Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

Application of **SPACE EXPLORATION HOLDINGS, LLC** for Authority to Launch and Operate the SpaceX NGSO MSS System	ICFS File No. SAT-LOA-_____ Call Sign: _____

APPLICATION FOR LAUNCH AND OPERATING AUTHORITY FOR THE SPACEX NGSO MSS SATELLITE SYSTEM

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SUMMARY

With this application, SpaceX seeks authority to provide next-generation mobile satellite connectivity via a new, purpose-build, non-geostationary orbit ("NGSO) mobile satellite service ("MSS") system. This new system of up to 15,000 satellites will provide ubiquitous connectivity to ordinary mobile handsets and a range of other devices and user terminals. Within the United States, SpaceX seeks authorization to operate in a subset of the International 2 GHz bands, 2000-2025 MHz, and 2180-2200 MHz bands ("2 GHz bands"). Additionally, the MSS system will offer Supplemental Coverage from Space ("SCS") within the United States in the PCS G Block (1910-1915 MHz and 1990-1995 MHz) and AWS-H Block (1915-1920 MHz and 1995-2000 MHz) bands. SpaceX proposes to offer MSS outside the U.S. across a range of bands, including L-band (1668-1675 MHz (Earth-to-space) and 1518-1525 MHz (space-to-Earth) and 1626.5 MHz (Earth-to-space) and 1525-1559 MHz (space-to-Earth)), Extended L-band (1610-1626.5 MHz (Earth-to-space) and 2483.5-2500 MHz (space-to-Earth), and International 2 GHz (1980-2025 MHz (Earth-to-space) and 2170-2200 MHz (space-to-Earth)) and to offer SCS through arrangements with terrestrial mobile operators using spectrum in the range of 1429-2690 MHz.

Over the last two years, SpaceX launched thousands of highly capable and operationally flexible Gen2 satellites, enabling the system to provide unprecedented high-capacity, low-latency satellite broadband service to Americans throughout every corner of the country. More recently, the Commission also authorized SpaceX to provide supplemental coverage from space to mobile devices in partnership with T-Mobile, leveraging SpaceX's Gen2 constellation to meet the rapidly developing and accelerating demand for mobile connectivity throughout the United States, including consumers, enterprises, and first responders. SpaceX has entered into agreements with multiple operators in other countries to deliver similar services internationally. This new system will offer a new generation of MSS connectivity, supporting voice, texting, and high-speed data.

The Space Bureau dismissed a previous SpaceX application to use the 2 GHz MSS band, concluding that only the incumbent AWS-4 licensee could provide MSS service in the band because "same band, separate operator" sharing would be impracticable. Thus, because EchoStar held the exclusive authorizations for both 2 GHz MSS and AWS-4, the Bureau concluded that no other prospective operator could apply to provide MSS service in the 2 GHz band. However, the Bureau's dismissal of SpaceX's application was without prejudice to SpaceX refiling its application under different circumstances.

Today, circumstances have fundamentally changed. SpaceX and EchoStar have now entered into an agreement to assign EchoStar's AWS-4 licenses, its AWS-H Block licenses, and its 2 GHz MSS market-access authorization to SpaceX. Therefore, the logic that previously led the Space Bureau to dismiss SpaceX's application to provide 2 GHz MSS service now compels the opposite result: the Bureau should swiftly accept and grant SpaceX's application, as it is now the only operator capable of deploying service in the band under the existing framework.

In addition to MSS in the 2 GHz band, SpaceX also proposes to provide in the United States MSS under the Commission's SCS framework in the AWS-H Block, consistent with the Table of Allocations and the SCS rules. As required by the SCS rules, SpaceX will be the only AWS-H Block licensee throughout the fifty U.S. states. Similarly, SpaceX proposes to extend its existing authorization to provide SCS in the PCS G Block to this new MSS system.

Allowing SpaceX to launch and operate the proposed MSS payloads on a new, purpose-built NGSO MSS system will have dramatic public interest benefits. While the 2 GHz and AWS-H Block bands are fundamentally underused today, SpaceX stands ready to rapidly deploy service, significantly enhancing the ubiquitous mobile coverage SpaceX provides today via its SCS system, benefitting all Americans, including those in underserved remote, rural, and tribal areas. And

because SpaceX will be the only co-channel MSS or terrestrial Mobile Service licensee in the fifty states in the relevant bands, it can do so without presenting any material risk of interference. Accordingly, the Commission should expeditiously grant SpaceX's application.

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APPLICATION FOR LAUNCH AND OPERATING AUTHORITY FOR THE SPACEX NGSO MSS SATELLITE SYSTEM

INTRODUCTION

In this application, Space Exploration Holdings, LLC ("SpaceX") requests authority to launch and operate a new constellation of 15,000 NGSO satellites designed from the ground up to support high-speed connectivity directly to mobile devices. These space stations will provide MSS internationally in L-band (1668-1675 MHz (Earth-to-space) and 1518-1525 MHz (space-to-Earth) and 1626.5 MHz (Earth-to-space) and 1525-1559 MHz (space-to-Earth)), Extended L-band (1610-1626.5 MHz (Earth-to-space) and 2483.5-2500 MHz (space-to-Earth), and International 2 GHz (1980-2025 MHz (Earth-to-space) and 2170-2200 MHz (space-to-Earth)), as well as offer direct-to-device supplemental coverage internationally in frequencies spanning 1429-2690 MHz. Of these frequencies, the PCS G Block (1910-1915 MHz (Earth-to-space) and 1990-1995 MHz (space-to-Earth), AWS-H Block (1915-1920 MHz (Earth-to-space) and 1995-2000 MHz (space-to-Earth)) and a subset of the International 2 GHz band—*i.e.*, 2000-2025 MHz (Earth-to-space) and 2180-2200 MHz (space-to-Earth) (the "2 GHz MSS" bands)—will be used to provide service in the U.S. (the PCS G Block, AWS-H Block, and 2 GHz MSS bands will be collectively referred

to as the "MSS Bands"). Granting this application will enable SpaceX to provide dramatically improved mobile service, offering increased capacity, reduced latency, and broader service coverage for mobile users across the United States, including first responders, commercial enterprises, and other users who are underserved or unserved by existing networks.

I. SPACEX'S 2 GHZ MSS SYSTEM WILL BRING UBIQUITOUS CONNECTIVITY TO MOBILE CUSTOMERS IN THE UNITED STATES WITHOUT CAUSING INTERFERENCE TO OTHER LICENSEES.

A. Realizing the Commission's Vision for Mobile-Satellite Service

i. International 2 GHz band (1980-2025 MHz and 2170-2200 MHz)

The 1980-2010 MHz (Earth-to-space) and 2170-2200 MHz (space-to-Earth) bands are allocated worldwide for MSS on a co-primary basis; and the 2010-2025 MHz (Earth-to-space) band is allocated for MSS in Region 2 on a co-primary basis.[1] The Commission adopted conforming domestic allocations for a subset of these international bands, 2000-2020 MHz and 2180-2200 MHz, which are recorded in its rules.[2] SpaceX proposes to provide MSS in those bands consistent with international allocations and the Commission's rules.

In a small portion of the International 2 GHz band, 2020-2025 MHz, the Commission has not yet created an MSS allocation. However, it also does not have any service rules for Fixed or Mobile systems in the band, and the Commission's Universal Licensing System shows no active licenses in the band. In 2020, Kepler Communications, Inc. and Spire Global, Inc., filed a Petition

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1 *See* ITU, Final Acts of the World Administrative Radio Conference at 62-64 (Geneva, 1993); *see also* Amendment of Section 2.106 of the Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service, 12 FCC Rcd. 7388 (1997); Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz, 26 FCC Rcd. 5710 (2011) ("2 GHz Band Co-Allocation NPRM").

2 *See* 47 C.F.R. § 25.202(a)(4)(ii).

for Rulemaking to add an MSS allocation to the band.[3] These petitions correctly note that this band would provide critical spectrum resources for new operators to meet the growing need for uplink MSS operations.[4] SpaceX therefore requests a waiver of the U.S. Table of Frequency Allocations to use the 2020-2025 MHz band for uplink for its mobile satellite user terminals consistent with the ITU Region 2 allocation, subject to the outcome of the Kepler/Spire Petition.[5]

ii. AWS-H Block (1915-1920 MHz and 1995-2000 MHz)

As with the 2 GHz MSS band, the AWS-H Block today is exclusively licensed to EchoStar, via its subsidiaries, throughout the continental United States. However, EchoStar has agreed and requested Commission authorization to assign each of these licenses to SpaceX. As a result of that transaction, SpaceX will become the exclusive terrestrial licensee in the band across the continental U.S.

Consistent with the U.S. table of frequency allocations, SpaceX proposes to provide service in the AWS-H Block band under the Commission's SCS rules, which permit a satellite operator to provide SCS service in allocated bands so long as it obtains the appropriate authorization from a terrestrial licensee with exclusive rights. Here, because the SCS and terrestrial operators will be one and the same entity, SpaceX, no such agreement or accompanying spectrum lease will be necessary. Accordingly, SpaceX has requested waivers of certain SCS procedural rules, which do not apply in this context.

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[3] *See* Petition to Revise Sections 2.106 and 25.142 of the Commission's Rules to Expand Spectrum Availability for Small Satellites by adding Mobile-Satellite Service Allocation in the Frequency Band 2020-2025 MHz, RM-11869 (filed Oct. 30, 2020) ("Kepler/Spire Petition") (pending).

[4] Kepler reciprocates its support for SpaceX's request for authority to operate an MSS system in the 2020-2025 MHz band. *See* Letter from Nickolas G. Spina to Marlene Dortch, ICFS File No. SAT-MOD-20220906-00100 (filed Oct. 28, 2022).

[5] SpaceX recognizes that its MSS system is subject to compliance with the outcome of any future rulemaking. *See SpaceX Request for Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System, 39 FCC Rcd 12550, ¶ 89(iiii) (2024) ("SpaceX G Block SCS Order").*

Consistent with the SCS framework, SpaceX also plans to deploy SCS in this band internationally. SpaceX will file the appropriate notifications with the Commission as it obtains the necessary authorizations to provide MSS in AWS-H Block spectrum in other jurisdictions.

As with the 2 GHz Band, SpaceX can rapidly use this spectrum to provide enhanced MSS service to users across the United States and around the world, offering increased throughput, lower latency, and improved coverage.

iii. PCS G Block (1910-1915 MHz and 1990-1995 MHz)

The Commission previously authorized SpaceX to deliver SCS in the PCS G Block via its Gen2 system.[6] Extending that authorization to the MSS system will enable SpaceX to consolidate its MSS direct-to-device services within one constellation, driving efficiencies and improving the coverage and capabilities of these services. Through its existing SCS service in G Block, SpaceX has demonstrated the tremendous public interest benefits of ubiquitous coverage to consumer handsets and devices that this service can deliver, as well as demonstrated that the service operates without causing harmful in-band or out-of-band interference.

B. Description of MSS System Architecture

The SpaceX MSS system will consist of a constellation of low and very low Earth orbit satellites that will leverage SpaceX's existing ground equipment as well as add new equipment that aims to optimize performance for consumers.

i. Space Segment

The proposed SpaceX MSS system will consist of up to 15,000 built-for-purpose MSS satellites. After full deployment, the SpaceX MSS system will be able to cover the entirety of the United States and its territories where authorized and provide full global coverage wherever it is

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[6] *See SpaceX G Block SCS Order*.

authorized to operate. The MSS system will have the capability to route traffic across SpaceX's Gen1 and Gen2 systems via optical links. A more precise description of the frequency and channelization plan for the SpaceX MSS system is included in Schedule S and the Technical Attachment accompanying this application.

ii. Ground Segment

The SpaceX MSS system will communicate with fixed and mobile earth stations and will be capable of providing connectivity virtually anywhere on Earth. SpaceX intends to use its MSS service to communicate with a wide array of end user devices, as contemplated by the SCS and MSS rules. SpaceX will submit applications to the Commission as needed to request blanket authority for user terminals that will operate in the United States and its territories, pursuant to Section 25.115 of the Commission's rules.[7]

SpaceX plans to leverage its existing fixed-satellite service ("FSS") ground infrastructure to support these MSS operations. The Commission has determined that the use of FSS spectrum to operate feeder links in support of MSS operations is consistent with an FSS allocation because the "satellites will be communicating directly with fixed earth stations when performing feeder link operations" even if those FSS communications support a mobile service.[8] The MSS system will share gateway facilities with SpaceX's Gen1 and Gen2 systems, employing the same backhaul bands as the Gen2 system. As detailed in the included Waiver Requests and Technical Attachment, these operations will protect co-frequency operators licensed in prior processing rounds by ensuring that any additional interference to those operators will be limited to the time-weighted

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7 47 C.F.R. § 25.115.

8 *See SpaceX G Block SCS Order* ¶ 49.

3% long-term and absolute 0.4% long short-term interference protection criteria the Commission adopted in its NGSO sharing order.[9]

C. SCS Certifications

SpaceX certifies that SCS earth stations will qualify as "licensed by rule" earth stations under § 25.115(q).[10] As detailed in the enclosed waiver requests, SpaceX seeks a waiver of the requirement to lease spectrum from a terrestrial licensee with respect to the AWS-H Block, and to certify that it has done so,[11] because SpaceX itself will also serve as the terrestrial licensee. SpaceX certifies that, upon consummation of the EchoStar/SpaceX transaction, it will hold all co-channel licenses within the GIAs where SpaceX proposes to offer SCS service.[12] SpaceX has previously demonstrated that it satisfies all SCS requirements with respect to the PCS G Block.[13]

II. GRANT OF THIS APPLICATION WILL SERVE THE PUBLIC INTEREST BY ENABLING SPACEX TO OFFER NEXT-GENERATION SERVICES TO UNDERSERVED AND UNSERVED MOBILE USERS THROUGHOUT THE UNITED STATES.

SpaceX is dedicated to leveraging advancements in satellite technology to ensure that all Americans have access to robust connectivity, even while on the move and during emergencies. For example, the Commission authorized SpaceX to operate earth stations in motion ("ESIMs") that reflect American consumer and business realities on the ground by enabling broadband services on moving aircraft, ships, and vehicles.[14] As the Commission found in establishing a regime for SCS, satellite services to mobile devices "serve several important public interest goals

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9 *Revising Spectrum Sharing Rules for Non-Geostationary Orbit, Fixed-Satellite Service Systems*, Second Report and Order and Order on Reconsideration, 39 FCC Rcd. 12656 (2024).

10 *See* 47 C.F.R. § 25.125(b)(1)(iii).

11 *See* 47 C.F.R. § 25.125(b)(1)(i).

12 *See* 47 C.F.R. § 25.125(b)(1)(i), (ii).

13 *See SpaceX G Block SCS Order*.

14 *See* ICFS File Nos. SES-LIC-20210309-00698, SES-AMD-20210731-01295, SES-LIC-20210803-01360, and SES-LIC-20210803-01361.

for the nation," such as "expand[ing] the reach of communications services, particularly emergency services," "spur[ring] advancements in cutting-edge, space-based technologies that will position the United States as a global leader in this arena," and "continu[ing] our efforts to promote the innovative and efficient use of our nation's spectrum resources."[15] SpaceX was one of the first to realize the promise of SCS, partnering with T-Mobile to offer space-based services to standard cell phones where terrestrial networks are unavailable[16]—and the early network already proved its mettle during and after natural disasters, including recent hurricanes and wildfires.

In the meantime, consumer demand for broadband is surging, and extending connectivity to all Americans, especially those on the wrong side of the digital divide, requires an infusion of innovative capabilities and capacity. With a new standalone MSS system, designed from the ground up for direct-to-device mobile connectivity, SpaceX can ensure that its system is optimized to meet this exploding demand.

SpaceX's MSS system will also be configured to permit maximum frequency reuse and agility to enhance the flexibility, capacity, and robustness of the overall system. Furthermore, optical inter-satellite links permit flexible routing of traffic on-orbit to satisfy consumer demand, enhance network efficiency, preempt network congestion, and maximize the system's ability to share feeder-link frequencies with other operators.

The MSS Bands will support a range of services, enabling SpaceX to craft a compelling array of offerings to address the connectivity needs of Americans wherever they are and whatever they are doing. By operating at low and very low altitudes, SpaceX's MSS system can broaden its

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[15] Single Network Future: Supplemental Coverage from Space, 39 FCC Rcd. 2622, ¶ 2 (2024).

[16] *See*, *generally*, *SpaceX G Block SCS Order*.

coverage and reduce transmission latencies, ensuring that all Americans—even those in remote and polar regions—experience the same high quality mobile services. Additionally, as SpaceX has acquired EchoStar's terrestrial AWS-4 licenses in the 2 GHz band, SpaceX may deploy ground-based systems in the U.S., creating a hybrid satellite/terrestrial network to expand the coverage and capacity of these services. And consumers are not the only beneficiaries of this improved service. For many federal users, satellite service is the only communications option to support critical missions. Improving capacity and reducing latency in these communications could have significant national security benefits. All of these services are in the public's best interests and advance the Commission's objectives.

SpaceX's MSS system will employ a host of cutting-edge innovations to ensure its system does not cause harmful interference to others. As discussed in the Technical Attachment accompanying this application, the system will not create harmful interference to other systems authorized to provide service in these frequency bands.[17] By operating at low and very low altitudes, SpaceX's MSS system will enable small spot beams and greater satellite diversity, efficiently achieving a high degree of frequency reuse of valuable spectrum resources and significantly enhancing the data capacity available anywhere in the world. Moreover, the SpaceX MSS satellites' ability to route traffic between themselves—as well as between the MSS system and SpaceX's Gen1 and Gen2 systems—using optical links will permit the MSS system to limit its use of feeder link beams where their operation would otherwise cause unacceptable levels of interference to other operators. As it has done previously, SpaceX will coordinate in good faith to

[17] *See* Technical Attachment.

optimize spectrum efficiency and leverage its flexibility to share spectrum with other licensed systems.

Finally, SpaceX designed its MSS system to use the proven orbital debris mitigation strategies that the Commission and Space Bureau have approved for use of SpaceX's Gen2 system, preserving the extremely low risk that SpaceX's satellites will become a source of orbital debris. For example, SpaceX's MSS system utilizes the built-in advantages of operating at low altitudes so that, in the unlikely event that any debris does result, atmospheric drag will ensure that such debris will quickly disintegrate in the atmosphere and pose no further danger to space operations or life on the ground. Moreover, the MSS satellites will have sufficient maneuverability to avoid other satellites and orbital debris throughout their mission lifetime and through the de-orbit process.

III. ITU COST RECOVERY

SpaceX is aware that, as a result of the actions taken at the 1998 Plenipotentiary Conference, as modified by the ITU Council in 2005, the ITU now charges processing fees for satellite network filings. As a consequence, Commission applicants are responsible for any and all fees charged by the ITU. SpaceX confirms that it is aware of this requirement and accepts responsibility to pay any ITU cost recovery fees associated with this application. Invoices for such fees may be sent to the contact representative listed in the accompanying FCC Form 312.

CONCLUSION

For the foregoing reasons, and for the reasons set forth in the accompanying materials, SpaceX requests that the Commission find authorizing SpaceX to launch and operate its proposed NGSO MSS system will serve the public interest and issue such grant expeditiously.

Respectfully submitted,

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