

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of

Intuitive Machines, LLC

Application for Authority to Launch and
Operate the Altus Lunar Data Relay
Constellation

Call Sign:

File No. SAT-LOA-20260513-
00197

APPLICATION OF INTUITIVE MACHINES, LLC

Timothy Bransford
Liam Fulling
GREENBERG TRAURIG LLP
2101 L St. NW, Ste 1000
Washington, D.C. 20037

David Pattillo
Head of Spectrum Policy &
Regulatory Affairs
Intuitive Machines, LLC
13467 Columbia Shuttle St.
Houston, TX 77059

Counsel to Intuitive Machines

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NARRATIVE

Intuitive Machines, LLC (“Intuitive Machines”), hereby requests authority under Section 25.123 of the Federal Communications Commission’s (“FCC” or “Commission”) streamlined small spacecraft rules¹ to launch and operate the Lunar Data Network (“LDN”) constellation of lunar orbiting relay satellites, named Altus (“Altus” or “Altus Constellation”), for a period of up to 72 months, using spectrum in the 2025-2110 MHz, 2200-2290 MHz, 2483.5-2500 MHz, 7190-7235 MHz, 8450-8500 MHz, 22.55-23.15 GHz, 23.15-23.55 GHz, 25.5-27 GHz, and 27-27.5 GHz bands (the “Altus Mission”).²

The Altus Mission is part of the National Aeronautics and Space Administration’s (“NASA”) broader Near Space Network Service (“NSNS”) effort to provide missions within one million miles of Earth with robust communications services. NASA’s efforts involve a combination of government and commercial assets to connect scientific missions, including both

¹ See 47 C.F.R. § 25.123 (“This section shall ... apply to applicants for space stations that will operate beyond Earth's orbit and that are able to certify compliance with the certifications ... of this section”).

² The Altus Constellation will use the L-band (1164-1215 MHz and 1559-1610 MHz) to receive Global Navigation Satellite Systems (“GNSS”) signals and augment them for use by Intuitive Machines’ customers. No transmission or emissions will occur in this band from the Altus Constellation.

manned and autonomous spacecraft, exploring our solar system. The Altus Mission will deploy a constellation of five (5) lunar orbiting relay satellites (“Altus-1,” “Altus-2,” Altus-3,” “Altus-4,” and “Altus-5”) to provide continuous, uninterrupted connectivity between missions on the lunar surface and ground stations on Earth. Altus satellites will serve as a “bent-pipe” transmission medium communicating with missions on the lunar surface via S- and Ka-band frequencies and then relaying such communications to a dedicated network of ground stations on the Earth’s surface via X- and Ka-band frequencies. The Altus Constellation will also have a GNSS antenna and separate receiver to receive L-band frequency transmissions. The satellite receives and processes GNSS signals to compute the current position, velocity and time, which is provided to lunar Position, Navigation, and Timing (“PNT”) users to compute their own position, velocity and time. The Altus Mission will supplement NASA’s own Lunar Reconnaissance Orbiter (“LRO”), and in the longer term, ensure uninterrupted connectivity to the lunar surface after the LRO’s eventual retirement.

Accordingly, the Altus Mission is critical to furthering the national space policy objectives of the United States and grant of this license would strongly serve the public interest.

I. BACKGROUND

Under Space Policy Directive 1 (“SPD-1”), the President announced that it is the goal of the U.S. government to return human beings to the Moon for the first time in a half-century. SPD-1 established the mission of NASA to:

“Lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and to bring back to Earth new knowledge and opportunities. Beginning with missions beyond low-Earth orbit, *the United States will lead the return of humans to the*

Moon for long-term exploration and utilization, followed by human missions to Mars and other destinations[.]”³

A critical component of this mission to return human beings to the Moon, dubbed the Artemis Program,⁴ begins with the NSNS effort to provide critical communications, tracking, and navigation services to missions exploring the Moon. This infrastructure will play an essential role in establishing a long-term presence on the Moon and beyond.

Intuitive Machines, founded in 2013, is leading an effort to develop a commercial Lunar Payload and Data Service (“LPDS”) which provides transit to lunar orbit, intact payload delivery to the lunar surface, data communications, and power services to assets both in lunar orbit and on the surface of the Moon. Intuitive Machines has been selected by NASA as part of its Commercial Lunar Payload Services (“CLPS”) program to send robotic landers, rovers, and other payloads to the Moon. Intuitive Machines’ first lunar mission (“IM-1”), carried out in February 2024, was the first commercial lunar lander to have successfully soft-landed on the Moon, and carried payloads developed by NASA, as well as commercial and educational customers.⁵ Intuitive Machines’ second lunar mission (“IM-2”), which concluded in March 2025, further advanced lunar exploration by achieving the southernmost lunar landing ever and completing several program and payload milestones, for which the data are still being collected and analyzed.⁶

³ Space Policy Directive 1: Reinvigorating America’s Human Space Exploration Program (Dec. 11, 2017) (emphasis added), available at <https://trumpwhitehouse.archives.gov/presidential-actions/presidential-memorandum-reinvigorating-americas-human-space-exploration-program/>.

⁴ Artemis is the twin sister of Apollo, and the Goddess of the Moon. See NASA, *The Artemis Plan: NASA’s Lunar Exploration Program Overview* (Sept. 2020) (“Artemis Plan”), available at https://dn710004.ca.archive.org/0/items/artemisplan_sept2020/artemisplan_sept2020_text.pdf.

⁵ See Intuitive Machines, SAT-LOA-20210423-00055 (Call Sign S3084) (“IM-1 Application”); Intuitive Machines Historic IM-1 Mission Success: American Ingenuity Never Gives Up, Press Release (Feb. 29, 2024), available at <https://investors.intuitivemachines.com/news-releases/news-release-details/intuitive-machines-historic-im-1-mission-success-american>.

⁶ See Intuitive Machines, SAT-LOA-20240524-00112 (Call Sign S3201) (“IM-2 Application”); Intuitive Machines Executes Southernmost Lunar Landing and Operates Payloads, Press Release (March 7, 2025), available at <https://www.intuitivemachines.com/im-2>.

A forthcoming third Intuitive Machines lunar mission (“IM-3”) will involve landing a further evolution of the NOVA-C lunar lander on the surface of the Moon. Launch of the third NOVA-C is currently planned for Q4 2026. Similar to the IM-1 and IM-2 missions, the IM-3 mission will deliver commercial and NASA payloads to the lunar surface for the purpose of conducting scientific research and technology demonstrations.

On September 17, 2024, NASA announced the award of the “Subcategory 2.2 GEO to Cislunar Relay Services” contract to Intuitive Machines. The contract tasks Intuitive Machines with supporting the NSNS effort by providing communications services for NASA missions in Earth orbit and cislunar space. Pursuant to the contract, Intuitive Machines will provide lunar data relay and direct-to-Earth data services. Lunar relays will play an essential role in delivering PNT services by extending coverage to the Moon’s South Pole and reducing reliance on NASA’s Deep Space Network (“DSN”) while also offering operational independence from data processing on Earth.

Accordingly, Intuitive Machines respectfully requests that the Commission grant this application expeditiously to allow Intuitive Machines to prepare for the launch and operation of the Altus Mission, which will serve as essential communications infrastructure for supporting the United States’ quickly growing and eventually permanent presence on the Moon.

II. ALTUS MISSION DESCRIPTION

A. Mission Phase Overview

Altus-1 is expected to launch in Q4 2026, Altus-2 and Altus-3 are expected to launch in Q4 2027, and Altus-4 and Altus-5 are expected to launch in 2028. The Altus Constellation will operate in four phases: (i) Launch Phase; (ii) Transit Phase; (iii) Operational Lunar Orbit Phase; and (iv) Post-Mission Disposal Phase. Each phase of the mission is briefly described below.

1. Launch Phase

Each Altus satellite is planned to be launched aboard a SpaceX Falcon 9 rocket.⁷ During the Launch Phase, after launch and launch vehicle separation, Intuitive Machines' control facility in Houston will expeditiously establish communications with each individual Altus satellite to begin tracking the spacecraft and computing Trajectory Correction Maneuver ("TCM") burns.

2. Transit Phase

During the Transit Phase, each Altus satellite will perform a Ballistic Lunar Transfer ("BLT") trajectory that will last 120-170 days. The BLT will include a lunar flyby 5-10 days after launch, a long coast phase lasting between 110-160 days, during which each Altus satellite's maximum distance can reach 1.5 million km from Earth, and a return to the Moon for Lunar Orbit Injection ("LOI"). Throughout the Transit Phase, several trajectory maneuvers will be performed to properly target the operational orbit.

3. Operational Lunar Orbit Phase

During the Operational Lunar Orbit Phase, the Altus Constellation will orbit the Moon in an Elliptical Lunar Frozen Orbit ("ELFO") with an orbit period of approximately 33 hours. This phase's duration will be evaluated in conjunction to spacecraft health until retirement is initiated.

4. Post-Mission Disposal Phase

The Post-Mission Disposal Phase will consist of identifying primary and backup lunar craters to target for disposal of each Altus satellite, followed by controlled maneuvers to place the Altus satellite on trajectory for safe disposal within the selected lunar crater. The Altus satellites have been designed with adequate propulsive capabilities to retire in this manner, and Intuitive

⁷ Altus-1 is tentatively planned to launch concurrently on the same launch vehicle as the IM-3 NOVA-C lander. Intuitive Machines, however, requests that the Commission process each application on its own merits in parallel.

Machines will track the Altus satellite to impact on the lunar surface. The Post-Mission Disposal Phase is explained further in Attachment A, Technical Appendix.

B. Altus Satellite Description

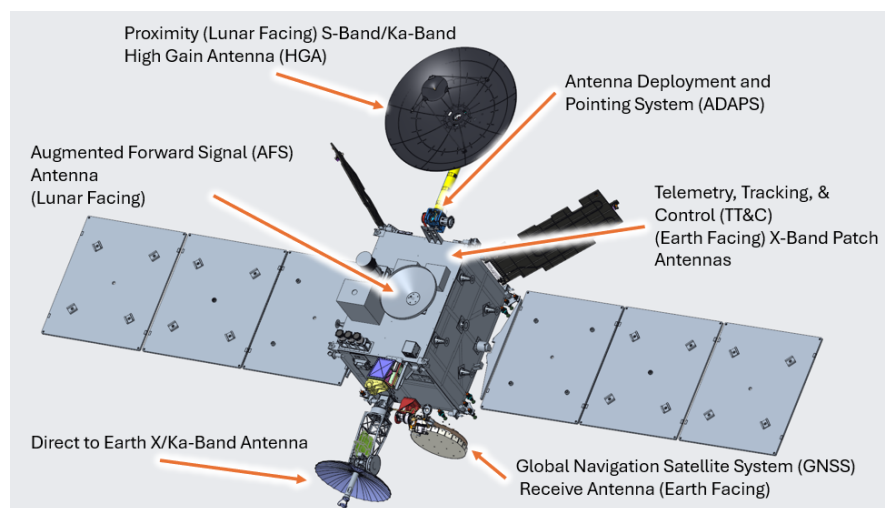
The Altus satellite will be delivered to orbit via SpaceX's Falcon 9 rocket on a standard 24" diameter port of an ESPA Grande payload adapter ring. The satellite is deployed in a direction perpendicular to the launch vehicle longitudinal axis by means of a 24" diameter SEOPS Keystone separation band. The quick-release Keystone band includes 18 permanently retained separation springs that impart a uniform separation velocity to the Altus satellite with minimal tipoff.

The Altus-1 propulsion system is a hydrazine monopropellant propulsion system, with sixteen 4N Reaction Control System ("RCS") thrusters and eight 28N main thrusters. The propellant is stored in a single propellant tank, separated by helium pressurant gas via a flexible diaphragm, and will operate in blowdown throughout the duration of the mission. Attitude determination is achieved with redundant inertial measurement units ("IMU") and star trackers. Attitude control is primarily conducted via a redundant reaction wheel assembly, with the ability to swap to the dual-redundant monopropellant RCS.

The Altus-1 propulsion system will be utilized in three primary phases. The first phase includes placing the spacecraft into its correct orbit around the Moon, by performing a series of burns including TCM, Deep Space Maneuvers ("DSM") and an LOI utilizing both the main thrusters and RCS. The second phase will include momentum wheel desaturation and orbit maintenance maneuvers. The RCS thrusters will be used for momentum wheel desaturation at periodic intervals, and the main thrusters will be utilized to perform orbit maintenance maneuvers. The third phase includes the disposal burn of the spacecraft. This will be performed by the spacecraft main thrusters.

The Altus satellites utilize a three-axis stabilized bus, with a dry mass of approximately 519 kg and an approximate wet mass of 640 kg. The deployed envelope measures 749 x 342 x 198 centimeters. Two fixed body-mounted, three segment solar panels produce 2600 Watts at beginning-of-life (BOL) and 2000 Watts at end-of-life (“EOL”), with energy stored in four 825 Watt-hour Lithium-ion batteries and an unregulated 28 volts direct current (“VDC”) bus voltage. A representative view of an Altus satellite is shown in Figure 1.

Figure 1: Representative Diagram of Altus Satellite



1. Spectrum Usage

The Altus Constellation will use X- and Ka-bands for communications from Altus satellites to the Earth and from the Earth to Altus satellites, and S- and Ka-bands for cislunar (proximity) communications. Both the Earth-to-space/space-to-Earth and cislunar communications can support NASA’s LunaNet Interoperability Frequency Plan.⁸ The Altus satellites will also utilize the L-band for receipt of GNSS signals. A further description of the spectrum usage for the Altus Constellation is provided in Attachment A, Technical Appendix.

⁸ See LunaNet Interoperability Specification Document, Version 5, available at: <https://www.nasa.gov/wp-content/uploads/2025/02/lunanet-interoperability-specification-v5-baseline.pdf?emrc=606f95>.

a) Earth-to-Space Uplink (Receive)

(1) X-Band (7190-7235 MHz)

The United States Table of Frequency Allocations (“Table of Allocations”), Section 2.106 of the Commission’s rules, allocates the 7190-7235 MHz band to various Federal uses on a primary basis, including Earth exploration-satellite service, fixed, and space research uses.⁹ The band is not currently allocated to non-Federal uses.¹⁰ As detailed below, Intuitive Machines requests a waiver of the Table of Allocations to the extent necessary to communicate with Altus satellites in this band.

(2) Ka-Band (22.55-23.15 GHz)

The Table of Allocations allocates the 22.55-23.15 GHz band to shared Federal and non-Federal fixed, inter-satellite, mobile, and space research (Earth-to-space) transmission.¹¹ As discussed below, Intuitive Machines requests a waiver of the Table of Allocations for its proposed operations in the 22.55-23.15 GHz band.

b) Space-to-Earth Downlink (Transmit)

(1) X-Band (8450-8500 MHz)

The Table of Allocations allocates the 8450-8500 MHz band on a primary basis to fixed Federal use and on a co-primary basis to space research service for Federal and non-Federal users.¹² However, the FCC has not promulgated rules of general applicability for such service.¹³ Therefore, Intuitive Machines requests a waiver of the FCC’s rules to communicate with Altus satellites in this band.

⁹ See 47 C.F.R. § 2.106.

¹⁰ *Id.*

¹¹ *Id.*

¹² *Id.*

¹³ *Id.*

(2) Ka-Band (25.5-27 GHz)

The Table of Allocations allocates the 25.5-27 GHz band on a co-primary basis to inter-satellite, space research (space-to-Earth) and standard frequency and time signal-satellite (Earth-to-space) uses for Federal and non-Federal users.¹⁴ A waiver request is outlined below to authorize Intuitive Machines' space-to-Earth downlink operations in this frequency band.

c) Lunar Proximity (Lunar Orbit-to-Lunar Surface)

(1) S-Band (2025-2110 MHz, 2483.5-2500 MHz)

The Table of Allocations provides that the 2025-2110 MHz band is allocated on a co-primary basis for Federal and non-Federal fixed, mobile, and space operation (Earth-to-space) uses.¹⁵ The Table of Allocations provides that the 2483.5-2500 MHz band is allocated on a co-primary basis for Federal and non-Federal mobile-satellite and radiodetermination-satellite uses.¹⁶ A portion of the band is also allocated to non-Federal fixed and mobile services.¹⁷

Each satellite in the Altus Constellation supports downlink communications from lunar orbit to the lunar surface in the 2025-2110 and 2483.5-2500 MHz S-band ranges as part of its proximity link architecture. In the context of the overall relay architecture, data originating from Earth is uplinked to the Altus satellite and then forwarded down to users and assets on the lunar surface, such that this band is part of the end-to-end relay chain.

Intuitive Machines is coordinating with NASA and other Federal agencies to ensure that cislunar and intra-lunar communications will not interfere with U.S. government operations and will operate such downlinks consistent with the outcome of this coordination. As described below,

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.*

Intuitive Machines requests a waiver of the Table of Allocations to permit Altus satellite operations in these bands, which are necessary to the success of the Altus Mission.

(2) Ka-Band (22.55-23.55 GHz)

The Table of Allocations allocates the 22.55-23.55 GHz band to shared Federal and non-Federal fixed, inter-satellite, mobile, and space research (Earth-to-space) transmission.¹⁸ As discussed below, to the extent that the FCC requires a waiver for Intuitive Machines' proposed operations in the 22.55-23.55 GHz band, Intuitive Machines requests a waiver of the Table of Allocations.

d) Lunar Proximity (Lunar Surface-to-Lunar Orbit)

(1) S-Band (2200-2290 MHz, 2483.5-2500 MHz)

The Table of Allocations allocates the 2200-2290 MHz band to various Federal uses on a primary basis, including space operation, Earth exploration-satellite service, fixed, mobile, and space research uses.¹⁹ The band is not currently allocated to non-Federal uses.²⁰ The Table of Allocations provides that the 2483.5-2500 MHz band is allocated on a co-primary basis for Federal and non-Federal mobile-satellite and radiodetermination-satellite uses.²¹ A portion of the frequency band is also allocated to non-Federal fixed and mobile uses.²² As detailed below, Intuitive Machines requests a waiver of the Table of Allocations to the extent necessary to communicate with Altus satellites in this band.

¹⁸ *Id.*

¹⁹ *Id.*

²⁰ *Id.*

²¹ *Id.*

²² *Id.*

(2) Ka-Band (25.5-27.5 GHz)

The Table of Allocations allocates the 25.5-27.5 GHz band on a co-primary basis to space research, inter-satellite, and standard frequency and time signal-satellite Federal and non-Federal uses.²³ As discussed below, to the extent that the FCC requires a waiver for Intuitive Machines' proposed operations in the 25.5-27.5 GHz band, Intuitive Machines requests a waiver of the Table of Allocations.

2. Small Spacecraft Licensing Criteria

Intuitive Machines hereby provides information pursuant to the Commission's streamlining small satellite licensing order²⁴ to ensure the Commission has a comprehensive understanding of the Altus Mission and involved relay satellites. Section 25.123 of the Commission's rules states that applicants filing under the streamlined rules must certify that they meet certain criteria.²⁵ Table 3 identifies the streamlined rules criteria and certifies that Intuitive Machines meets the criteria or otherwise requests a waiver. Intuitive Machines performed an orbital debris assessment using the latest version of NASA's Debris Assessment Software (DAS). Applicable results are provided in the table below.

Table 2: Small Spacecraft License Criteria

47 C.F.R. § 25.123(b) Criteria	Compliance
(1) The space station(s) will operate and be disposed of beyond Earth's orbit.	All involved Altus satellites will be lunar orbiting and disposed of on the lunar surface. ²⁶

²³ *Id.*

²⁴ See *Streamlining Licensing Procedures for Small Satellites*, Report and Order, IB Docket No. 18-86, ¶ 65 (rel. Aug. 2, 2019) (“*Smallsat Order*”) (noting that it is adopting its proposal “to allow small spacecraft with planned non-Earth orbiting missions, *such as commercial lunar missions*, to file under the streamlined process.”) (emphasis added).

²⁵ See 47 C.F.R. § 25.123.

²⁶ See Attachment A, Technical Appendix, § A.17.5.

47 C.F.R. § 25.123(b) Criteria	Compliance
(2) The total lifetime from deployment to spacecraft end-of-life for any individual space station will be six years or less.	Each Altus satellite has a maximum expected 6 year projected useful life. Intuitive Machines will request appropriate authorization from the Commission for any expected operations beyond this timeframe.
(3) Each space station will be identifiable by a unique signal-based telemetry marker distinguishing it from other space stations or space objects.	Intuitive Machines certifies that each Altus satellite will be uniquely identified by the proper telemetry signal. ²⁷
(4) The space station(s) will release no operational debris.	Intuitive Machines certifies that Altus satellites will not release any operational debris. ²⁸
(5) No debris will be generated in an accidental explosion resulting from the conversion of energy sources on board the space station(s) into energy that fragments the spacecraft.	Intuitive Machines certifies that Altus satellites employ features to mitigate the likelihood of such accidental explosions, and the probability for such an event is well below the 0.001 probability requirement per NASA-STD-8719.14B as described in the Technical Appendix. ²⁹
(6) The probability of a collision between each space station and any other large object (10 centimeters or larger) during the lifetime of the space station is 0.001 or less as calculated using current NASA software or higher fidelity models.	Intuitive Machines certifies that the probability of a collision sufficient to prevent compliance with the disposal plan is well below the required value of 0.001. Large Object Impact and Debris Generation Probability is 1.1537E-07. ³⁰
(7) Operation of the space station(s) will be compatible with existing operations in the authorized frequency band(s). Operations will not materially constrain future space station entrants from using the authorized frequency band(s).	Intuitive Machines will coordinate with NASA and other government agencies and seek waivers of the Table of Allocations for non-interfering use of federal bands. Use of these bands is consistent with NASA's LunaNet radiofrequency program and will not constrain current or future users of the band.

²⁷ See *id.*, § A.15.

²⁸ See *id.*, § A.17.2.

²⁹ See *id.*, § A.17.3.

³⁰ See *id.*, § A.17.4.

47 C.F.R. § 25.123(b) Criteria	Compliance
(8) The space station(s) can be commanded by command originating from the ground to immediately cease transmissions and the licensee will have the capability to eliminate harmful interference when required under the terms of the license or other applicable regulations.	Intuitive Machines has complete command capability from its control center in Houston to cease transmissions to and from each Altus satellite. ³¹
(9) Each space station is 10 cm or larger in its smallest dimension.	Intuitive Machines certifies Altus satellites are larger than 10 cm in their smallest dimension. ³²
(10) Each space station will have a mass of 500 kg or less, including any propellant.	Each Altus satellite’s wet mass is approximately 640 kg; therefore, Intuitive Machines is requesting a waiver of this provision.
(11) Upon receipt of a space situational awareness conjunction warning, the operator will review and take all possible steps to assess the collision risk, and will mitigate the collision risk if necessary. As appropriate, steps to assess and mitigate the collision risk should include, but are not limited to: Contacting the operator of any active spacecraft involved in such a warning; sharing ephemeris data and other appropriate operational information with any such operator; and modifying space station attitude and/or operations.	Intuitive Machines will review conjunction warnings, coordinate physical operations of the Altus satellites with any operator using similar orbits, and, if necessary, mitigate collision risks to minimize operational impacts. ³³

Small spacecraft operating under the streamlined rules are exempt from the Part 25 processing round and default service requirements.³⁴ In lieu of the processing round rules, the Commission requires applicants to “(a) certify that operations of its satellites will not interfere with those of existing operators, (b) certify that it will not materially constrain future operators

³¹ See *id.*, § A.12.

³² See *id.*, § A.2.

³³ See *id.*, § A.17.4.

³⁴ *Smallsat Order*, ¶ 80.

from using the assigned frequency band(s), and (c) provide a brief narrative description illustrating the methods by which both current and future operators will not be materially constrained.”³⁵ Intuitive Machines certifies that the operations of the Altus Mission will not interfere with existing operators and that it will not materially constrain future operators from using the requested frequency bands.

In the *Smallsat Order*, the Commission provided examples of applications that may satisfy the required description requirement. Potentially acceptable scenarios include those where the satellite operator possesses “a limited number of earth stations and downlinks during relatively short periods of time, with the ability to effectively schedule transmissions such that future satellite entrants can be accommodated.”³⁶ As detailed in this application, the Altus Mission’s limited operational time on discrete frequencies with a handful of earth stations mitigates the risk of interference. Moreover, Intuitive Machines will operate on an unprotected, non-interference basis with respect to other authorized operators in the relevant bands. Intuitive Machines is also pursuing appropriate coordination with relevant stakeholders to ensure that no harmful interference to such operations will occur.

C. Ground segment

Uplink (receive) and downlink (transmit) communication with the Altus satellites will be supported by three ground stations in the U.S.: Morehead State University (“Morehead”) in Kentucky,³⁷ the Brewster Gateway,³⁸ and the Catawissa Gateway.³⁹ Additionally, the Altus satellites will be supported by the Goonhilly ground station in the United Kingdom, as well as

³⁵ *Id.*, ¶ 81.

³⁶ *Id.*

³⁷ Morehead will separately seek special temporary authority to support the Altus Mission. Intuitive Machines will support Morehead in this effort as appropriate.

³⁸ File number SES-LIC-20260110-00794 and Call Sign E260184.

³⁹ File number SES-LIC-20260312-00628 and Call Sign E260194.

NASA's DSN as set forth in Attachment A, Technical Appendix. Additional ground station sites will be added on an ongoing basis as the Altus Constellation develops, at which time Intuitive Machines will supplement the application with additional information.

III. PUBLIC INTEREST STATEMENT

The Altus Mission, which supports the NASA Artemis lunar initiative, represents a critical next step in the new era of space exploration and will dramatically improve connectivity and situational awareness on the Moon, and unequivocally advances the United States' long-term strategic interests in space. As former NASA administrator Jim Bridenstine recognized, the Artemis program will enable "humanity ... [to] explore regions of the Moon never visited before, uniting people around the unknown, the never seen, and the once impossible."⁴⁰ In April 2026, NASA achieved its first crewed lunar flyby in fifty years, a key step toward long-term return to the Moon, and anticipates the first Artemis lunar landing in early 2028.⁴¹

A key enabler of this mission is the expansion of cislunar networking infrastructure and capabilities. As lunar relay services become fully operational, they will be integrated into the NSNS effort's expanding portfolio, enhancing communications and navigation support for future lunar missions. NASA selected Intuitive Machines to provide this service on behalf of NASA. The establishment of operational lunar relay services for this mission is essential to ensure data flows seamlessly between ground stations on Earth and the lunar surface.

Grant of this application is fully consistent with the public interest by allowing Intuitive Machines to fulfill long-term United States and NASA objectives to develop a permanent American presence on the Moon. Among other clear benefits, the Altus Mission will provide

⁴⁰ See *Artemis Plan*.

⁴¹ See NASA, *NASA on Track for Future Missions with Initial Artemis II Assessments* (Apr. 2026), available at <https://www.nasa.gov/missions/nasa-on-track-for-future-missions-with-initial-artemis-ii-assessments/>.

essential connectivity and situational awareness on the Moon, forming the foundational communications and navigation infrastructure upon which all future lunar activities will depend. The connectivity provided by the Altus Mission is a critical gating item for humans returning to the Moon near the end of this decade, as well as a prerequisite to long-term settlement on the Moon. Without reliable communications and navigation services on and around the Moon, crewed missions cannot be conducted safely, efficiently, or sustainably. The Altus Mission directly addresses this need by deploying a dedicated lunar relay and navigation network that will serve NASA and commercial operators alike.

IV. OTHER MATTERS

A. Waiver Requests

The Commission may waive any of its rules if there is “good cause” to do so.⁴² In general, waiver is appropriate if (i) special circumstances warrant a deviation from the general rule; and (ii) such deviation would better serve the public interest than would strict adherence to the rule.⁴³ Generally, the Commission will grant a waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the public interest.⁴⁴ Good cause exists to waive the following rules under the special circumstances presented in this application.

1. U.S. Table of Frequency Allocations

a) 2025-2110 MHz (Lunar Orbit-to-Lunar Surface)

The 2025-2110 MHz band is allocated to Federal space research and other Federal uses, as well as on a co-primary basis with fixed, mobile, and space operation commercial uses. This

⁴² See 47 C.F.R. § 1.3; *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990) (“*Northeast Cellular*”); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969) (“*WAIT Radio*”).

⁴³ See *Northeast Cellular*, 897 F.2d at 1166.

⁴⁴ See *WAIT Radio*, 418 F.2d at 1157.

band may be allocated to non-Federal Earth-to-space transmission in the space research service subject to such conditions as may be applied on a case-by-case basis, and the limitation that any use may not cause harmful interference to authorized Federal and non-Federal operations. Intuitive Machines will coordinate with NASA and other Federal and non-Federal operators in this band to ensure the Altus Constellation's operations will not cause harmful interference.

Moreover, given that Intuitive Machines' proposed use of this band is for lunar orbit-to-lunar surface downlink only, no interference potential with other third-party allocated spectrum users exists. More specifically, downlink transmissions will be radiating from the lunar orbiting relay spacecraft towards the lunar surface; with the Moon itself creating substantial natural blockage of an already low-power communications link, in combination with the Moon's distance from Earth, any signal pointed toward Earth will be significantly weakened. To the extent the Commission does not consider the Altus Constellation's lunar proximity downlink operations to be permissible under the Federal space research allocation, Intuitive Machines hereby requests a waiver of the Table of Allocations to operate lunar proximity downlinks in this band. Good cause exists to grant the requested waiver, and deviation from the rule would not undermine the contemplated protections to authorized users of the band.

b) 2200-2290 MHz (Lunar Surface-to-Lunar Orbit)

Good cause exists to grant waiver to authorize lunar surface-to-lunar orbit data uplink in the 2200-2290 MHz frequency band. This band is allocated to the space research service for Federal licensees,⁴⁵ and is allocated to space operations (space-to-Earth) and EESS (space-to-Earth) on a co-primary basis across all ITU regions. There is no current allocation for non-Federal users in the United States, and the Altus Constellation will not be transmitting to TDRS

⁴⁵ See 47 C.F.R. §§ 2.102(a), 2.106.

systems.⁴⁶ Intuitive Machines will coordinate its proposed use with applicable Federal operators prior to use to ensure that harmful interference does not occur, and Intuitive Machines initial use case corresponds to a Federal contract adhering to NASA's Lunar Electromagnetic Spectrum Architecture specifications.

Additionally, the data uplink utilizing the 2200-2290 MHz band is a purely lunar communication link. The low-power transmission operating in the band originates on the lunar surface and is received at a lunar orbital relay, meaning the signal will not intentionally target the Earth's surface in the 2200-2900 MHz band and path loss will prevent interference with other authorized terrestrial and space services. Therefore, good cause exists to grant a waiver of the Table of Allocations in the event the Commission concludes that the proposed Altus satellite operations in the band are not permissible under the Federal space research allocation.

c) 2483.5-2500 MHz (Lunar Orbit-to-Lunar Surface and Lunar Surface to Lunar Orbit)

Similarly, good cause exists to grant waiver to authorize lunar data uplink and downlink in the 2483.5-2500 MHz band. The Table of Allocations allocates the 2483.5-2500 MHz band on a shared basis to the mobile-satellite and radiodetermination-satellite services in the space-to-Earth direction only, alongside the fixed and mobile services for non-Federal use. Special circumstances exist to grant the waiver requested herein because the band's allocations were developed for direct-to-Earth operations and do not reach the novel context proposed here: transmissions occurring entirely between the lunar surface and lunar orbit and never purposefully directed toward Earth.

Grant of the waiver will not undermine the rule's objective of preventing harmful interference because low-power transmissions directed exclusively to and from the lunar surface and lunar orbit will be attenuated by the Moon and experience path loss that will eliminate any

⁴⁶ See *id.*, n.US303.

interference potential with space-to-Earth transmissions. Intuitive Machines further commits to coordinate with affected Federal and non-Federal users, as applicable, including Globalstar,⁴⁷ to ensure its operations do not cause harmful interference. Applying allocations written for Earth-directed operations to lunar links would frustrate rather than advance the rational spectrum use the framework exists to promote, particularly where the initial operations are undertaken under contract with a federal government agency. Therefore, waiver would better serve the public interest than strict adherence to the rule.

d) 7190-7235 MHz (Earth-to-Lunar Orbit Uplink)

Under the Table of Allocations, the 7190-7235 MHz band is allocated to the Earth exploration-satellite service (Earth-to-space), the space research service (Earth-to-space), and the fixed service, each on a primary basis exclusively for Federal use; no non-Federal allocation exists in the band. Special circumstances warranting deviation from the rule exist because the Commission's rules presently provide no mechanism for a non-Federal commercial operator to access this band, even when initially performing a contracted Federal mission, leaving a waiver as the only available means to authorize an operation the band is otherwise well suited to host.

Grant of this proposed waiver would not undermine the policy objective of the rule—reserving the band for Federal scientific operations and protecting them from harmful interference—because Intuitive Machines will carefully coordinate with affected Federal users consistent with established interference-mitigation and coordination practices for lunar and near-Earth links in this band, thereby preserving the interests the allocation protects while advancing the public interest in lunar exploration and efficient spectrum use. Additionally, the highly directional nature of the proposed large antennas used to transmit the uplink signal will create a

⁴⁷ Globalstar is the principal non-Federal user of this spectrum, however, Intuitive Machines should not impact Globalstar's operations because Intuitive Machines' use of the frequency band is limited to lunar operations.

high level of discrimination resulting from the tight nature of the beam, significantly limiting any interference potential to users that are not directly in the boresight. Further, the initial proposed use of this frequency band is being conducted in direct support of, and at the request of, a Federal agency, such that the operation advances rather than conflicts with the purposes underlying the existing Federal allocations.

e) 8450-8500 MHz (Lunar Orbit-to-Earth Downlink)

The Table of Allocations allocates the 8450-8500 MHz band to the space research service (space-to-Earth) on a co-primary basis for both Federal and non-Federal use and to the fixed service on a primary basis for Federal use only. Because the Commission's rules afford a non-Federal commercial operator no allocation status in this band unless it qualifies as a space research service operator, leaving no path to authorize a downlink performed initially under Federal contract, good cause exists to grant the waiver request.

Intuitive Machines will conduct diligent coordination efforts with Federal and non-Federal users of this spectrum band to ensure that Intuitive Machines' operations do not cause harmful interference to incumbent users.⁴⁸ The proposed downlink is conducted in accordance with NASA's frequency use specifications in cislunar communications, such that the operation advances rather than conflicts with the purposes underlying the band's allocations.

Grant would better serve the public interest than strict adherence to the rule because the frequency use is initially being requested by a Federal government agency pursuant to contract in furtherance of national lunar-exploration objectives, and foreclosing access to a band designated for space research downlinks would frustrate that Federal mission without yielding any offsetting public benefit.

⁴⁸ Moreover, Intuitive Machines' proposed downlink operations in this band are functionally similar to the space research operations the band's existing allocations are designed to accommodate.

f) 22.55-23.15 (Earth-to-Lunar Orbit Uplink)

The 22.55-23.15 GHz band is not available to Intuitive Machines under the existing regulatory framework. The Table of Allocations allocates this band, for both Federal and non-Federal uses, exclusively to four co-primary services: fixed, mobile, inter-satellite, and space research. The requisite good cause to grant waiver is present because Intuitive Machines' proposed transmissions will undergo extensive coordination to ensure they are compatible with existing Federal and non-Federal use, preserving the currently allocated use cases. Additionally, the transmissions will initially be carried out in accordance with a Federal contract pursuant to Federal specifications. Far from cutting against the band's purpose, the operation furthers it.

Further, the proposed Earth stations will significantly limit interference potential due to their highly directional nature and high level of discrimination. Therefore, grant of this waiver request plainly serves the public interest more than rigid application of the rule would. The spectrum is sought by a Federal agency under contract to advance national objectives in lunar exploration, and dedicated coordination efforts will ensure that incumbent users are adequately protected from harmful interference.

g) 22.55-23.55 GHz (Lunar Orbit-to-Lunar Surface)

Under the Table of Allocations, the 22.55-23.55 GHz band is allocated to the fixed, mobile, inter-satellite, and space research services, each on a co-primary basis shared between Federal and non-Federal users. Intuitive Machines' proposed transmissions occur entirely in the lunar domain between lunar-orbiting satellites and the lunar surface, rather than to or from the Earth, and thus occur outside the terrestrial and Earth-orbit interference environment the Table of Allocations is principally designed to manage. Lunar communications use poses minimal interference risk to terrestrial and Earth-orbiting incumbents because the low-power signals generated in this

frequency band will experience path loss from deep space environmental conditions and attenuation by the Moon, eliminating interference to incumbent links.

Moreover, Intuitive Machines will coordinate with Federal and Non-Federal users operating in lunar orbit to ensure no harmful interference is experienced by incumbent users. For these reasons, Intuitive Machines respectfully requests grant of the requested waiver.

h) 25.5-27 GHz (Lunar Orbit-to-Earth Downlink)

Under the Table of Allocations, the 25.5-27 GHz band is allocated for Federal use to Earth exploration-satellite (space-to-Earth), fixed, inter-satellite, mobile, space research (space-to-Earth), and standard frequency and time signal-satellite services, and for non-Federal use only to the inter-satellite, standard frequency and time signal-satellite, and space research services. Because Intuitive Machines is a non-Federal entity operating in none of the allocated services, it cannot proceed without a waiver permitting operation on a non-interference basis. Intuitive Machines' proposed direct-to-Earth transmissions do not undermine the policy the Table of Allocations exists to protect—orderly shared use among the allocated Federal and non-Federal services, and protection of sensitive scientific downlink operations from harmful interference—because Intuitive Machines will coordinate with affected Federal and non-Federal users, as applicable. Intuitive Machines will observe the established power flux-density and interference-mitigation conditions governing space-to-Earth operations in this band to ensure harmful interference will not occur, thereby preserving every interest the allocation safeguards while advancing the public interest in lunar exploration. Moreover, initial frequency use in this band is required by Federal contract in furtherance of NASA's lunar missions, and therefore the public interest is served by grant of the requested waiver.

i) 25.5-27.5 GHz (Lunar Surface-to-Lunar Orbit)

The Table of Allocations allocates the 25.5-27.5 GHz band for Federal use to the Earth exploration-satellite, fixed, inter-satellite, mobile, space research, and standard frequency and time signal-satellite services, and for non-Federal use only to the inter-satellite, standard frequency and time signal-satellite, and space research services. Because Intuitive Machines is a non-Federal entity operating in none of the allocated services and because Part 25 cross-references no service rules to this band reaching Intuitive Machines' proposed lunar links, Intuitive Machines cannot proceed without a waiver. Intuitive Machines' transmissions in this frequency band occur wholly in the lunar domain between the lunar surface and lunar-orbiting satellites, rather than to or from the Earth, and thus occur outside the Earth-orbit interference environment the Table of Allocations is designed to manage. Intuitive Machines' lunar use poses minimal interference risk to terrestrial and Earth-orbiting incumbents because the low-power signal will never intentionally be pointed directly toward Earth and will experience significant path loss if traveling towards Earth. Moreover, Intuitive Machines will coordinate use of the frequency band with incumbent Federal and non-Federal users.

2. Waiver of Section 25.202(g)(1) for TT&C Operations in the 7190-7235 MHz and 8450-8500 MHz Bands

Section 25.202(g)(1) anticipates that satellite systems will conduct TT&C operations using spectrum at the edge of or within their assigned bands. Intuitive Machines proposes to (i) conduct uplink (Earth-to-space) command and ranging transmissions centered at 7199.762, 7206.571, 7213.380, 7220.189, and 7226.998 MHz and (ii) conduct downlink (space-to-Earth) command and ranging transmissions centered at 8459, 8467, 8475, 8483, and 8491 MHz. Intuitive Machines will use the spectrum command and ranging uplinks to each of the satellites in the Altus Constellation for a limited period of time. Waiver of this rule is appropriate due to the time-limited, pre-

coordinated, unprotected, non-interfering operations of the Altus Constellation. Accordingly, such a waiver would serve the public interest.

3. 47 C.F.R. § 25.123(b)(10)

Intuitive Machines also requests a waiver of the requirement that the wet mass of the Altus satellites not exceed 500 kg. The wet mass of each Altus satellite will be approximately 640 kg and the dry mass is approximately 519 kg. Waiver is appropriate and necessary in this case given the fact that each non-Earth orbiting satellite under the Altus Mission will be disposed of on the lunar surface, thus minimizing the probability that retired spacecraft present an orbital debris risk for future manned or autonomous missions. Waiver in this instance will also support the availability of a regulatory pathway for authorizing smaller, non-Earth orbiting spacecraft and specifically U.S.-sponsored lunar missions.⁴⁹

Although the Commission adopted a 500 kg “wet” mass limit, the figure has limited applicability to non-Earth orbiting spacecraft.⁵⁰ Indeed, the Commission acknowledged that it would consider revisiting certain restrictions on spacecraft applying under the streamlined process “in the future once we have additional experience authorizing these missions.”⁵¹

The particular facts of the Altus Mission make strict compliance inconsistent with the public interest.⁵² The Altus Constellation represents one of the first lunar missions seeking to use

⁴⁹ See *Smallsat Order*, ¶ 65 (“We adopt the *NPRM* proposal to allow small spacecraft with planned non-Earth orbiting missions, such as commercial lunar missions, to file under the streamlined process”).

⁵⁰ Given the limited sample size of non-earth orbiting spacecraft applications, it is not clear that 500 kg is an appropriate metric for determining if a given spacecraft is “small” in the first instance. See *id.*, ¶ 66 (providing only that the FCC “modify the mass certification to specify a maximum mass for these spacecraft, including fuel, of 500 kilograms. ... consistent with the comments we received suggesting that we adopt a higher mass limit for non-Earth-orbiting small spacecraft systems.”). Nevertheless, while Commenters suggested the 500 kg limit as being better than the 180 kg limit proposed for Earth-orbiting satellites, commenters also noted that commercial lunar spacecraft generally include significant amounts of fuel which should not count towards any mass limit. Moreover, each commenter suggests 500 kg without providing any basis for why it is an appropriate limit. See generally Commercial Spaceflight Federation Comments at 9, Moon Express Comments at 2, and CSSMA Comments at 14-15.

⁵¹ *Smallsat Order*, ¶ 67.

⁵² See *Northeast Cellular*, 897 F.2d at 1166.

this regulatory pathway, and it is critical that the FCC recognize the need for licensing provisions that accurately reflect the legitimate mass requirements of non-Earth orbiting systems, especially given propellant requirements. A waiver of the mass requirement in this instance is necessary to fulfill the significant public interest objectives of the Altus Mission and the larger Artemis project. Finally, the FCC already determined that a waiver of § 25.123(b)(10) was appropriate for the IM-1 and IM-2 missions.⁵³

Considering these special circumstances and the public interest benefits of the Altus Mission, deviation from the Commission’s small spacecraft mass limitation is necessary and appropriate to grant Intuitive Machines authority to launch and operate the Altus satellites.⁵⁴

B. NOAA Authorization

Altus-1 includes certain payload cameras onboard that may point towards Earth, as more fully described in Attachment A, Technical Appendix. Intuitive Machines is engaged with the Commercial Remote Sensing Regulatory Affairs (“CRSRA”) office at the National Oceanic and Atmospheric Administration (“NOAA”) regarding these remote sensing applications. Intuitive Machines recognizes that grant of a NOAA authorization to operate a commercial remote sensing system may be required to authorize the Altus Constellation and commits to work with NOAA and other U.S. government stakeholders as needed to ensure that the Altus Constellation complies with U.S. commercial remote sensing requirements.

FCC and NOAA licensing authorities overlap with respect to operation of remote sensing instruments. NOAA has authority to authorize operation of a commercial (private) remote sensing system under the National and Commercial Space Programs Act.⁵⁵ However, the Commission

⁵³ See, e.g., *IM-1 Application*, FCC Grant of Authority at 4; *IM-2 Application*, FCC Grant of Authority at 4.

⁵⁴ See *id.*; see also *WAIT Radio*, 418 F.2d at 1159.

⁵⁵ 51 U.S.C. § 60121 *et seq.*

retains authority to authorize the launch and operation of the satellite system and the use of spectrum. Intuitive Machines acknowledges that implementation of the Altus Constellation will be contingent on successful conclusion of the FCC and NOAA processes.

C. Amended Small Spacecraft Rules

Out of an abundance of caution, Intuitive Machines is also providing a statement consistent with the Commission's amended small spacecraft rules. In particular, Sections 25.122(d)(4) and (d)(6) are relevant to Altus Mission operations.⁵⁶ Section 25.122(d)(4) requires a description of design and operational strategies used to minimize the risk of collision with inhabitable spacecraft if the mission transits through the inhabited spacecraft's orbit. Although orbital parameters are very different, each Altus satellite will cross the altitudes of several satellites, including the ISS, on their way to the Moon. Launch clearing analysis through Geostationary Orbit (GEO) will be performed by the launch provider and this window will just be a few hours long. For any issues in cislunar space, Altus satellites have a propulsive capability which will enable them to avoid such inhabitable spacecraft.

Likewise, the Altus satellites are fully compliant with amended Section 25.122(d)(6). As certified above, each Altus satellite will be uniquely identified by the proper telemetry signal.⁵⁷ Moreover, Intuitive Machines will register each launch with Space Track via the 18th SPCS for reporting of orbit data. Thus, even under the Commission's small spacecraft rules, the Altus Mission is compliant.

⁵⁶ See *Applications for streamlined small spacecraft authorization*, 85 Fed. Reg. 52452 (Aug. 25, 2020) (amending 47 C.F.R. § 122(d) which is made applicable to small spacecraft through 47 C.F.R. § 25.122(c)).

⁵⁷ See Attachment A, Technical Appendix, § A.15.

D. ITU Compliance

Intuitive Machines has prepared and filed, via the FCC, with the International Telecommunication Union (“ITU”) an Advance Publication Information (“API”) submission for its proposed system. The API information has been sent to the FCC separately under the ITU Name USA-LUNARSAT-1. Consistent with Section 25.111(d) and (e) of the Commission’s rules, Intuitive Machines is also providing a declaration of unconditional acceptance of all consequent ITU cost-recovery charges to the Commission.⁵⁸

V. CONCLUSION

For the foregoing reasons, and for the reasons set forth in the accompanying materials, Intuitive Machines requests that the Commission expeditiously grant Intuitive Machines operating authority for the Altus Mission, which unambiguously and unequivocally serves the public interest.

Respectfully submitted,

/s/ David Pattillo

David Pattillo
Head of Spectrum Policy & Regulatory
Affairs
Intuitive Machines, LLC
13467 Columbia Shuttle St.
Houston, TX 77059

Timothy Bransford
Liam Fulling
GREENBERG TRAURIG LLP
2101 L St. NW, Ste 1000
Washington, D.C. 20037

Counsel to Intuitive Machines

⁵⁸ See Attachment C, ITU Cost Recovery Letter; see also 47 C.F.R. § 25.111(d)-(e).