Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Loft Orbital Solutions Inc.	)	File No. _____
	)	
Application for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Earth-Exploration Satellite Service	)	Call Sign: _____

APPLICATION

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APPLICATION

Loft Orbital Solutions Inc. ("Loft Orbital") requests authority to launch and operate a single microsatellite, YAM-5, in low-Earth, non-geostationary ("NGSO") orbit, pursuant to 47 C.F.R. § 25.114 of the Federal Communications Commission ("FCC" or "Commission") rules. Loft Orbital is one of the first commercial service providers flying payloads on behalf of customers. By standardizing the accommodation and operation of payloads and handling the end-to-end mission on the customers' behalf, Loft Orbital reduces the time, cost, and complexity for organizations to access space. Specifically, Loft Orbital procures, deploys, and operates space infrastructure on behalf of its customers, enabling them to focus their financial and human capital resources on developing novel payload technologies as well as new techniques for exploiting space-based data and services. Ultimately, Loft Orbital intends for its service to unlock greater utility that can be derived from low-Earth orbit ("LEO") across commercial and governmental applications. Furthermore, by ridesharing multiple payloads belonging to different customers on the same spacecraft, Loft Orbital hopes to reduce the number of satellites that would have been launched if each customer had procured its own spacecraft. Loft Orbital believes that this model will ultimately reduce both space debris as well as the overall administrative burden on the FCC and other regulatory bodies. For all of these reasons, Loft

Orbital submits that grant of this application is in the public interest and requests grant of this application in time to allow Loft Orbital to launch YAM-5 by October 2022, which is the earliest predicted launch window.

I. BACKGROUND AND SYSTEM DESCRIPTION

Loft Orbital is a San Francisco, California-based company incorporated in Delaware in January 2017. To date, Loft Orbital has launched two satellites and has one satellite, YAM-3, that is in active operations.[1] Loft Orbital's business objective is to provide customers with the experience of rapid and turnkey access to space by handling the procurement, payload integration, deployment, and operations of the spacecraft on behalf of its customers. To facilitate this model, Loft Orbital in most cases will be responsible for regulatory compliance and licensing of the satellite mission.[2] It is Loft Orbital's long-term goal to serve as an aggregation platform for LEO payloads and in so doing reduce the need for entities to launch their own spacecraft or obtain the associated regulatory licenses, simplifying the process for deploying new and innovative satellite services and reducing administrative burdens and workloads.

Loft Orbital performs overall spacecraft integration at its facility in Golden, Colorado. A typical Loft Orbital satellite platform features two components. The first is a microsatellite bus for which Loft Orbital leverages external manufacturing partners. The second is a "Hub", a standardized payload adapter that provides a mechanical and thermal accommodation for the onboard payloads, as well as critical payload services such as power, command and control, and

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[1] *See* Stamp Grant, Loft Orbital, IBFS No. SAT-LOA-20200907-00105 (granted May 28, 2021) ("YAM-3 Grant"). Both YAM-2 and YAM-3 were authorized under the FCC's streamlined small satellite rules. 47 C.F.R. § 25.122.

[2] To be clear, Loft Orbital owns and controls the YAM-5 satellite. Specifically, Loft Orbital regulates the power to and can shut off a payload and has the technical capability and contractual right to accept or reject payload tasking requests by customers.

onboard processing capabilities. Payloads flown by Loft Orbital may be furnished by the customer, procured from a third party on behalf of the customer, or developed in-house by Loft Orbital. Customers task their payload through Loft Orbital's mission operations platform, Cockpit.

As a universal payload adapter, the Hub serves as an interface that decouples the onboard payloads from the satellite bus. This approach enables Loft Orbital to use a common, generic satellite bus for each mission, despite a variable payload configuration. The Payload Hub can either "rideshare" multiple payloads or fly a single payload as a dedicated mission. It is also payload-agnostic, as it supports a wide range of common interface types and protocols. As such, the Payload Hub can accommodate a wide range of payload types including imagers, radio frequency ("RF") payloads, technology demonstrations, and weather and scientific payloads.

The exact payload configuration on each Loft Orbital mission is driven by customer demand. Loft Orbital designates each mission in its fleet as "Yet Another Mission" or "YAM," with an ascending numerical designation.[3] Loft Orbital has manifested YAM-5 on a Falcon 9 that is scheduled for launch in October 2022.

A. Space Segment

As discussed in more detail in Sections 3, 5, and 6 of the Technical Annex, YAM-5 will use UHF frequencies (400.15-401 MHz and 401-402 MHz) for backup telemetry, tracking, and command ("TT&C") downlinks and (449.75-450.25 MHz) for backup TT&C uplinks,[4] S-band

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[3] *See, e.g.*, YAM-3 Grant.

[4] Back-up TT&C communications in the UHF bands shall only be employed in the event of the inability to use the primary TT&C links in the 2025-2110 MHz and 8025-8400 MHz bands, such as when the satellite is tumbling, and for occasional testing to ensure the operational capability of the back-up TT&C system.

frequencies (2025-2110 MHz) for primary data and TT&C uplinks, and X-band frequencies (8025-8400 MHz) for primary data and TT&C downlinks.[5]

The YAM-5 satellite will have a receive-only payload that concurrently receives the Global Positioning System ("GPS") L1 navigational signals and L-band data signals in the 1535-1559 MHz band from authorized and coordinated Inmarsat PLC ("Inmarsat") satellites.[6] The L-band data signal provides satellite navigation correction data, augmenting the accuracy of Loft Orbital's location assessment.

The YAM-5 satellite will also be flying an experimental radio developed internally by Loft Orbital that will use S-band frequencies, transmitting in the 2240-2290 MHz band and receiving in the 2067-2110 MHz band. This radio will be used to demonstrate a future capability Loft Orbital would like to mature, in which TT&C signals are sent directly to the Hub, bypassing the satellite bus radios and resulting in greater operational efficiency. Loft Orbital would expect to conduct demonstrations and tests associated with the experimental radios only a few dozen times during commissioning and then only sporadically over the 6-year mission lifetime. To be clear, the experimental radios will not be used operationally.

Loft Orbital will operate the following payloads onboard YAM-5 on behalf of its customers:[7]

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[5] As discussed below, Loft Orbital may also in certain situations transmit telemetry in the X-band downlink.

[6] Specifically, the YAM-5 satellite will receive transmissions from the following Inmarsat satellites: 3F1, 4F2, 3F3, AF1, 4F3, 3F5, and 4F1. Loft Orbital understands that these Inmarsat satellites are authorized by the United Kingdom.

[7] *See supra* note 2. Pursuant to guidance from FCC staff, Loft Orbital will license all radiofrequency payloads onboard YAM-5.

- 1 longwave infrared camera;[8]
- A customer-furnished flight computer
- A sensing payload
- An IoT payload that transmits and receives in the 2400-2483.5 MHz band ("S-band IoT Payload").

The YAM-5 satellite will be commissioned after ejection from its launch vehicle. Extensive telemetry capability exists onboard each spacecraft, and it is possible to control each spacecraft via ground command, including extensive adjustments to the flight software. Non-real-time (scheduled) commanding is also used to fulfill the concept of operations as required by Loft Orbital's customers. YAM-5 will not have a propulsion system for orbit adjustment or decommissioning purposes. However, it can perform station-keeping and collision avoidance maneuvers using differential drag techniques.

B. Ground Segment

The Mission Operations Center ("MOC") for YAM-5 will be located in Loft Orbital's San Francisco, California headquarters. The MOC will provide monitoring, control, and on-call engineering support around the clock and includes a team of full-time engineering support staff. Loft Orbital will operate YAM-5 using an in-house developed Mission Control System called Cockpit. Cockpit is secure, cloud-hosted ground software that accepts tasking requests from customers to create a spacecraft tasking schedule, which is uplinked to the YAM-5 satellite.

Loft Orbital will use the Kongsberg Satellite Services ground station network at the following locations: Svalbard, Norway; Troll, Antarctica; Punta Arenas, Chile; Brostabotn,

[8] Loft Orbital has a commercial remote sensing license from the National Oceanic and Atmospheric Administration ("NOAA"), which covers the YAM-5 satellite.

Norway; Hartebeesthoek, South Africa; and Awarua, New Zealand. Loft Orbital will also use the ATLAS ground station network at the following locations: Harmon, Guam; and Awarua, New Zealand. The company may expand its future ground station network to include stations inside and/or outside the United States for the purposes of increasing opportunities for data transmissions. The company will also coordinate all non-U.S. ground stations with Federal operators in the relevant bands prior to operating any such stations and requests authority for such communications subject to coordination with relevant Federal operators.[9]

C. Launch Schedule and Orbital Information

YAM-5 will be launched as a secondary payload and will have the following orbital parameters:

- Minimum Circular Altitude: 500 km
- Maximum Circular Altitude: 550 km
- Target Deployment Circular Altitude: 525 km
- Orbit Type: Sun-Synchronous
- Inclination: 97.6 degrees

Loft Orbital has manifested YAM-5 on a Falcon 9 that is scheduled for launch in October 2022.

II. FREQUENCY USE

A. S-Band/X-Band EESS

The S-band (2025-2110 MHz, 2200-2290 MHz) and X-band (8025-8400 MHz) frequency bands each have allocations for Earth Exploration-Satellite Service ("EESS") use. Specifically, the 2025-2110 MHz (Earth-to-space) band is allocated internationally and in the

[9] *See, e.g.*, YAM-3 Grant, at Condition 14 ("Loft shall provide the FCC with an updated list of coordinated earth stations within ten business days following any changes to the list.").

U.S. for non-Federal EESS use, subject to 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.[10] The 2200-2290 MHz (space-to-Earth) band is allocated internationally for EESS, space research, and space operations, and is allocated in the United States for Federal EESS, space research, and space operations.[11] The 8025-8400 MHz (space-to-Earth) band is allocated internationally and in the U.S. for non-Federal EESS use on a primary basis.[12]

YAM-5 meets the definition of an EESS satellite because it will observe and record data originating from or surrounding the Earth and downlink such data to Earth stations that are part of the satellite network, like other EESS systems. Loft Orbital expects that the data associated with the imager and camera onboard YAM-5 will comprise more than 95% of the data downlinked. The other data transmissions will be associated with other payloads. For example, Loft Orbital expects that less than approximately 5% of the data downlinked by YAM-5, *i.e.*, a *de minimis* amount, will be associated with the data from the IoT payload and the flight computer. And even then, Loft Orbital understands that much of the IoT data will be sensor data, *e.g.*, temperature, rainfall, wind, soil conditions, etc., collected from terrestrial sensors. Because YAM-5 meets the definition of an EESS satellite, use of these frequency bands is consistent with the international and domestic frequency allocations.

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[10] *See* 47 C.F.R. § 2.106 n.US347. The 2025-2110 MHz (Earth-to-space) band is also allocated to space operations internationally. 47 C.F.R. § 2.106.

[11] *See* 47 C.F.R. § 2.106.

[12] The 8025-8400 MHz band is also subject to an electromagnetic compatibility analysis as may be applied on a case-by-case basis. 47 C.F.R. § 2.106 n.US258.

B. S-Band Experimental Payload

The YAM-5 satellite will be flying an experimental radio developed internally by Loft Orbital transmitting in the 2240-2290 MHz band and receiving in the 2067-2110 MHz band.[13] This radio will be used to demonstrate a future capability Loft Orbital would like to mature, in which TT&C signals are sent directly to the Hub bypassing the satellite bus radios and resulting in greater operational efficiency. Loft Orbital would expect to conduct demonstrations and tests associated with the experimental radios only a few dozen times during commissioning and then only sporadically over the 6-year mission lifetime. To be clear, the experimental radios will not be used operationally. As discussed below, Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to conduct such tests.[14]

C. UHF Space Operations

The 400.15-401 MHz (space-to-Earth) band is allocated internationally and in the U.S for federal and non-federal mobile-satellite and space research use on a primary basis as well as for federal and non-federal space operation use on a secondary basis. The 401-402 MHz (space-to-Earth) band is allocated internationally and in the U.S for federal and non-federal space operation use on a primary basis as well as for federal and non-federal EESS use on a primary and secondary basis, respectively.[15] The 449.75-450.25 MHz (Earth-to-space) band is allocated for federal and non-federal telecommand use, subject to such conditions as may be applied on a

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[13] *See supra* Part II.A (discussing the service allocations for these bands).

[14] *See infra* Part III.A.2.

[15] 47 C.F.R. § 2.106.

case-by-case basis and that operators take all practical steps to keep the carrier frequency close to 450 MHz.[16]

Loft Orbital requests to use the 400.15-401 MHz, 401-402 MHz, and 449.75-450.25 MHz bands for TT&C, consistent with the space operations service frequency band allocations.[17] Loft Orbital will use these frequencies only for back-up TT&C purposes.[18]

Additionally, Loft Orbital is aware that the FCC established an October 15, 2019, cut-off deadline for requests to operate, inter alia, in the 400.15-401 MHz band for the provision of Mobile-Satellite Service. Loft Orbital proposes to use this band for space operations on a secondary basis, consistent with the U.S. Table of Frequency Allocations, and its limited use of the band for TT&C is not mutually exclusive with other operations on a long-term basis. Accordingly, the request to use these frequencies should not be treated as inconsistent with the 400.15-401 MHz processing round.

D. L-band Inmarsat Frequencies

The L-band Inmarsat frequencies fall in the 1535-1559 MHz band, which is allocated for the Mobile-Satellite Service (space-to-Earth). Loft Orbital requests to use the L-band data signal, as a customer of Inmarsat, for satellite navigation correction data, augmenting the accuracy of Loft Orbital's location assessment. As discussed below, Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to receive L-band data signals from authorized and coordinated Inmarsat satellites.[19]

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[16] 47 C.F.R. § 2.106 n. US87.

[17] *See* 47 C.F.R. § 2.106 nn.5.286 and US87.

[18] *See supra* Part I.A and n.4.

[19] *See infra* Part III.A.4.

E. Sensing Payload

YAM-5's sensing payload will be used to conduct a spectral analysis of certain UHF-band and S-band frequencies of interest to Kinéis to characterize those frequency channels and assess potential interference to potential transmissions in those bands. Kinéis is a satellite operator and a global connectivity provider, created in 2019 by the Centre National d'Etudes Spatiales ("CNES") and Collecte Localisation Satellites ("CLS"). In the US, Kinéis' constellation provides connectivity for Internet of Things ("IoT") devices used by consumers in the United States and worldwide, as well as enhancements to maritime domain awareness through monitoring of maritime communications.[20] Through a cooperative effort between CNES and the National Oceanic and Atmospheric Administration with support from the National Aeronautics and Space Administration, Kinéis supports the ARGOS system, which is a unique satellite system dedicated to the study and protection of the environment, such as gauging variations in ocean temperature, currents and salinity, monitoring volcanic activity, measuring changes in Arctic sea ice, and tracking wildlife migration.[21]

The sensing payload will be used to detect observable environmental characteristics, *e.g.* Time of Arrival, Frequency of Arrival, modulation type, signal bandwidth, and signal power, of certain RF signals ranging between 300 MHz 3000 MHz.[22] Specifically, the signals of interest are in the following frequency bands:

- 399.9-400.05 MHz

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[20] *See Petition for Declaratory Ruling to Access the U.S. Market Using a Low-Earth Orbit Satellite System*, Order and Declaratory Ruling, IBFS File No. SAT-PDR-20191011-00113, FCC 21- 118, ¶ 1 (rel. Nov. 19, 2021) ("Kinéis Market Access Ruling").

[21] *See* Kinéis, https://www.kineis.com/en/ (last visited May. 18, 2022); Argos, https://argos-mission.cnes.fr/ (last visited June 4, 2022).

[22] The frequency range represents the capability of the relevant antenna.

- 401-403 MHz
- 2010-2025 MHz

While the payload senses the full RF signal as transmitted by the source, neither Loft Orbital nor Kinéis will decrypt, demodulate, or decode the underlying data being sensed, as part of the spectral analysis.[23] The spectral analysis data will assist in assessing the interference environment in the above bands, which include the frequencies in which the ARGOS system operates. To be clear, this sensing payload is not a part of the ARGOS system.

Additionally, for limited test purposes, Kinéis intends to conduct I/Q recordings of ARGOS transmissions from terminals located in France in the above UHF frequencies, *i.e.*, 399.9-400.05 MHz and 401-403 MHz. This testing is expected to occur no more than 15 times over the course of the mission.

F. S-Band IoT Payload

The 2400-2483.5 MHz (Space-to-Earth, Earth-to-space) band is allocated for non-Federal licensed operations in the Amateur, Fixed, and Mobile services on a primary basis[24] and unlicensed and ISM operations.[25] The S-band IoT Payload is an experimental IoT payload that will both transmit and receive signals in the 2400-2483.5 MHz band for experimental purposes to assess whether a future IoT service can be developed and implemented in this frequency band. As discussed below, to the extent necessary, Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to transmit and receive IoT signals in the 2400-2483.5 MHz band.[26]

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[23] Kinéis, as operator of the ARGOS system, has authority to receive transmissions in the identified frequency bands. *See* Kinéis Market Access Ruling ¶ 1.

[24] These services possess varying status (primary, secondary, or none) throughout the band. *See* 47 C.F.R. § 2.106.

[25] *See id*. § 2.106 and n.5.150; *id.* Parts 15 and 18.

[26] *See infra* Parts III.A.5 and III.A.6.

The experiment is intended to facilitate the development of Doppler Multichannel Spread Spectrum ("DMSS") technology by validating coverage and mobility of the DMSS OTA protocol, testing the tracking application with many geographically diverse endpoints, and completing performance testing on the DMSS ASIC in preparation for a device production release and certification.[27] The S-band IoT Payload will collect performance data regarding two-way satellite communications in this band and will support development of algorithms that will inform system designs. Specifically, the experiment will facilitate assessment of uplink/downlink link budget and system algorithms, scattering and atmospheric scintillation effects of the link, day- versus night-time effects on noise floor levels in the band, and satellite antenna radiation pattern effectiveness and predictions.

Totum Labs, Inc. ("Totum"), the exclusive user of this payload, has separately sought and received a Part 5 authorization to operate 100 ground terminals ("Endpoint"), located throughout the U.S., with Loft Orbital's YAM-3 satellite for experimental purposes.[28] Totum intends to request a modification of its license in order to operate its authorized ground terminals with YAM-5.[29] An Endpoint will only transmit when in line of sight of the satellite. The maximum duration of the transmit portion of a satellite-Endpoint connection session will be less than 4 minutes, and for any device the cumulative transmit time in a 24-hour period will be less than 20 minutes. The experimental testing is expected to last approximately 7 months.[30]

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[27] *See* Totum, https://totum.global/ (last visited May. 18, 2022); Application of Totum, ELS File No. 0044-EX-CM-2022 (granted May 12, 2022).

[28] *See* Application of Totum, ELS File No. 0044-EX-CM-2022 (granted May 12, 2022).

[29] *See* Email from Michael Miller, Totum, to Leann Nguyen, FCC, ELS File No. 0044-EX-CM-2022 (March 4, 2022).

[30] *See* Application of Totum, ELS File No. 0044-EX-CM-2022, at Reason for Modification Application (granted May 12, 2022).

III. WAIVER REQUESTS

The Commission may waive any of its rules if there is "good cause" to do so.[31] In general, waiver is appropriate if (1) special circumstances warrant a deviation from the general rule; and (2) such deviation would better serve the public interest than would strict adherence to the rule.[32] 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.[33] Loft Orbital submits that good cause exists to waive the following rules.

A. U.S. Table of Frequency Allocations

1. 2025-2110 MHz (Earth-to-Space) TT&C and Experimental Uplink

This band is allocated to EESS subject to 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.[34] As discussed above, Loft Orbital's proposed services meet the definition of EESS, and use of this band can and will be coordinated ensuring that operations will not cause harmful interference. Accordingly, the YAM-5 satellite may use this frequency band consistent with the U.S. Table of Frequency Allocations. Loft Orbital also proposes to use this frequency band to conduct limited tests of radio equipment being developed internally for future TT&C capability.[35] Accordingly, to the extent necessary, Loft Orbital requests a waiver

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[31] *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).

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

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

[34] *See* 47 C.F.R. § 2.106 n.US347.

[35] *See supra* Part I.A.

of the U.S. Table of Frequency Allocations to conduct such tests and/or in the event the Commission concludes that the YAM-5 satellite is not an EESS system.

2. 2200-2290 MHz (Space-to-Earth) Experimental Downlink

This band is allocated internationally for EESS, space research, and space operations, and is allocated in the United States for Federal EESS, space research, and space operations.[36] Loft Orbital will transmit on these frequencies only to non-U.S. ground stations and only for limited tests of radio equipment being developed internally for future TT&C capabilities. As discussed above, Loft Orbital's proposed use is consistent with the international allocation and will be coordinated ensuring that operations will not cause harmful interference.[37] Accordingly, to the extent necessary, Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to conduct such tests.

3. 8025-8400 MHz (Space-to-Earth) Data Downlink

This band is allocated to EESS on a primary basis on a case-by-case basis.[38] As discussed above, Loft Orbital's proposed services meet the definition of EESS, and use of this band can and will be coordinated ensuring that operations will not cause harmful interference. Accordingly, the YAM-5 satellite may use this frequency band consistent with the U.S. Table of Frequency Allocations. Nonetheless, to the extent necessary, Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations in the event the Commission concludes that the YAM-5 satellite is not an EESS system.

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[36] *See* 47 C.F.R. § 2.106.

[37] *See supra* Part I.A.

[38] *See* 47 C.F.R. § 2.106 n.US258.

4. 1535-1559 MHz (Space-to-Space) Data Signals (Inmarsat Frequencies)

Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to receive L-band data signals from authorized and coordinated Inmarsat satellites.[39] The signals fall within the 1535-1559 MHz band, which is allocated for the Mobile-Satellite Service (space-to-Earth), and Loft Orbital is a customer of Inmarsat.[40] The YAM-5 satellite will be receiving the L-band transmission from higher altitude GEO satellites that are already authorized to transmit to earth stations. Moreover, receipt of that signal in space will not cause any interference.[41] For the above reasons, grant of the waiver is justified.

5. 2400-2483.5 MHz (Space-to-Earth) S-band IoT Payload Downlink

To the extent necessary, Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to transmit (space-to-Earth) IoT signals in 2400-2483.5 MHz.[42] The band is allocated for non-Federal licensed operations in the Amateur, Fixed, and Mobile services on a primary basis[43] and unlicensed and ISM operations.[44]

As discussed in the Technical Annex, operations in this band would be below the noise floor. Accordingly, the proposed use of the band will not cause interference to authorized users

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[39] *See supra* note 6.

[40] *See* 47 C.F.R. §§ 2.102(a), 2.106.

[41] *See, e.g.*, Iridium Constellation LLC Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation, Order and Authorization, 31 FCC Rcd 8675 ¶ 26 (2016). The Commission also has previously authorized earth stations licensed in the United States for communications with Inmarsat satellites for similar types of location accuracy services. *See, e.g.*, Stamp Grant, Deere & Company, IBFS File No. SES-LIC-20130422-00340 (granted Feb. 9, 2016).

[42] *See* 47 C.F.R. §§ 2.102(a), 2.106.

[43] These services possess varying status (primary, secondary, or none) throughout the band. *See* 47 C.F.R. § 2.106.

[44] *See id*. § 2.106 and n.5.150; *id.* Parts 15 and 18.

in the band. Further, the frequencies will be used for experimental purposes with a limited number of terminals to assess whether a future IoT service can be developed and implemented in this frequency band. Accordingly, grant of the waiver request is justified.

6. 2400-2483.5 MHz (Earth-to-Space) S-band IoT Payload Uplink

To the extent necessary, Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to receive (Earth-to-space) IoT signals in 2400-2483.5 MHz. The band is allocated for non-Federal licensed operations in the Amateur, Fixed, and Mobile services on a primary basis[45] and unlicensed and ISM operations.[46] As discussed above, there would be only limited use of this band for test purposes.[47] Accordingly, the proposed use of the band will not cause interference to authorized users in the band.

B. Modified Processing Round Rules

Loft Orbital requests waiver of Sections 25.156 and 25.157 of the Commission's rules, which stipulate the processing of "NGSO-like satellite systems" under a modified processing round framework.[48] Instead, Loft Orbital requests that this application be processed pursuant to the first-come, first-served procedure adopted for "GSO-like satellite systems" under Section 25.158 of the Commission's rules.[49] The Commission has previously waived the modified

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[45] These services possess varying status (primary, secondary, or none) throughout the band. *See* 47 C.F.R. § 2.106.

[46] *See id.* § 2.106 and n.5.150; *id.* Parts 15 and 18.

[47] *See supra* Part II.F.

[48] *See* 47 C.F.R. §§ 25.156, 25.157.

[49] *See* 47 C.F.R. § 25.158.

processing round requirement and allowed NGSO EESS systems[50] to be processed on a first-come, first-served basis and should do so here.[51]

Spectrum sharing in the proposed EESS frequencies, S-band and X-band, will be possible because YAM-5 and satellites in other similar systems transmit/receive only in short periods of time while visible to a receiving/transmitting earth station. For harmful interference to occur, satellites belonging to the different systems would have to be visible to the earth station and transmitting or receiving using the same frequencies at the exact same time. In such an unlikely event, the resulting inline interference could be avoided by coordinating the satellite transmissions so that they do not occur simultaneously. Accordingly, there is no mutual exclusivity between YAM-5 and other NGSO EESS systems using the same frequency band. Loft Orbital will also comply with technical requirements in Part 2 of the Commission's rules and applicable ITU rules and complete coordination with the Federal operators as required.[52]

Because the purpose of the modified processing round is to preserve opportunities for competitive entry in frequency bands where licensing the first applicant to operate in the band would prevent subsequent applicants from using the spectrum, grant of the waiver would not

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[50] As discussed above, YAM-5 meets the definition of an EESS satellite. *See supra* Part II.A.

[51] *See* Stamp Grant, Planet Labs, Inc., IBFS File No. SAT-LOA-20130626-00087 (granted Dec. 3, 2013); Stamp Grant, Skybox Imaging, Inc., IBFS File No. SAT-LOA-20120322-00058 (granted Sept. 9, 2012) ("Skybox Imaging Stamp Grant"); *Space Imaging, LLC*, Declaratory Order and Order and Authorization, 20 FCC Rcd 11964 ¶¶ 9-11 (2005) ("*Space Imaging Order*").

[52] *See Space Imaging Order* ¶¶ 26-3; *DigitalGlobe, Inc.*, Order and Authorization, 20 FCC Rcd 15696 ¶¶ 1, 15 (2005) ("*DigitalGlobe Order*"); *see also* Stamp Grant, Planet Labs Inc., IBFS File No. SAT-MOD-20170713-00103 (granted Jul. 18, 2019); Skybox Imaging Stamp Grant; Stamp Grant, Spire Global Inc., IBFS File No. SAT-LOA-20151123-00078 (granted in part Mar. 18, 2016) ("Spire Stamp Grant").

undermine the rules.[53] Accordingly, waiving Sections 25.156 and 25.157 will not undermine the policy objectives of these rules, and the waiver request is justified here.

C. Default Service Rules

Loft Orbital requests a waiver of the default service rules under Section 25.217(b) of the Commission's rules.[54] The Commission has not adopted band-specific rules for the services Loft Orbital proposes to provide. Additionally, the Commission has previously granted a waiver of the default service rules to NGSO EESS and other similar applicants based on the fact that the operators are required to comply with technical requirements in Part 2 of the Commission's rules and applicable ITU rules.[55] In these cases, the Commission concluded that, because the cited requirements had been sufficient to prevent harmful interference, there was no need to impose additional technical requirements on operations in that band and, therefore, granted the waiver requests. These same reasons warrant waiver of the default service rules here.

D. Milestone and Bond Requirements

Loft Orbital requests waiver of the Commission's milestone and bond requirements for NGSO systems.[56] Loft Orbital anticipates the launch of YAM-5 in October 2022. Moreover, Loft Orbital does not seek mutually exclusive use of the spectrum used, as discussed above. Accordingly, there can be no concerns about speculation or spectrum warehousing, and there is

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[53] *See, e.g., Space Imaging Order* ¶ 10.

[54] *See* 47 C.F.R. § 25.217(b); see also 47 C.F.R. §§ 25.156, 25.157.

[55] *See Space Imaging Order* ¶¶ 26-31 (2005); *DigitalGlobe Order* ¶¶ 1, 15; *see also* Stamp Grant, Planet Labs Inc., IBFS File No. SAT-MOD-20170713-00103 (granted Jul. 18, 2019); Stamp Grant, Planet Labs Inc., IBFS File No. SAT-MOD-20150802-00053 (granted Sept. 15, 2016); Stamp Grant, Planet Labs, Inc., IBFS File No. SAT-LOA-20130626-00087 (granted Dec. 3, 2013); Skybox Imaging Stamp Grant; Spire Stamp Grant.

[56] *See* 47 C.F.R. §§ 25.164, 25.165.

no basis to impose the milestone or bond requirements. In similar situations for many EESS or similar providers, the Commission has waived the milestone and bond requirements.[57]

The public interest would be served by waiver of the milestone and bond requirements. As the Commission is aware, the magnitude of the bond amount was established based on the cost of manufacturing and deploying more traditional satellite systems, which the Commission estimated in the hundreds of millions of dollars for geostationary satellite systems and more for NGSO systems.[58] In contrast, the cost of deploying a smallsat system, such as the one proposed by Loft Orbital, would be orders of magnitude less. Thus, the imposition of a bond requirement would impose a material, disproportionate burden on applicants for innovative systems.

For these reasons, Loft Orbital submits that waiver of the milestone and bond requirements is justified.[59]

IV. ITU COMPLIANCE

Loft Orbital has prepared the ITU Advance Publication Information submission for its proposed system, USASAT-30L-1, and is contemporaneously providing this information to the

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[57] *See, e.g.*, Stamp Grant, Planet Labs Inc., IBFS File No. SAT-MOD-20200615-00076, at Condition 13 (granted Mar. 18, 2021); Stamp Grant, Planet Labs Inc., IBFS File No. SAT-MOD-20170713-00103, at Condition 14 (granted Jul. 18, 2019); Stamp Grant, Planet Labs Inc., IBFS File No. SAT-MOD-20150802-00053, at Condition 14 (granted Sept. 15, 2016); Stamp Grant, Spire Global, Inc., IBFS File No. SAT-LOA-20151123-00078, at Conditions 6-7 (granted in part Jun. 16, 2016).

[58] *See Amendment of the Commission's Space Station Licensing Rules and Policies*, Notice of Proposed Rulemaking and First Report and Order, 17 FCC Rcd 3847 ¶ 112 (2002); *Amendment of the Commission's Space Station Licensing Rules and Policies*, First Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 10760 ¶ 168 (2003).

[59] In the event the Commission denies this waiver request, Loft Orbital affirms that it will comply with the bond requirement.

Commission under separate cover. Attached to this application is Loft Orbital's signed ITU cost recovery letter.[60]

V. CONCLUSION

For the reasons stated above, Loft Orbital submits that the public interest would be served by expeditious grant of the application.

Respectfully submitted,

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[60] *See* Exhibit D, ITU Cost Recovery Letter.