARY SATELLITE ORBIT SYSTEM IN KA-BAND FREQUENCIES

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EXECUTIVE SUMMARY

Kuiper Systems LLC ("Kuiper"), a wholly-owned subsidiary of Amazon.com Services, Inc. (collectively "Amazon"), requests Federal Communications Commission ("FCC" or "Commission") authority to launch and operate a Ka-band non-geostationary satellite orbit ("NGSO") fixed-satellite service ("FSS") system to provide high-speed, low-latency broadband services to consumers, businesses, and other customers worldwide. Amazon's Kuiper System will consist of 3,236 satellites in 98 orbital planes at altitudes of 590 km, 610 km, and 630 km.

Amazon's mission is to be Earth's most customer-centric company, and the Kuiper System is one of our ambitious projects to fulfill this mission. The Kuiper System will deliver satellite broadband communications services to tens of millions of unserved and underserved consumers and businesses in the United States and around the globe. According to the FCC's 2019 Broadband Deployment Report, 21.3 million Americans lack access to fixed terrestrial broadband with benchmark download and upload speeds of 25 Mbps/3 Mbps, and more than 33 million Americans do not have access to mobile LTE broadband speeds of 10 Mbps/3 Mbps. Amazon will help close this digital divide by offering fixed broadband communications services to rural and hard-to-reach areas. This includes connectivity to homes, schools, hospitals, government offices, businesses of all sizes, first responders, and disaster relief operations. The Kuiper System will also enable mobile network operators to expand wireless services to unserved and underserved mobile customers and provide high-throughput mobile broadband connectivity services for aircraft, maritime vessels, and land vehicles.

Amazon seeks to maximize the potential of spectrum and orbital resources available to advanced NGSO broadband constellations – providing high quality broadband service to customers while simultaneously enhancing spectrum efficiency and spectrum sharing with other

authorized systems. The Kuiper System will do this by combining advanced satellite and earth station technologies with an innovative constellation design and software defined network control functions. With the Kuiper System, Amazon will unleash opportunities for learning, employment, entrepreneurship, communication, and economic growth across the United States and globally.

Amazon has the expertise, infrastructure, and financial resources to make the Kuiper System a success. We recognize that the effective implementation of global broadband NGSO FSS services requires more than the design, construction, and deployment of a technologically advanced satellite system, low-cost customer terminals, and gateways. It also requires worldwide terrestrial network infrastructure and customer operations capabilities. Amazon sells products and services to hundreds of millions of customers today via physical and online stores, entertainment content streaming, design and manufacturing of consumer electronics devices, and leading public cloud computing web services. Amazon also has global terrestrial networking and compute infrastructure required for the Kuiper System, including intercontinental fiber links, data centers, compute/edge compute capabilities and the tools, techniques, and know-how to securely and efficiently transport data. Amazon will leverage its resources and capabilities to develop, implement, and interconnect the Kuiper System and terrestrial networks to delight customers.

Amazon shares the FCC's vision that everyone should have access to high-speed broadband services at affordable prices, and we stand ready to make this vision a reality. Grant of this application will enable Amazon to join the effort to help close the digital divide in the United States and globally. Accordingly, Amazon respectfully requests that the Commission grant its application to launch and operate the Kuiper System.

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Kuiper Systems LLC, a wholly owned subsidiary of Amazon.com Services, Inc., requests authority to launch and operate an NGSO system using Ka-band frequencies allocated for satellite services. Amazon's Kuiper System will provide customers with high-speed, low-latency broadband connectivity worldwide. The Kuiper System will consist of 3,236 satellites operating in 98 orbital planes at altitudes of 590 km, 610 km, and 630 km. The Kuiper System includes high-performance satellites, terrestrial gateways, internetworking technologies, and a range of customer terminals. Grant of this application will enable the delivery of affordable, high-quality broadband connectivity to tens of millions of unserved and underserved consumers and businesses worldwide. Accordingly, Amazon respectfully requests grant of its application.

I. COMPANY BACKGROUND

At Amazon, we strive to continuously innovate on behalf of our customers. Amazon's Kuiper System – a satellite constellation that will deliver high-capacity, low-latency broadband communications services to tens of millions of unserved and underserved consumers and businesses – is one such innovation we are incredibly passionate about.

Amazon has the infrastructure, financial resources, and experienced team to make this ambitious initiative a reality. Amazon already has in-house expertise in advanced technology development including unmanned aircraft systems (*i.e.,* Amazon Prime Air), robotics and

automation (*e.g.,* Amazon Robotics, Project Scout), and high performance, highly reliable, distributed datacenters, networks and services (*i.e.,* Amazon Web Services). With Project Kuiper, Amazon has assembled, and is continuing to recruit, a team of experts in modern satellite design, propulsion, antennas, orbital analysis, networking, and space safety, all of whom will work with leading suppliers in the industry to ensure the Kuiper System is safe, reliable, high performance, and highly efficient. Amazon will leverage its considerable engineering resources, global operational capabilities and cost-conscious approach in order to design, launch, and operate an advanced NGSO system that provides customers with an affordable, high-quality broadband experience.

II. SYSTEM DESCRIPTION

The Kuiper System is designed to support high spectrum efficiency, frequency reuse, and spectrum sharing with other satellite operators, consistent with applicable FCC rules, using small spot beams and advanced interference avoidance capabilities. It will consist of 3,236 satellites operating in 98 orbital planes at altitudes of 590 km, 610 km, and 630 km, as shown in Table 1.

Table 1. Constellation Design Showing Altitudes and Inclinations

Altitude (km)	Inclination	Planes	Number of Satellites per Plane	Number of Satellites
630	51.9	34	34	1156
610	42	36	36	1296
590	33	28	28	784

The Kuiper System will be capable of providing continuous coverage to customers within approximately 56˚N and 56˚S latitude serving the continental United States, Hawaii, U.S. territories, and other regions of the world. The Kuiper System deployment plan will proceed in

five phases, as shown in Table 2. The cumulative number of planes launched to each inclination is shown in each row, along with the total number of launched satellites.

Table 2. Constellation Deployment Launch Plan

Constellation Deployment Sequence					
Phase	**Shell (Alt/Inclination)**	**Added Planes**	**Satellites/Plane**	**Deployed Satellites**	**Total Satellites**
1	630 km/51.9°	17	34	578	578
2	610 km/42.0°	18	36	648	1226
3	630 km/51.9°	17	34	578	1804
4	590 km/33.0°	28	28	784	2588
5	610 km/42.0°	18	36	648	3236

Service rollout will begin as soon as the first 578 satellites are launched. Coverage begins at 56˚N and 56˚S latitudes and quickly expands toward the equator as more satellites are launched.

The Kuiper System will operate using the following Ka-band frequencies:

Table 3. Frequency Bands[1]

Frequency Band (GHz)	Use[2]
17.7-17.8	Customer Links (↓) (Non-U.S. Only)
17.8-18.3	Customer Links (↓)
18.3-18.6	Customer Links (↓)
18.8-19.3[3]	Customer Links (↓)
19.3-19.4[4]	Gateway Links (↓)
19.4-19.6[5]	Gateway Links (↓)
19.6-19.7	Gateway Links (↓)
19.7-20.2	Customer and Gateway Links (↓)
27.5-28.35[6]	Gateway Links (↑)
28.35-28.5	Gateway Links (↑)

[1] Transmissions in the Earth-to-space direction are represented by "↑" and transmissions in the space-to-Earth direction are represented by "↓". Technical information, including link polarization and antenna gain information, is included in the Schedule S and Technical Appendix accompanying this application.

[2] Due to the advanced design of the Kuiper System, it will be possible to utilize frequency bands for an alternate purpose when needed. Although the "Use" column in Table 3 identifies the intended use of the frequency bands, the Kuiper System can modify the use of a frequency band when necessary or appropriate.

[3] Amazon will also use the 19.25-19.3 GHz band for telemetry, tracking, and command ("TT&C") downlinks.

[4] Amazon will also use the 19.3-19.4 GHz band for TT&C downlinks.

[5] Amazon recognizes that use of the 19.4-19.6 GHz band may require coordination with incumbent operations in this band.

[6] Amazon will also use the 27.5-28.05 GHz band for TT&C uplinks. Please note that only three 50 MHz portions are used at 27.5-27.55 GHz, 27.95-28.0 GHz, and 28.0-28.05 GHz.

28.5-28.6	Customer Links (↑)
28.6-29.1	Customer Links (↑)
29.1-29.25[7]	Gateway Links (↑)
29.25-29.5[8]	Gateway Links (↑)
29.5-30.0	Customer and Gateway Links (↑)

The Kuiper System's ground segment will consist of customer terminals and gateway earth stations, as well as a software-defined network and satellite control functionality, including satellite operations centers and TT&C earth stations. Customer terminals will be safe, reliable, and easy to install at customer locations. A variety of customer terminal models will be available with varying performance capabilities tailored to different customer segments (*e.g.,* residential and enterprise customers). Mobile terminals will be supported for specific mobility applications (*e.g.*, aeronautical, maritime, and land-mobile) and will be compliant with earth stations in motion ("ESIM") rules and other requirements adopted by the Commission. Gateway earth stations will be connected with high-speed fiber links to global Internet exchange points and point-of-presence sites to interchange traffic and reduce network hops and latency. Amazon will separately submit applications to the Commission requesting authority to operate gateway earth stations and customer terminals in the United States.[9]

[7] Amazon recognizes that use of the 29.1-29.25 GHz band may require coordination with incumbent operations in this band.

[8] Amazon recognizes that use of the 29.25-29.3 GHz band may require coordination with incumbent operations in this band.

[9] *See* 47 C.F.R. §§ 25.115, 25.130.

III. GRANT OF THIS APPLICATION WILL SERVE THE PUBLIC INTEREST

As the Commission is well aware, customers use broadband connectivity for a variety of purposes. Broadband enables jobs and economic development. It supports education—connecting students everywhere to experts and resources anywhere. It opens new possibilities for industries, including the agricultural, medical, banking, retail, and transportation sectors, which will benefit from new and emerging technologies available over the Internet. Broadband also allows people to communicate with one another, engage in civil discourse, and enjoy the best of the world's culture and entertainment.

A. The Kuiper System Will Help Close the Digital Divide in the United States and Globally

Amazon recognizes that customers everywhere require low latency, high-quality broadband connectivity, and aggregate demand for broadband is rapidly accelerating. Amazon is committed to meeting the demand of residential broadband customers, particularly in unserved and underserved communities. It is a considerable technical and business challenge for large scale NGSO systems to deliver the low cost, high-performance broadband experience that customers need, but Amazon has a track record of delivering on ambitious projects and is committed to its Kuiper System initiative.

Demand for broadband connectivity continues to grow, as customers everywhere seek higher speeds and greater capacity to support a wide range of existing and emerging applications. Global bandwidth usage grew at an annual rate of 27.3% from 2014-2017.[10] Similar growth rates

[10] *See* International Telecommunication Union, Measuring the Information Society Report, Volume 1, at 13 (2018), https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2018/MISR-2018-Vol-1-E.pdf.

are predicted over the next several years, with global Internet traffic expected to reach 4.8 zettabytes by 2022.[11]

Unfortunately, broadband access remains unavailable for many people. As the FCC identified in its 2019 Broadband Deployment Report, 21.3 million Americans lack access to fixed, residential broadband with benchmark download and upload speeds of 25 Mbps and 3 Mbps, respectively.[12] Unavailability of fixed broadband is particularly stark in rural areas, where 26.4% of Americans lack access to high-speed services, compared to only 1.7% of Americans in urban areas.[13] In addition, 33.4 million Americans, including over 14 million Americans in rural areas, remain without access to mobile broadband connections with speeds of at least 10/3 Mbps.[14] Connectivity challenges persist globally as well. Although progress has been made to improve connectivity, 3.8 billion people worldwide remain without fast and reliable broadband service.[15]

Granting Amazon's application will bring the Commission closer to achieving its mission to close the digital divide. Consumer demand for broadband services is massive and far exceeds the potential capacity available by all NGSO systems proposed to date, including Amazon's Kuiper System. This is true even assuming that all pending and licensed systems will in fact

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[11] *See* Cisco Visual Networking Index: Forecast and Methodology, 2017-2022, at 1, Figure 1 (updated Feb. 27, 2019), https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-741490.pdf.

[12] *See Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, 2019 Broadband Deployment Report, GN Docket No. 18-2387, FCC 19-44, ¶ 33 (rel. May 29, 2019) ("*2019 Broadband Deployment Report*").

[13] *See id.*, Figure 1.

[14] *See id.*, ¶ 35, Figure 2b.

[15] *See* Press Release, International Telecommunication Union, *U.N. Broadband Commission Sets Global Broadband Targets to Bring Online the World's 3.8 Billion Not Connected to the Internet* (Jan. 23, 2018), https://www.itu.int/en/mediacentre/Pages/2018-PR01.aspx.

deploy and achieve their intended capacity performance. Authorizing Amazon to launch and operate the Kuiper System will add broadband service capacity, thereby connecting millions of Americans who would otherwise not be served.

Terrestrial operators are also working determinedly to close the digital divide[16] and Amazon stands ready to join the effort. The Kuiper System will help bridge gaps in coverage by complementing the efforts of terrestrial fixed and mobile carriers and reaching some of the most remote and hard-to-reach areas – where it is often geographically difficult or cost prohibitive for terrestrial service providers to operate today.

In addition to increasing the reach and functionality of broadband offerings, Amazon will support terrestrial operators by providing backhaul services. This will enable terrestrial carriers to connect more customers around the world, especially those in rural areas, as well as to extend their next generation wireless networks. The Kuiper System will therefore enable Amazon, directly and in partnership with terrestrial operators, to help close the digital divide and unleash opportunities for learning, employment, entrepreneurship, communication and economic growth.

B. The Kuiper System Will Help Enterprise Customers and Grow Local Economies

Businesses large and small, government agencies, and public institutions need high-quality broadband coverage everywhere. This includes schools, hospitals, banks, shops, transportation, and Internet of Things and Machine-to-Machine systems. High-quality broadband helps drive digital transformation of industries, including the agricultural, medical, banking, retail, and

[16] *See* Press Release, Federal Communications Commission, *Draft 2019 Broadband Deployment Report Shows More than 25% Drop in Americans Lacking Access to Fixed Broadband* (Feb. 19, 2019), https://docs.fcc.gov/public/attachments/DOC-356271A1.pdf (observing that in 2018 terrestrial operators deployed fiber to 5.9 million new homes, the largest number ever recorded).

transportation sectors, which benefit from new and emerging technologies available over the Internet.

Companies around the world are moving to a cloud-based infrastructure to increase IT agility, gain unlimited scalability, improve reliability, and lower costs. They want the flexibility to expand their operations at a rapid pace without worrying about setting up new IT infrastructure. Enterprise customers want to enhance their end-user and customer experiences with high speeds and low latencies, so they can avoid delays and interruptions. They also want to be able to easily support any country-specific data sovereignty requirements, which means they need the flexibility to have a wide selection of geographic regions of data centers from which to choose to deploy their application workloads.

Amazon has the global cloud infrastructure that companies can depend on – no matter their size, changing needs, or challenges. Amazon's infrastructure is designed and built to deliver the most flexible, reliable, scalable, and secure cloud computing environment with the highest quality global network performance available today. Every component of the Amazon infrastructure is designed and built for redundancy and reliability, from regions to networking links to load balancers to routers and firmware.

From Day 1, Amazon's Kuiper System will leverage the secure, high-quality global networking and cloud infrastructure that Amazon has built over more than a decade and bring that value to enterprise, consumer, and other customers. Expanded access to broadband connectivity in even the most rural and hard-to-reach locations, supported by Amazon's terrestrial infrastructure, will help businesses digitally transform their operations, expand public services, and grow local economies.

C. The Kuiper System Will Enable Greater Access To Government Services and Support Public Protection and Disaster Relief

Government agencies, too, will benefit from access to the Kuiper System. Amazon already supports numerous government agencies and access to the Kuiper System will extend the reach of these support services, enabling greater access to government services and allowing more government agencies to enhance their operations. The Kuiper System will also support public protection and disaster relief services, including in most of the world's most remote locations. Fixed customer terminals can be deployed and provisioned with voice and data access for first responders, humanitarian workers, and medical personnel globally where and when it is needed. In addition, Kuiper System mobile terminals will support air, maritime, and land-based response personnel in more effectively accomplishing their public protection missions.

IV. SPECTRUM ACCESS AND SHARING WITH OTHER KA-BAND NGSO SYSTEMS

Amazon respectfully requests authority to operate in requested Ka-band frequencies pursuant to Section 25.261 of the FCC's rules.[17] As discussed herein and in the attached Technical Appendix, the Kuiper System is designed to share spectrum with other authorized Ka-band NGSO systems as contemplated by that provision. Furthermore, authorizing spectrum access pursuant to Section 25.261 rules is consistent with the Commission's "case-by-case treatment" of new NGSO FSS applicants and would strongly serve the public interest.

[17] *See* 47 C.F.R. § 25.261. *See also Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809, ¶ 61 (2017) ("*NGSO FSS Order*"). To the extent necessary to consider this application and permit such treatment, Amazon also requests waiver of certain procedural rules governing NGSO system applications. *See* Section V.A., *infra*.

A. Background

The Commission rules have evolved substantially with respect to spectrum access for NGSO systems, and Ka-band NGSO FSS systems in particular, reflecting advances in technology and spectrum sharing techniques. Historically, the Commission's spectrum access rules for "NGSO-like systems"[18] were based on a presumed inability to share spectrum, which led to the division of available spectrum equally among initial applicants. At that time, the FCC generally considered the potential for follow-on NGSO licensing to be unlikely because it would likely have assigned "operating rights in all the available spectrum" to first-round licensees.[19]

Today, the Commission has a fundamentally different approach in its rules governing NGSO FSS spectrum access. The FCC has recognized that NGSO systems in various frequency bands operating with earth stations using directional antennas can share spectrum far more effectively than ever before and new NGSO technology advancements continue to enhance spectrum sharing capabilities. Thus, rather than dividing available spectrum equally among licensees for their exclusive use,[20] the FCC now enables all licensees through Section 25.261 to access the same spectrum and applies a $\Delta T/T$ of 6 percent threshold to define the inline event

[18] 47 C.F.R. § 25.157(a) ("For purposes of this section, the term 'NGSO-like satellite operation' means: (1) Operation of any NGSO satellite system, and (2) Operation of a GSO MSS satellite to communicate with earth stations with non-directional antennas.").

[19] *Amendment of the Commission's Space Station Licensing Rules and Policies*, First Report and Order, 18 FCC Rcd 10760, ¶ 61 (2003) ("*2003 Satellite Licensing Order*") ("As an initial matter, we do not anticipate conducting many second or additional processing rounds, because operating rights in all the available spectrum in the frequency band will be assigned equally to all qualified applicants in the first processing round, assuming that the applicants' spectrum requirements exceed the available allocation. In addition, the Commission invited comment on redistributing a licensee's spectrum rights to the licensee or licensees remaining in operation, in the event that a license is cancelled or relinquished.").

[20] *See* 47 C.F.R. § 25.157(e), (f), and (g).

requiring coordination or spectrum division.[21] This NGSO FSS spectrum access rule promotes "more accommodation, more sharing, and ultimately, more competition[.]"[22]

Section 25.261 of the FCC's rules, entitled "Sharing among NGSO FSS space stations" provides:

> ***(a) Scope.*** *This section applies to NGSO FSS operation with earth stations with directional antennas anywhere in the world under a Commission license, or in the United States under a grant of U.S. market access.*
>
> ***(b) Coordination.*** *NGSO FSS operators must coordinate in good faith the use of commonly authorized frequencies.*
>
> ***(c) Default procedure.*** *Absent coordination between two or more satellite systems, whenever the increase in system noise temperature of an earth station receiver, or a space station receiver for a satellite with on-board processing, of either system, ΔT/T, exceeds 6 percent due to interference from emissions originating in the other system in a commonly authorized frequency band, such frequency band will be divided among the affected satellite networks in accordance with the following procedure:*
>
> > *(1) Each of n (number of) satellite networks involved must select 1/n of the assigned spectrum available in each of these frequency bands. The selection order for each satellite network will be determined by the date that the first space station in each satellite system is launched and capable of operating in the frequency band under consideration;*
> >
> > *(2) The affected station(s) of the respective satellite systems may operate in only the selected (1/n) spectrum associated with its satellite system while the ΔT/T of 6 percent threshold is exceeded;*
> >
> > *(3) All affected station(s) may resume operations throughout the assigned frequency bands once the threshold is no longer exceeded.*[23]

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[21] The current version of Section 25.261 replaced a prior version that relied on good-faith coordination or, absent coordination, a specified angular separation designed to accommodate the incumbent licensee and systems proposed at the time. *See The Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ka-band*, First Report and Order, 18 FCC Rcd 14708, ¶ 43 (2003). *See also* 47 C.F.R. § 25.261 (2017).

[22] *See NGSO FSS Order,* ¶ 50.

[23] *See* 47 C.F.R. § 25.261.

This fundamental change in the Commission's approach to NGSO FSS spectrum access has a significant implication for consideration of this application. The determination that multiple NGSO FSS systems of various designs can share spectrum pursuant to good faith coordination or, absent coordination, temporarily dividing spectrum during intermittent interference events, means that the existence of NGSO FSS licensees or prior-round applicants does not preclude the authorization of additional co-frequency NGSO FSS systems. This is consistent with Section 25.261(a), the scope of which establishes that all NGSO FSS systems with directional antennas are capable of sharing spectrum under this framework.[24]

B. The Commission Should Apply Section 25.261 Spectrum Access Provisions to the Kuiper System

The Commission can apply Section 25.261 in considering new NGSO FSS proposals like the Kuiper System application. In the *NGSO FSS Order*, the Commission made its approach to spectrum access for new NGSO FSS applicants clear:

> *While we will initially limit sharing under the ΔT/T of 6 percent threshold to qualified applicants in a processing round, treatment of later applicants to approved systems must necessarily be case-by-case based on the situation at the time, and considering both the need to protect existing expectations and investments and provide for additional entry as well as any comments filed by incumbent operators and reasoning presented by the new applicant*.[25]

The Commission recognized appropriately that initially only processing round participants would be subject to the provisions in Section 25.261 but the treatment of later applicants vis-à-vis approved systems "would necessarily be case-by-case," permitting new applicants to demonstrate

[24] 47 C.F.R. § 25.261(a) ("(a) Scope. This section applies to NGSO FSS operation with earth stations with directional antennas anywhere in the world under a Commission license, or in the United States under a grant of U.S. market access."). *See also NGSO FSS Order*, ¶¶ 51-53.

[25] *NGSO FSS Order*, ¶ 61.

that the sharing provisions intended for NGSO FSS systems using directional antennas should be applied.

In doing so, the Commission appropriately balanced the public interest of new entrants with the expectations of approved systems. The Section 25.261 spectrum access regime – particularly the consequence of limiting spectrum splitting – facilitates sharing by promoting good-faith coordination among NGSO FSS systems. The Commission concluded, and Amazon agrees, this approach will result in "more accommodation, more sharing, and ultimately, more competition[.]"[26] Indeed, this is precisely why the Commission's *NGSO FSS Order* rejected proposals by some commenters who sought to require later applicants to operate on an unprotected, non-interference basis with respect to operators authorized in an earlier processing round.[27]

Amazon's Kuiper System is designed to operate in full compliance with the requirements of Section 25.261. As demonstrated in the Technical Appendix and Schedule S accompanying this application, the Kuiper System is designed to facilitate spectrum sharing on par with other proposed and operational NGSO FSS systems, avoid inline interference events where necessary through coordination or dynamic spectrum sub-channelization, and maximize the use of Ka-band spectrum and orbital resources through small spot beams and advanced network control functionality.

Authorizing the Kuiper System pursuant to Section 25.261 is also appropriate given the status of the current processing round. Amazon's application arrives during the pendency of the

[26] *Id.*, ¶ 50.

[27] *See id.*, ¶¶ 59-61. Notably, however, other operators like Kepler Communications welcomed new systems with the technical capabilities to share spectrum efficiently. *See, e.g.,* Comments of Kepler Communications Inc., IB Docket No. 16-408, at 3 (filed Feb. 27, 2017) ("Shutting out future entrants to any market must be avoided to ensure that there is incentive for new systems to continue innovating and pushing the boundaries in the efficient use of spectrum and space systems.").

current Ka-band NGSO processing round – some applications have been granted only recently and others remain pending before the Commission.[28] Given the long build-out periods of NGSO FSS systems,[29] these systems are still in nascent stages and multiple applications to modify authorized systems have already been filed.[30] Furthermore, because authorized Ka-band NGSO FSS systems are conditioned on compliance with the spectrum sharing provisions of Section 25.261, the investment-backed expectations of prior-round participants would not be disrupted by authorization of another Ka-band NGSO FSS system that can operate in accordance with this carefully crafted spectrum access regime.[31]

Finally, for all the reasons set forth in this application, including those identified in Section II above, granting Amazon's application will strongly serve the public interest. From bringing satellite-based broadband connectivity to unserved and underserved communities to extending the geographic coverage of terrestrial broadband systems to improving commercial operations and

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[28] *See, e.g., Theia Holdings A, Inc., Request for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Fixed-Satellite Service, Mobile-Satellite Service, and Earth-Exploration Satellite Service*, Memorandum Opinion, Order, and Authorization, IBFS File Nos. SAT-LOA-20161115-00121 and SAT-AMD-20170301-00029, Call Sign S2986 (May 9, 2019); ViaSat, Inc. Petition for Declaratory Ruling Granting Access to the U.S. for a Non-U.S.-Licensed Non-Geostationary Orbit Satellite Network, IBFS File Nos. SAT-PDR-20161115-00120 and SAT-APL-20180927-00076, Call Sign S2985 (filed Nov. 15, 2016).

[29] *See NGSO FSS Order,* ¶ 67 (requiring complete deployment of authorized constellations within 9 years).

[30] *See Application of Space Exploration Holdings, LLC For Modification of Authorization for the SpaceX NGSO Satellite System*, Call Signs S2983 and S3018, IBFS File No. SAT-MOD-20181108-00083 (filed Nov. 8, 2018); Application of WorldVu Satellites Limited for Modification to OneWeb U.S. Market Access Grant for the OneWeb Ku- and Ka-Band System, Call Sign S2963, IBFS File No. SAT-MOD-20180319-00022 (filed Mar. 19, 2018).

[31] This is particularly true in the current Ka-band NGSO processing round where initial applicant expectations were based on reverting to a much smaller amount of "home spectrum" during inline interference events. With the Commission's adoption of Section 25.261 during the pendency of the processing round, spectrum access expectations are greatly improved even in the context of sharing with the Kuiper System.

government services worldwide, Amazon's Kuiper System will bring substantial benefits to customers in the United States and around the globe.

Amazon looks forward to engaging constructively with existing and future Ka-band NGSO FSS system operators to maximize customer benefits to be provided by all proposed systems. The demand for broadband in America is so large that even if all licensed and pending NGSO systems – not just those using Ka-band – were successfully deployed and achieve their targeted capacity performance, they will still offer insufficient aggregate capacity to meet the total demand for broadband services in unserved and underserved areas. This is true even when including the Kuiper System, although it will materially aid in closing this digital divide by serving millions of additional Americans. It is therefore essential for all NGSO FSS system proponents to work collaboratively with each other and the Commission to maximize the potential implementation of all of these systems.

V. WAIVERS

Amazon respectfully requests waiver of certain FCC rules in connection with the Commission's consideration of the Kuiper System application. These waiver requests address inharmonious administrative requirements, variations in spectrum allocations across ITU regions, and evolution of FCC policy in the *NGSO FSS Order*. Several of these waiver requests are similar to those granted to other NGSO FSS licensees. In all cases, grant of the requested waivers would serve the public interest.

The Commission may waive any of its rules if there is "good cause" to do so.[32] Waiver is appropriate where "special circumstances warrant a deviation from the general rule" and "such

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

deviation will serve the public interest" better than strict adherence to the rule.[33] Generally, the Commission will grant a waiver of its rules if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the public interest.[34] The Commission may also consider potential hardship, equity, or policy implementation factors as part of its review.[35] Amazon respectfully submits that good cause exists to waive the following rules to the extent necessary to consider and grant the Kuiper System application.

A. The Commission Should Waive Certain Administrative Processing Rules To Facilitate Consideration of the Kuiper System Application

Amazon requests waiver of Sections 25.157(c) and 25.155(b) of the Commission's rules,[36] which set forth administrative procedures for the agency's consideration of NGSO FSS applications.[37] Waiver would not undermine the purpose of the rule because adoption of the Section 25.261 spectrum sharing framework by the Commission in its *NGSO FSS Order* moots the need for comparative review to ensure competitive entry. Waiver also serves the public interest better than strict adherence to the rules of Sections 25.157(c) and 25.155(b) because of the Kuiper System's ability to share spectrum with existing licensees as well as new entrants.

1. Section 25.157(c), NGSO Application Processing Rounds

Amazon requests waiver of the Commission's administrative rule for NGSO application processing, which is no longer necessary to ensure competitive entry following the agency's

[33] *Northeast Cellular*, 897 F.2d at 1166.

[34] *WAIT Radio*, 418 F.2d at 1157.

[35] *Id.* at 1159.

[36] 47 C.F.R. §§ 25.155(b), 25.157(c).

[37] Should the Commission decide not to grant Amazon's request for waiver of the processing round rules, it should still apply the Section 25.261 spectrum sharing rule to Amazon's operations for the reasons set forth in this application, including above in Sections III and IV, *supra*.

adoption of a new spectrum sharing framework for NGSO FSS systems. Section 25.157(c) provides:

> *(c) Each application for NGSO-like satellite operation that is acceptable for filing under § 25.112, except replacement applications described in paragraph (b) of this section, will be reviewed to determine whether it is a "competing application," i.e., filed in response to a public notice initiating a processing round, or a "lead application," i.e., all other applications for NGSO-like satellite operation.*
>
> > *(1) Competing applications that are acceptable for filing will be placed on public notice to provide interested parties an opportunity to file pleadings in response to the application pursuant to § 25.154.*
> >
> > *(2) Lead applications that are acceptable for filing will be placed on public notice. This public notice will initiate a processing round, establish a cut-off date for competing NGSO-like satellite system applications, and provide interested parties an opportunity to file pleadings in response to the application pursuant to § 25.154.*[38]

Waiver of Section 25.157(c) would not undermine the purpose of the FCC's processing round rule, which is to "facilitate[] the potential for competitive market entry."[39] As discussed above, the Commission adopted the current NGSO processing-round framework in 2003 because, at that time, such systems communicated with earth stations having "little or no directivity towards a satellite" such that "NGSO systems generally cannot operate on the same spectrum without causing unacceptable interference to each other."[40] Once a processing round closed under this framework, it was virtually impossible to accommodate new applicants through subsequent processing rounds because all of the available spectrum was divided equally at the outset among

[38] 47 C.F.R. § 25.157(c).

[39] *2003 Satellite Licensing Order*, ¶ 22.

[40] *Id.*, ¶ 21. *See also id.*, ¶ 25 ("[L]icensing one satellite system operator to provide service in a particular frequency band segment precludes other satellite system operators from providing service in that frequency band segment.").

qualified applicants in the initial processing round.[41] This is no longer the case given advancements in NGSO FSS technology and the use of directional earth station antennas, which enable co-frequency operations among NGSO licensees.

Section 25.261 creates an NGSO sharing framework reflecting these developments. By enabling all systems to access the same spectrum except during inline interference events, it maximizes spectrum use while preserving the opportunity for entry by new NGSO FSS systems.[42] This, in turn, essentially moots the need for comparative consideration of multiple applications in a processing round because grant of one application does not foreclose grant of future applications for the same spectrum.

A Commission decision not to initiate a processing round in response to the filing of Amazon's Kuiper System application would also be entirely consistent with FCC precedent. The Commission has declined to initiate a new processing round when considering an NGSO application on numerous occasions, including where the operator demonstrated that its system would "employ a mechanism designed to permit multiple NGSO systems to operate in the same spectrum[;]"[43] where applicants sought to operate in NGSO bands in which, due to "unique operating features" of the systems within those bands, "operators are generally capable of sharing

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[41] *See id.*, ¶ 61 ("[W]e do not anticipate conducting many second or additional processing rounds, because operating rights in all the available spectrum in the frequency band will be assigned equally to all qualified applicants in the first processing round, assuming that the applicants' spectrum requirements exceed the available allocation.").

[42] During such events, spectrum access would be governed by inter-system coordination agreements or the spectrum would be divided equally among involved systems for the short duration of the inline interference event.

[43] *Northrop Grumman Space & Mission Systems Corporation; Applications for Authority to Operate a Global Satellite System Employing Geostationary Satellite Orbit and Non-Geostationary Satellite Orbit Satellites in the Fixed-Satellite Service in the Ka-band and V-band*, Order and Authorization, 24 FCC Rcd 2330, ¶ 33 (2009) ("*Northrop Grumman Order*").

spectrum[;]"[44] where applicants' proposed operations would not "cause harmful interference to other operators in the band[;]"[45] and where the applicant's "planned operations [were] fully compatible with [existing operations], and would be compatible with future satellite systems in [the requested] frequency bands."[46] Given the design of the proposed Kuiper System, these considerations apply equally here. Accordingly, the Commission should waive the administrative requirements for contemporaneous consideration of additional Ka-band NGSO applications in this case.

2. Section 25.155(b), Mutual Exclusivity

Amazon seeks waiver of Section 25.155(b) to the extent this rule may be interpreted to require Commission consideration of its application in a new Ka-band NGSO processing round. Pursuant to Section 25.155(a), applications are mutually exclusive only "if their conflicts are such that the grant of one application would effectively preclude by reason of harmful interference, or other practical reason, the grant of one or more other applications."[47] Section 25.155(b) provides

[44] *Space Imaging, LLC*, *Petition for Clarification of Amendment of the Commission's Space Station Licensing Rules and Policies*, Declaratory Order and Order and Authorization, 20 FCC Rcd 11964, ¶¶ 10, 11 (2005) ("*Space Imaging Order*") (finding that waiver of the processing round rules "will neither preclude future systems from using the spectrum assigned to Space Imaging, nor cause harmful interference to other operators in the band"). *See also DigitalGlobe, Inc., Modification of Authorization to Construct, Launch and Operate a Remote-Sensing Satellite System,* Order and Authorization, 20 FCC Rcd 15696, ¶ 8 (2005) ("*DigitalGlobe Order*") (waiving the processing round requirement because "DigitalGlobe's application . . . presents similar circumstances" to those in the application granted in the *Space Imaging Order*).

[45] *Space Imaging Order*, ¶ 11. *See also DigitalGlobe Order*, ¶ 8.

[46] *Lockheed Martin Corporation*, *Application to Launch and Operate a Geostationary Orbit Space Station in the Radionavigation Satellite Service at 133° W.L.*, Order and Authorization, 20 FCC Rcd 11023, ¶ 15 (2005) (waiving processing round procedures for Lockheed Martin Corporation's request to provide Radionavigation Satellite Service using L-band frequencies it proposed to share with existing and future NGSO L-band systems).

[47] 47 C.F.R. § 25.155(a).

that "[a] license application for NGSO-like satellite operation, as defined in §25.157(a), will be entitled to comparative consideration with one or more mutually exclusive applications only if the application is received by the Commission in a condition acceptable for filing by the 'cut-off' date specified in a public notice."[48] Here, the Kuiper System application is not "mutually exclusive" with other Ka-band NGSO FSS system applications because grant of this application will not preclude grant of other applications for the same spectrum. Waiver of Section 25.155(b), therefore, is warranted to the extent it could be interpreted to require contemporaneous consideration of additional Ka-band NGSO applications.

B. Other Waiver Requests

1. Section 2.106, Table of Frequency Allocations

a. 17.7-17.8 GHz

Amazon requests a waiver, to the extent necessary, of the U.S. Table of Frequency Allocations and the Ka-band plan to use the 17.7-17.8 GHz band for user beam downlinks internationally. In the United States, this band is allocated to fixed services on a primary basis and to FSS Earth-to-space transmissions for broadcasting-satellite service ("BSS") feeder links.[49] Internationally, this band is authorized for FSS space-to-Earth transmissions in all three ITU regions and is also authorized for fixed, mobile, and FSS Earth-to-space transmissions.[50] Amazon intends to use this band only outside of the United States consistent with international allocations. Amazon demonstrates in the attached Technical Appendix that its use of the spectrum will not cause interference to authorized services. Grant of the waiver will facilitate Amazon's ability to

[48] 47 C.F.R. § 25.155(b).

[49] *See* 47 C.F.R. § 2.106. *See also NGSO FSS Order*, Appendix B.

[50] In ITU Region 2, this band is also authorized for BSS.

use frequency diversity to address potential interference and coordination issues. The FCC has previously granted requests to use this band for downlink operations.[51] For these reasons, waiver of the Table of Frequency Allocations and the Ka-band plan (if necessary for operations outside of the United States) would serve the public interest. This requested waiver of the U.S. Table of Allocations and the FCC's Ka-band Plan is included out of an abundance of caution, but may not be required since the proposed use of the band is exclusively outside of the United States.

b. 17.8-18.3 GHz, 18.3-18.6 GHz, 18.8-19.3 GHz, 19.3-19.4 GHz, 28.35-28.6 GHz, and 28.6-29.1 GHz

Amazon seeks waiver of the U.S. Table of Frequency Allocations and the Ka-band plan to provide FSS to ESIMs using the 17.8-18.3 GHz, 18.3-18.6 GHz, 18.8-19.3 GHz, 19.3-19.4 GHz, 28.35-28.6 GHz, and 28.6-29.1 GHz bands.[52] These bands are allocated for, *inter alia*, FSS both in the United States and in all three regions internationally. The FCC has already authorized ESIMs communicating with GSO satellites to operate in these bands,[53] and has a pending

[51] *See, e.g., Inmarsat Mobile Networks, Inc., Application to Operate a Fixed-Satellite Service Gateway Earth Station Facility in Lino Lakes, Minnesota with the Inmarsat-5 F2 Space Station*, Order and Authorization and Declaratory Ruling, 30 FCC Rcd 2770, ¶ 44 (2015) (granting waiver to use the 17.7-17.8 GHz band for GSO FSS downlinks in Lino Lakes, Minnesota).

[52] As explained above, Amazon proposes to provide customer terminal downlinks in the 17.8-18.3 GHz, 18.3-18.6 GHz, and 18.8-19.3 GHz bands, gateway and TT&C downlinks in the 19.3-19.4 GHz band, gateway uplinks in the 28.35-28.6 GHz band, and customer terminal uplinks in the 28.6-29.1 GHz band. *Supra* Table 3.

[53] *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service*, Report and Order and Further Notice of Proposed Rulemaking, 33 FCC Rcd 9327 (2018).

rulemaking proceeding proposing to enable NGSO FSS communications with ESIMs in the bands.[54]

Waiver of the U.S. Table of Frequency Allocations and the Ka-band plan will serve the public interest. Amazon intends to operate in accordance with the rules ultimately adopted in the *NGSO ESIMs* proceeding. As noted in that rulemaking, ESIM operation in these bands is intended to promote "innovative and flexible use of satellite technology, as well as regulatory equity between GSO and NGSO FSS systems."[55] Grant of this waiver request would enable service to customers on mobile platforms (including aircraft, maritime vessels, and land vehicles) as contemplated by the Commission and without causing harmful interference to other operations.

c. 19.7-20.2 GHz and 29.5-30.0 GHz

To the extent necessary, Amazon requests waiver of the Commission's Ka-band plan to provide both mobile-satellite service ("MSS") and FSS in the 19.7-20.2 GHz and 29.5-30.0 GHz bands. Although these frequencies are allocated for FSS and MSS domestically and internationally, and rules enabling ESIMs to communicate with NGSO systems are under consideration, FCC service rules do not presently exist for MSS. The Commission found it was in the public interest to grant O3b U.S. market access to provide MSS, in addition to FSS, in the 19.7-20.2 and 29.5-30.0 GHz bands.[56] Like O3b, Amazon's MSS operations will be supported

[54] *Facilitating the Communications of Earth Stations in Motion with Non-Geostationary Orbit Space Stations*, Notice of Proposed Rulemaking, IB Docket No. 18-315, FCC 18-160, ¶ 1 (rel. Nov. 16, 2018).

[55] *Id.*

[56] *O3b Limited, Request for Modification of U.S. Market Access for O3b Limited's Non-Geostationary Satellite Orbit System in the Fixed-Satellite Service and in the Mobile-Satellite Service*, Order and Declaratory Ruling, 33 FCC Rcd 5508, ¶¶ 21-22 (2018) ("*O3b Order*").

exclusively by directional antennas and will therefore have the same technical characteristics as its FSS operations in communicating with ESIMs.

Good cause thus exists to permit MSS operations in these bands on the same terms and conditions the FCC provided to O3b – namely, that (i) "Operations in portions of the 17.8-20.2 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 ("PFD") and equivalent power-flux density ("EPFD") limits contained in Section 25.208, 47 CFR § 25.208, and Articles 21 and 22, as well as Resolution 76 of the ITU Radio Regulations[;]" (ii) Amazon will "cooperate with other NGSO FSS operators in order to ensure that all authorized operations, including MSS operations in the 19.7-20.2 GHz band, jointly comport with the applicable limits for aggregate EPFD in the space-to-Earth direction (EPFD down) contained in Article 22 of the ITU Radio Regulations, as well as Resolution 76 of the ITU Radio Regulations[;]" and (iii) "MSS operations in the 19.7-20.2 GHz and 29.5-30 GHz frequency bands shall be conducted on a non-interference, non-protected basis with respect to other FSS operations in these bands."[57]

d. 19.4-19.6 GHz

Under the FCC's Ka-band plan, the 19.4-19.6 GHz band is allocated to fixed services and NGSO MSS feeder links for space-to-Earth transmissions in the United States.[58] As discussed above in Section V.B.1.c, the Kuiper System will provide both MSS and FSS in the 19.7-20.2 GHz and 29.5-30.0 GHz bands, and accordingly, its use of the 19.4-19.6 GHz band for MSS feeder links (space-to-Earth) conforms with the Ka-band plan. The Commission reached the same

[57] *Id.*, ¶ 46 (a), (b), (d).

[58] *See NGSO FSS Order*, Appendix B. Internationally, the 19.4-19.6 GHz band is allocated for FSS (space-to-Earth and Earth-to-space) on a co-primary basis with other services in all three ITU regions. *See* 47 C.F.R. § 2.106.

conclusion recently in granting O3b U.S. market access to provide MSS in the 19.7-20.2 GHz and 29.5-30.0 GHz bands and to use the 19.4-19.6 GHz band for MSS feeder links.[59] Further, as demonstrated in the associated Technical Appendix,[60] Amazon will coordinate with, as applicable, authorized operations in this band, including those of Iridium.[61] Nonetheless, to the extent necessary, Amazon requests waiver of the Ka-band plan and any applicable FCC rules for Amazon's proposed use of the 19.4-19.6 GHz band. Grant of the waiver will facilitate Amazon's ability to use frequency diversity to address potential interference and coordination issues and, accordingly, serves the public interest.

e. 29.1-29.25 GHz

In the United States under the Ka-band plan, the 29.1-29.25 GHz band is allocated to fixed service (local multipoint distribution service) and NGSO MSS feeder links for Earth-to-space transmissions.[62] As discussed above in Section V.B.1.c, the Kuiper System will provide both MSS and FSS in the 19.7-20.2 GHz and 29.5-30.0 GHz bands and, accordingly, its use of the 29.1-29.25 GHz band for MSS feeder links (Earth-to-space) conforms with the Ka-band plan. The

[59] *See O3b Order*, ¶¶ 19-23 (granting market access in the 19.3-19.7 GHz band for MSS feeder links and the 19.7-20.2 GHz and 29.5-30.0 GHz bands for both MSS and FSS). The Commission revised its Ka-band plan to allow for secondary NGSO FSS use of the 19.3-19.4 GHz and 19.6-19.7 GHz bands for space-to-Earth transmissions. *See NGSO FSS Order*, Appendix B.

[60] *See* Technical Appendix, Annex C, at C-7 – C-8.

[61] *See O3b Order*, ¶ 23 ("With respect to O3b's request for market access in the 19.3-19.7 GHz and 29.1-29.5 GHz bands, we note that coordination pursuant to Section 25.250 will be required between O3b's NGSO MSS feeder links in these bands and any previously authorized NGSO MSS systems not included in this processing round, including the Iridium system[.] . . . Sharing of the [bands] with other NGSO FSS operators authorized within this Ku-Ka-band processing round will be subject to Section 25.261.").

[62] *See NGSO FSS Order*, Appendix B. Internationally, the 29.1-29.25 GHz band is allocated to FSS (Earth-to-space) on a co-primary basis with other services in all three ITU regions. *See* 47 C.F.R. § 2.106.

Commission reached the same conclusion recently in granting O3b U.S. market access to provide MSS in the 19.7-20.2 GHz and 29.5-30.0 GHz bands and use of the 29.1-29.25 GHz band for MSS feeder links.[63] Amazon will coordinate with, as applicable, authorized operations in this band, including those of Iridium.[64]

Nonetheless, to the extent necessary, Amazon requests waiver of the Ka-band plan and any applicable FCC rules for Amazon's proposed use of the 29.1-29.25 GHz band. Grant of the waiver will facilitate Amazon's ability to use frequency diversity to address potential interference and coordination issues and, accordingly, serves the public interest.

f. 29.25-29.5 GHz

In the United States under the Ka-band plan, the 29.25-29.5 GHz band is allocated to GSO FSS and NGSO MSS feeder links for Earth-to-space transmissions.[65] As discussed above and in Section V.B.1.c, Amazon will provide both MSS and FSS in the 19.7-20.2 GHz and 29.5-30.0 GHz bands, and accordingly its use of the 29.25-29.5 GHz band for MSS feeder links (Earth-to-space) conforms with the Ka-band plan. The Commission reached the same conclusion recently in granting O3b U.S. market access to provide MSS in the 19.7-20.2 GHz and 29.5-30.0 GHz

[63] *See O3b Order*, ¶¶ 19-23 (granting U.S. market access in the 29.1-29.25 GHz band for MSS feeder links and the 19.7-20.2 GHz and 29.5-30.0 GHz bands for both MSS and FSS).

[64] *See supra* note 61. *See also* Technical Appendix, Annex C, at C-7 – C-8.

[65] *See NGSO FSS Order*, Appendix B. Internationally, the 29.25-29.5 GHz band is allocated to FSS (Earth-to-space) on a co-primary basis with other services in all three ITU regions. *See* 47 C.F.R. § 2.106.

bands and use of the 29.25-29.5 GHz band for MSS feeder links.[66] Amazon will coordinate with, as applicable, authorized operations in this band, including those of Iridium.[67]

Nonetheless, to the extent necessary, Amazon requests waiver of the Ka-band plan and any applicable FCC rules for Amazon's proposed use of the 29.25-29.5 GHz band. Grant of the waiver will facilitate Amazon's ability to use frequency diversity to address potential interference and coordination issues and, accordingly, serves the public interest.

2. Section 25.146(b), Geographic Coverage

Amazon seeks waiver of Section 25.146(b) of the FCC's rules, which provides that proposed Ku-band and Ka-band NGSO FSS satellite systems be capable of providing FSS on a continuous basis throughout the fifty states, Puerto Rico, and the U.S. Virgin Islands.[68] The Kuiper System covers the area between 56°N and 56°S latitudes. Accordingly, customers throughout continental U.S., Hawaii, and all U.S. territories will have access to Kuiper System services. So too will customers in many other countries within the coverage area. The Kuiper System will not provide FSS in the majority of Alaska, however, because the state's high latitude is outside of the coverage area.

As the Commission recently recognized, geographic service requirements impede system design flexibility, thereby hampering innovation and deployment.[69] The FCC further observed that the domestic coverage requirement specifically "could be unnecessary or counterproductive"

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[66] *See O3b Order*, 33 FCC Rcd 5508, ¶¶ 19-23 (granting U.S. market access in the 29.25-29.5 GHz band for MSS feeder links and the 19.7-20.2 GHz and 29.5-30.0 GHz bands for both MSS and FSS).

[67] Amazon understands that Iridium operates in the 29.25-29.3 GHz portion of this band. *See supra* note 61. *See also* Technical Appendix, Annex C, at C-7 – C-8.

[68] 47 C.F.R. § 25.146(b).

[69] *See NGSO FSS Order*, ¶¶ 69-70.

to the public interest.[70] For these reasons, the Commission eliminated its international coverage requirement, previously codified in Sections 25.145(c)(1) and 25.146(i)(2) of the agency's rules, reduced the scope of frequency bands to which the domestic coverage requirement applies, and proposed to eliminate the domestic coverage requirement altogether.[71] The FCC has granted waiver requests of this rule in the past, including for recent Ku-/Ka-band NGSO applications.[72] If the geographic coverage rule remains in place at the time of potential grant of this application, Amazon submits that a waiver is warranted here for all of these reasons.

3. Section 25.156(d)(4), Separate Processing of Feeder Link Applications

Amazon requests waiver of Section 25.156(d)(4) of the FCC's rules with respect to processing its request for access to feeder link spectrum.[73] This administrative rule requires that an application for feeder-link authority (or inter-satellite link authority) be processed separately from its associated service band.

Separate consideration is not necessary for the Kuiper System's proposed MSS feeder link operations. Amazon's use of these frequencies will not unreasonably preclude use by other operators because the Kuiper System employs advanced spectrum-sharing technologies to enable co-existence with other users of its band. In addition, separate consideration for these frequencies

[70] *Id.*, ¶ 75.

[71] *See id.*, ¶¶ 69-70, 75-76.

[72] *See, e.g.*, *Space Norway AS Petition for a Declaratory Ruling Granting Access to the U.S. Market for the Arctic Satellite Broadband Mission*, Order and Declaratory Ruling, 32 FCC Rcd 9649, ¶ 20 (2017) (granting waiver of both the international and geographic coverage requirements). The Commission also dismissed as moot requests for waiver of the geographic coverage requirements that were no longer necessary due to FCC rule changes. *See, e.g.*, *Audacy Corporation Application for Authority to Launch and Operate a Non-Geostationary Medium Earth Orbit Satellite System in the Fixed- and Inter-Satellite Services*, Order and Authorization, 33 FCC Rcd 5554, ¶ 34 (2018) ("*Audacy Order*"); *O3b Order*, ¶ 34.

[73] *See* 47 C.F.R. § 25.156(d)(4).

would cause unnecessary delay contrary to the public interest. The Commission has granted a similar request for waiver to Audacy Corporation for inter-satellite link operations in its Ka-band NGSO application,[74] and good cause similarly exists here to grant the requested waiver.

4. Section 25.114(c)(4)(v), Schedule S

Amazon requests, to the extent necessary, limited waiver of Section 25.114(c) of the FCC's rules, which requires submission of certain technical information using Schedule S.[75] Due to restrictions of the required Schedule S software, Amazon is unable to convey the inapplicability of saturation flux density ("SFD") values or Amazon's use of spare satellites in the Kuiper System via Schedule S. The Kuiper System processes signals prior to retransmission and therefore, unlike legacy satellite systems, does not involve SFD and there are no SFD values for Amazon to disclose. To satisfy the Schedule S software requirement to provide a numerical value for SFD, Amazon entered "0" and "-0.1" for maximum and minimum SFD values, respectively.

Limited waiver of Section 25.114(c)(4)(v) is warranted as it would enable Amazon to submit its technologically advanced and robust Kuiper System for approval without undermining the rule's intent that the Commission receive all information necessary to evaluate the application. Amazon provides all relevant information in this Legal Narrative, Technical Appendix, and, to the extent possible, Schedule S. Nuances concerning the lack of SFD have been explained here. The FCC has granted similar waivers to other NGSO system applicants that were unable to accurately

[74] *See Audacy Order*, ¶¶ 26-27 ("We find that the public interest would not be served by delaying action on Audacy's request and by opening a separate, further processing round for these frequency bands and that a waiver of Section 25.156(d)(4) is justified.").

[75] *See* 47 C.F.R. § 25.114(c).

describe their system architectures in Schedule S.[76] Accordingly, grant of limited waiver is appropriate, consistent with FCC precedent, and would serve the public interest.

VI. U.S. TABLE OF ALLOCATIONS FOOTNOTE CONDITIONS

Amazon will comply with the U.S. table of allocations, codified in Section 2.106 of the FCC's rules, and all corresponding footnotes except where it has requested waiver in Section V.B.1 above.[77] For example, Amazon will operate in the 17.7-17.8 GHz band outside of the United States only and consistent with international footnotes 5.484A and 5.517.[78] Amazon will also comply with U.S. table of allocations footnotes US334 and NG62 and all international footnotes applicable to the frequencies identified in Table 3 above.[79]

VII. MILESTONE, BOND, AND OTHER OBLIGATIONS

Amazon will comply with the satellite launch milestone applicable to authorized NGSO satellite systems and corresponding bond requirement as modified by the Commission in its *2015 Part 25 Streamlining Second Report and Order* and codified in Sections 25.164(b) and 25.165 of

[76] *See, e.g.*, *O3b Order*, ¶ 35; *Space Exploration Holdings, LLC, Application for Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System*, Memorandum Opinion, Order, and Authorization, 33 FCC Rcd 3391, ¶ 36 (2018).

[77] *See* 47 C.F.R. § 2.106; *infra* pp. 21-26.

[78] *See* 47 C.F.R. § 2.106, Table of Allocations Footnotes 5.484A and 5.517. The United States does not have an allocation for FSS (space-to-Earth) operations, and FSS (Earth-to-space) operations in the United States are limited to BSS feeder links. *See id.*, Table of Allocations Footnote US271.

[79] *See id.*, Table of Allocations Footnotes US334 (requiring coordination with federal FSS systems) and NG62 (prohibiting FSS systems from causing harmful interference to, or claiming protection from, FSS stations operating under the following Call Signs: KEB35, KGB72, KGC79, KIL20, KME49, KQG58, KQH74, KSA96, KSE73, KVH83, KYJ33, KZS88, WAX78, WLT380, WMK817, WML443, WMP367, and WSL69). *See also id.*, Table of Allocations Footnotes 5.525-5.529 and 5.543.

the FCC's rules, respectively.[80] We further agree to comply with Section 25.145(e) of the FCC's rules concerning the prohibition of certain agreements.[81]

VIII. ITU COST RECOVERY

Amazon understands and acknowledges that it is responsible for any ITU cost recovery fees associated with this application. Pursuant to ITU Resolution 88 (Rev. Marraheck, 2002) and ITU Council Decision 482, as modified, the ITU assesses processing fees for satellite network filings. FCC applicants are responsible for any and all fees charged by the ITU under Section 25.111(d) of the Commission's rules.[82] Amazon is aware of this requirement and it accepts responsibility for ITU cost recovery fees associated with ITU filings for the Kuiper System.

IX. REQUEST FOR TREATMENT AS PERMIT-BUT-DISCLOSE

Amazon requests the FCC treat this application as a "permit-but-disclose" for purposes of the agency's *ex parte* rules.[83] Allowing Amazon and other interested parties to engage in discussions with the Commission will best ensure that the public interest is served. Permit-but-disclose status in this case would also be consistent with consideration of earlier NGSO system applications.[84]

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[80] *See* 47 C.F.R. §§ 25.164(b), 25.165. *See also Comprehensive Review of Licensing and Operating Rules for Satellite Services*, Second Report and Order, 30 FCC Rcd 14713 (2015).

[81] *See* 47 C.F.R. § 25.145(e).

[82] 47 C.F.R. § 25.111(d).

[83] *See* 47 C.F.R § 1.1200(a) ("Where the public interest so requires in a particular proceeding, the Commission and its staff retain the discretion to modify the applicable *ex parte* rules by order, letter, or public notice.").

[84] *See e.g., Satellite Policy Branch Information, OneWeb Petition Accepted for Filing, 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, 7667 (2016).

X. CONCLUSION

Based on the foregoing, Amazon respectfully requests that the Commission grant its request for authority to launch and operate the Kuiper System.

Respectfully submitted,

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