Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Loft Orbital Solutions Inc.	)	File No. SAT-LOA-2019_____
	)	
Application for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Earth-Exploration Satellite Service	)	Call Sign: _____

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APPLICATION

Loft Orbital Solutions Inc. ("Loft Orbital") requests authority to launch and operate a constellation of 10 microsatellites in low-Earth, non-geostationary ("NGSO") orbit. Loft Orbital is the first commercial service to exclusively focus on 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 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 offering 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. It is Loft Orbital's belief that this new model will reduce the administrative burden on the Federal Communications Commission ("FCC" or "Commission") and other regulatory bodies as well as reduce space debris. For all of these reasons, Loft Orbital submits that grant of this application is in the public interest.

In line with Loft Orbital's business model, each satellite will consist of one or more payloads, typically no more than five, which Loft Orbital will operate on behalf of customers. The exact payload configuration on each satellite in the Loft Orbital constellation, known as Yet Another Mission ("YAM"), will likely vary. However, each satellite will utilize a standard bus as well as the same uplink and downlink frequencies. Loft Orbital seeks a single FCC license for its 10-satellite constellation and will seek authority, as necessary, to modify its license for subsequent missions that specify additional radiofrequency ("RF") payloads or otherwise materially change relevant technical parameters of the FCC-authorized YAM satellites.

Loft Orbital is building a payload interface adapter that is able to host a variety of payload types, including hyperspectral and optical sensors, technology demonstrations, weather and climate sensors, and RF and communications payloads. Loft Orbital expects that the primary payloads on YAM satellites will be sensors, including imagers, and accordingly, the YAM constellation should be treated as an Earth-Exploration Satellite Service ("EESS") satellite system.

Loft Orbital requests processing and grant of the satellite license under the Commission's new streamlining licensing procedures for small satellites ("Streamlined Rules").[1]

I. BACKGROUND AND SYSTEM DESCRIPTION

Loft Orbital is a San Francisco, California-based company incorporated in Delaware in January 2017. 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,

[1] *See Streamlining Licensing Procedures for Small Satellites*, Report and Order, IB Docket No. 18-86 (rel. Aug. 2, 2019) ("*Order*"). Loft Orbital is contemporaneously submitting to the Commission under separate cover a request to reduce the filing fee from $471,555.00 to $30,000.00.

and operations of the spacecraft on behalf of its customers. To facilitate turnkey access, Loft Orbital in most cases will be responsible for regulatory compliance and licensing of the satellite mission, in addition to securing insurance and mission financing. It is Loft Orbital's long-term goal to serve as an aggregation platform for LEO payloads and in doing so 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 outsources the manufacturing and development of the YAM microsatellite buses and develops, in-house, products that enable seamless integration and operation of multiple payloads on the microsatellite bus. Payloads flown by Loft Orbital may either be furnished by the customer, procured from a third party on behalf of the customer, or developed in-house by Loft Orbital.

Although Loft Orbital operates the spacecraft, the company allows customers to make tasking requests for their respective payload. Each customer has a service-level agreement with Loft Orbital that details both the requirements for operating the customer's payload as well as the concept of operations for the payload. In some cases, customers maintain the exclusive right to the data collected by a particular payload. In other cases, Loft Orbital has that right but markets the ability for customers to request tasking of a payload for a period of time or over a specific region and sells the rights to the data collected by the payload during the requested taskings.

To be clear, in all cases, Loft Orbital owns and controls the YAM 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.

As mentioned above, Loft Orbital will utilize a standard satellite bus for each mission in the YAM constellation. The company has developed a universal adapter, the "Payload Hub," that is a standard product used on each mission to accommodate the onboard customer payloads. The Payload Hub serves as both a mechanical and thermal interface as well as a data interface between the satellite bus and the onboard payloads. The Payload Hub is designed to accommodate a wide range of common interface types and protocols, enabling it to be payload-agnostic. As such, YAM satellites can accommodate a wide range of payload types including imagers, RF payloads, technology demonstrations, and weather and scientific payloads.

Loft Orbital respectfully requests that the FCC grant this application in time to allow Loft Orbital to launch its first satellite of the constellation by February 1, 2020, which is the earliest date of the scheduled launch window.

A. Space Segment

The YAM satellites will have a 5-year operational design life and will range in size from 75-100 kg.[2] The first satellite in the YAM constellation is called YAM-2. YAM-2 is an approximately 75-kg microsatellite, built by Blue Canyon Technologies ("Blue Canyon") in Boulder, Colorado. Blue Canyon is a leading provider of small satellite components and satellites buses for commercial, civil, and national security customers. YAM-2 is derived from Blue Canyon's FlexBus microsatellite platform and is a similar spacecraft design to the Air Force Research Lab's S5 Mission, which was built by Blue Canyon and launched in February 2019. Loft Orbital has manifested YAM-2 on a PSLV launch in a launch window from February

[2] To the extent Loft Orbital seeks in the future to use a materially different satellite bus from that specified in this application, it will seek the necessary FCC authority.

1 - April 30, 2020 to a Sun Synchronous Orbit at an altitude of 550 km.[3] Loft Orbital has contracted with Spaceflight Services as the launch broker for this mission.

Each YAM satellite can consist of a wide range of payload types, including hyperspectral and optical sensors, technology demonstrations, weather and climate sensors, and RF and communications payloads. The great majority of the data downlinked for each satellite is expected to be associated with the sensor payloads, and accordingly, the YAM constellation should be treated as an EESS system.[4]

As discussed in more detail in Sections 3, 5, and 6 of the Technical Appendix, the YAM satellites will have a transmit and receive capability for telemetry, tracking, and command ("TT&C") and a transmit capability for mission data. The spacecraft operates in the S-band (2025 – 2110 MHz (uplink) and 2200 – 2290 MHz (downlink)) for TT&C and the X-band (8025 – 8400 MHz (downlink)) for mission data.[5]

Additionally, the YAM satellites will feature a space-to-space intersatellite link that utilizes the Globalstar constellation and operates at Globalstar-authorized and assigned frequencies. This intersatellite link transmits in the L-band (1615.65 MHz and 1616.88 MHz center frequencies) and receives in the S-band (2489.31 MHz and 2490.54 MHz center frequencies).

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[3] Loft Orbital will deploy the YAM-2 satellite between 500 km and 550 km. Because the launch provider has not selected the final destination, Loft Orbital has assumed 550 km as the worst-case scenario for orbital debris mitigation purposes.

[4] *See infra* Part II.B (discussing why the YAM constellation is an EESS system).

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

Finally, each YAM satellite will have a receive-only payload that concurrently receives Global Positioning System ("GPS") 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.

In addition, each YAM satellite may have other RF payloads, and Loft Orbital will seek FCC approval in the future for any RF payload that has not already been approved for the YAM constellation. For example, YAM-2 will carry a customer RF payload that transmits in the 400.15-401 MHz band and receives in the 864-925 MHz band. This payload will be licensed by the French administration,[7] and the customer of this payload may separately request U.S. market access. Basic technical parameters for this payload are provided in Section 2 of the Technical Appendix.[8] A chart of all the relevant frequencies is provided in Section 3 of the Technical Appendix.

Each 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

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[6] Specifically, The YAM satellites 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] The International Telecommunication Union ("ITU") filing covering the operations of this payload is F-SAT-NG-8.

[8] Consistent with FCC precedent, Loft Orbital has provided some basic information about the payload. *See*, *e.g.*, *Iridium Constellation LLC Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation*, Order and Authorization, IBFS File Nos. SAT-MOD-20131227-00148; SAT-AMD-20151022-00074 ¶ 26 (granted Aug. 1, 2016) ("*Iridium Order*") (conditionally authorizing Iridium's operations on the 1087.7-1092.3 MHz frequency band).

(scheduled) commanding is also used to fulfill the concept of operations as required by Loft Orbital's customers. The early YAM satellites will not carry propulsion systems for orbit adjustment or decommissioning purposes. However, they can perform station-keeping and collision avoidance maneuvers using differential drag techniques.[9]

YAM-2 will have 3 customer payloads onboard. Loft Orbital operates each payload on behalf of one or more customers. Those payloads are identified below:

- A cryocooled hyperspectral imager with a ground sampling distance of 35 km.[10]
- A hyperspectral imager with a ground sampling distance of 90 km.
- An Internet-of-Things ("IoT") payload that transmits in the 400.15-401 MHz band and receives in the 864-925 MHz band.

B. Ground Segment

The Mission Operations Center ("MOC") for the YAM constellation 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 all YAM spacecraft 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 satellite.

At present, Loft Orbital will use the Kongsberg Satellite Services ground station network at Svalbard, Norway ("SvalSat") and Troll, Antartica ("TrollSat").[11] The company may expand

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[9] Loft Orbital may request FCC authority at a later date to modify its satellites to include a propulsion system.

[10] Loft Orbital is aware of the requirement to obtain a commercial remote sensing license from the National Oceanic and Atmospheric Administration ("NOAA") for the operations of imaging sensors and intends to comply with all NOAA regulatory requirements. *See* 15 C.F.R. Part 960.

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 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.[12]

C. Launch Schedule and Orbital Information

The YAM satellites will be launched using either secondary payload launch service providers or dedicated small satellite launch service providers. Section (I)(A) above references the most up-to-date launch information for YAM-2. The YAM satellites will have the following orbital parameters.

- Minimum Circular Altitude: 425 km
- Maximum Circular Altitude: 570 km
- Inclination: polar sun-synchronous

II. WAIVER REQUESTS

The Commission may waive any of its rules if there is "good cause" to do so.[13] 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

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[11] *See* Technical Appendix § 16.

[12] *See, e.g.*, Stamp Grant, Planet Labs Inc., IBFS No. SAT-MOD-20170713-00103, at Condition 7 (granted Jul. 19, 2018) ("Transmissions of ... data in the 8025-8400 MHz frequency band many only be made to earth stations coordinated with National Aeronautics and Space Administration (NASA). Planet shall provide the FCC the list of coordinated earth stations.").

[13] *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).

the rule.[14] 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.[15] Loft Orbital submits that good cause exists to waive the following rules.

A. Application of Streamlined Rules

Loft Orbital requests waiver of the Commission's standard Part 25 processing rules.[16] Instead, Loft Orbital requests the Commission process this application under the Streamlined Rules.

The newly adopted Section 25.122 of the Commission's rules states that applicants, filing under the Streamlined Rules, must certify that they meet certain criteria.[17] The following table identifies the Streamlined Rules criteria and confirms that the YAM constellation meets the criteria. As a result, processing this application under the Streamlined Rules is in the public interest. The application processing time will be reduced for the Commission, allowing Loft Orbital to quickly obtain regulatory certainty for its customers and investors and meet its deployment schedule.

47 C.F.R. § 25.122(c) Criteria	Loft Orbital Compliance
(1) The space station(s) will operate only in non-geostationary orbit.	The YAM satellites will be deployed into sun-synchronous circular orbits

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

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

[16] *See* 47 C.F.R. § 25.114; see also *Order* ¶ 3 ("The Commission's part 25 satellite licensing rules, primarily used by commercial systems, group satellites into two general categories—geostationary-satellite orbit (GSO) systems and non-geostationary-satellite orbit (NGSO) systems—for purposes of application processing.").

[17] *See supra* note 1.

47 C.F.R. § 25.122(c) Criteria	Loft Orbital Compliance
	with orbit altitudes between 425 and 570 km.[18]
(2) The total in-orbit lifetime for any individual space station will be six years or less.	YAM-2 is expected to have a total in-orbit lifetime of 5.3 years.[19] All other YAM satellites will have in-orbit lifetimes of less than six years.
(3) The space station(s): (i) Will be deployed at an orbital altitude of 600 kilometers or below; or (ii) Will maintain a propulsion system and have the ability to make collision avoidance and deorbit maneuvers using propulsion.	The YAM satellites will be deployed at an orbital altitude below 570 km.[20]
(4) Each space station will be identifiable by a unique signal-based telemetry marker distinguishing it from other space stations or space objects.	Each YAM satellite will have unique transmitting telemetry channels, allowing each satellite to be identifiable during commissioning and in-orbit activities.[21]
(5) The space station(s) will release no operational debris.	The YAM satellites will not release any operational debris.[22]
(6) The space station operator has assessed and limited the probability of accidental explosions, including those resulting from the conversion of energy sources on board the space station(s) into energy that fragments the spacecraft.	Loft Orbital has assessed and limited the probability of accidental explosions, including those resulting from the conversion of energy sources on board the YAM satellites into energy that fragments the spacecraft.[23]
(7) The probability of a collision between each space station and any other large object (10 centimeters or larger) during the orbital lifetime of the space station is 0.001 or less as calculated using current NASA software or other higher fidelity model.	The probability of collision between each YAM satellite and other large objects is 0.00001 as calculated by the NASA Debris Assessment Software.[24]

[18] *See* Attachment D, Orbital Debris Assessment Report § 1.

[19] *See id.* § 6.

[20] *See id.* § 1.

[21] *See* Attachment C, Technical Annex § 5.

[22] *See id.* § 17.

[23] *See id.*

[24] *See* Attachment D, Orbital Debris Assessment Report § 5.

47 C.F.R. § 25.122(c) Criteria	Loft Orbital Compliance
(8) The space station(s) will be disposed of post-mission through atmospheric re-entry. The probability of human casualty from portions of the spacecraft surviving re-entry and reaching the surface of the Earth is zero as calculated using current NASA software or higher fidelity models.	Each YAM satellite will be disposed of through atmospheric re-entry.[25] The satellites will have a human casualty risk of zero.[26]
(9) 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).	Operation of the YAM satellites will be compatible with existing and future operators in the authorized frequency bands. Spectrum sharing will be possible because the YAM satellites and satellites in other similar systems transmit/receive only during short periods of time while visible to a receiving/transmitting earth station.[27]
(10) 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.	The YAM satellites can be commanded by the MOC at any time to immediately cease transmissions and to eliminate harmful interference.[28]
(11) Each space station is 10 cm or larger in its smallest dimension.	YAM-2's smallest dimension is approximately 60 cm.[29] Other YAM satellites will be comparable in size and, in any event, will meet the 10 cm requirement.
(12) Each space station will have a mass of 180 kg or less, including any propellant.	YAM-2 will weigh approximately 78.8 kg.[30] Other YAM satellites will be comparable in mass and, in any event, will have a mass of 180 kg or less, including propellant.

[25] *See id.* § 6.

[26] *See id.* § 7. As explained, NASA DAS reports that the YAM satellites are compliant with the requirement with a per satellite casualty risk of 1:100000000. *See id.*

[27] *See infra* II.B.

[28] *See supra* § I, I.B.

[29] *See* Attachment D, Orbital Debris Assessment Report § 5.

[30] *See id.* § 6.

Pursuant to Sections 1.3 and 1.1166 of the Commission's rules,[31] Loft Orbital is separately submitting a petition for waiver or reduction of the application fee to the Office of the Managing Director. Good cause exists for the Commission to grant Loft Orbital the request. The Streamlined Rules have not yet been published in the Federal Register and are not in effect. Accordingly, but for a simple procedural requirement, Loft Orbital would be required to pay only $30,000.00.[32] Loft Orbital has paid the full $471,575.00 filing fee while the Commission processes the fee reduction request.

B. Modified Processing Round Rules

In the event that the Commission does not process this application under the Streamlined Rules,[33] 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.[34] 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

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[31] *See* 47 C.F.R. §§ 1.3, 1.1166.

[32] The Commission has consistently waived rules that have been modified but not yet published in the Federal Register or dismissed such waiver requests as moot in light of the subsequent publication. *See, e.g.*, *Iridium Constellation LLC*, 31 FCC Rcd 8675 ¶¶ 12, 36 (2016) (granting Iridium a waiver of the then-existing rules to perform non-band-edge TT&C operations because newly adopted rules, which were not yet in effect, permitted such use); *Space Exploration Holdings*, LLC, Memorandum Opinion, Order and Authorization, 33 FCC Rcd 3391 ¶¶ 6, 21, 24, 27 (2018) (dismissing as moot several Ka-band frequency use waivers in light of the subsequent adoption of applicable rules); *Telesat Canada*, Order and Declaratory Ruling, 33 FCC Rcd 11469 ¶¶ 4, 16, 18, 20 (2018) (dismissing as moot various V-band frequency use waivers in light of the subsequent adoption of applicable rules).

[33] *See Order* ¶ 81.

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

25.158 of the Commission's rules.[35] The Commission has previously waived the modified processing round requirement and allowed NGSO EESS systems to be processed on a first-come, first-served basis and should do so here.[36]

The YAM constellation meets the definition of an EESS system. The YAM satellites 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. For example, for YAM-2, the data associated with the two hyperspectral sensors will be the primary data downlinks, and Loft Orbital expects this data will comprise more than 95% of the data downlinked. Loft Orbital also expects that the other satellites in the YAM constellation will primarily downlink imaging or other sensor data and will advise the FCC if, in the future, the primary data downlinks would not be associated with EESS transmissions and seek further FCC authority, as necessary. The other data transmissions will be associated with other payloads. For example, with respect to YAM-2, Loft Orbital expects that less than 5% of the data downlinks, *i.e.*, a *de minimis* amount, will be associated with the data from the IoT payload. And even then, much of the IoT data will be sensor data, *e.g.*, temperature, rainfall, wind, soil conditions, etc.,[37] collected from terrestrial sensors.

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[35] *See* 47 C.F.R. § 25.158.

[36] *See* Stamp Grant, Planet Labs, Inc., IBFS File No. SAT-LOA-20130626-00087 (granted Dec. 3, 2013) ("Planet Labs Stamp Grant"); 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*").

[37] *See, e.g.*, *Agrictulture*, Sigfox, https://www.sigfox.com/en/agriculture (last viewed Jul. 23, 2019).

Spectrum sharing will be possible because the satellites forming the YAM constellation 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 the YAM constellation and other NGSO EESS systems using the same frequency band.

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 undermine the rules.[38] 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

In the event that the Commission does not process this application under the Streamlined Rules,[39] Loft Orbital requests a waiver of the default service rules under Section 25.217(b) of the Commission's rules.[40] 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 applicants based on the fact that the operators are required to comply with technical requirements in Part 2 of the Commission's rules and

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

[39] *See Order* ¶ 81.

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

applicable ITU rules.[41] 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. U.S. Table of Frequency Allocations

1. 2025-2110 MHz (Earth-to-Space) TT&C 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.[42] 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 constellation 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 Loft Orbital system is not an EESS system.

2. 8025-8400 MHz (Space-to-Earth) Data Downlink

This band is allocated to EESS on a primary basis on a case-by-case basis.[43] As discussed above, Loft Orbital's proposed services meet the definition of EESS, and use of this

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[41] *See Space Imaging Order* ¶¶ 26-31; *DigitalGlobe, Inc.*, Order and Authorization, 20 FCC Rcd 15696 ¶¶ 1, 15 (2005); *see also* Planet Labs Stamp Grant; Skybox Imaging Stamp Grant; Stamp Grant, Spire Global Inc., IBFS File No. SAT-LOA-20151123-00078 (granted in part Mar. 18, 2016).

[42] *See* 47 C.F.R. § 2.106 n.US347.

[43] *See* 47 C.F.R. § 2.106 n.US258. Loft Orbital intends to use the 8025-8400 MHz frequencies primarily for data downlinks but may on occasion also use these downlinks for TT&C downlinks, as permitted under the FCC's rules.

band can and will be coordinated ensuring that operations will not cause harmful interference. Accordingly, the YAM constellation 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 constellation is not an EESS system.

3. 2200-2290 MHz (Space-to-Earth) TT&C Downlink

Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to use the 2200-2290 MHz band (space-to-Earth) as a TT&C downlink.[44] This band is allocated to Space Operations (space-to-Earth) and EESS (space-to-Earth) on a co-primary basis across all ITU regions. In the U.S., this band is allocated only for Federal use.[45] The S-band transmitter would be used only to communicate with non-U.S. Earth stations, such as SvalSat and TrollSat. Loft Orbital will coordinate such use with all Federal operators prior to use.

4. L-band (Space-to-Space) Data Signals

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.[46] The signals fall within the 1535-1559 MHz band, which is allocated for the Mobile-Satellite Service ("MSS") (space-to-Earth).[47]

The L-band data signal provides satellite navigation correction data, augmenting the accuracy of Loft Orbital's location assessment. It decreases the number of false positive

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

[45] *See* 47 C.F.R. § 2.106 nn.5.392, US303.

[46] *See supra* note 6.

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

conjunction alerts and enhances space situational awareness, imagery analysis, and geolocation applications. Additionally, reception of the signal cannot cause interference to other authorized systems. The YAM NGSO satellites will be receiving the L-band transmission from higher altitude GEO satellites that are already authorized to transmit to earth stations. Accordingly, receipt of that signal in space will not cause any interference.[48] For the above reasons, grant of the waiver is justified.

5. 1613.8-1626.5 MHz and 2483.5-2495 MHz (Globalstar) Frequencies

Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to use the 1613.8-1626.5 MHz and 2483.5-2495 MHz frequency bands for intersatellite services.[49] Each YAM satellite will have a conventional (but, space-hardened) GSP-1720 Modem (FCC type-approved) operating as a satellite transceiver. Specifically, the transceiver will operate on Globalstar-authorized and assigned channels centered at 1615.65 MHz and 1616.88 MHz. The satellite transceiver will be dynamically assigned a corresponding frequency channel in the forward (command link) direction at the 2489.31 MHz and 2490.54 MHz center frequencies.

The 1613.8-1626.5 MHz band is allocated for MSS (Earth-to-space) on a primary basis.[50] The band is also allocated to Aeronautical Radionavigation on a primary basis and Radiodetermination-Satellite Service ("RDSS") (Earth-to-space) on a primary basis. The

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[48] *See, e.g., Iridium Order* ¶ 26. 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).

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

[50] Although not applicable here, the band is also allocated for MSS (space-to-Earth).

2483.5-2495 MHz band is allocated for MSS (space-to-Earth) and RDSS (space-to-Earth) on a primary basis.

The Globalstar modem will be used in limited, time-sensitive scenarios as part of Loft Orbital's service to its customers. Loft Orbital anticipates using the Globalstar modem to send very short text messages based on analytics from one or more of the customer payloads. In the special situations in which the analytics trigger a pre-established alert, such as a leaking oil pipeline, Loft Orbital would send a message using the Globalstar modem rather than waiting for the satellite to pass over an earth station, greatly increasing the responsiveness of the Loft Orbital system. Moreover, as discussed in the technical appendix, use of these frequencies for intersatellite service will not cause harmful interference to other authorized operations, including that of Iridium.[51] For these reasons, grant of this waiver is justified and serves the public interest.

E. Form 312 Schedule S Requirements

Loft Orbital requests a limited waiver of Section 25.114(c) of the Commission's rules, which requires certain information to be filed in the Schedule S. Schedule S requests orbital information for all satellites. Given Loft Orbital's status as a secondary payload customer and uncertainty regarding future launches, Loft Orbital cannot practicably provide this information.[52] Loft Orbital has provided representative data that will allow the Commission to conduct an accurate technical assessment of the YAM constellation. Strict application of the rules here is unnecessary to serve the purposes of the rules, which is to ensure that the Commission has all the relevant information to evaluate the application. Given that Loft Orbital has provided all

[51] *See* Attachment C, Technical Annex at § 13.

[52] *See* FCC Form 312 Schedule S, Tables S4-S5.

relevant information in the narrative and Schedule S, waiver of the certain Schedule S requirements is appropriate.[53]

F. Bond Requirements

In the event that the Commission does not process this application under its Streamlined Rules,[54] Loft Orbital requests waiver of the FCC's milestone and bond requirements for NGSO systems.[55] Loft Orbital anticipates the launch of YAM-2 between February and April 2020. Additional satellites are expected to be deployed periodically thereafter. Moreover, Loft Orbital does not seek mutually exclusive use of the spectrum, as discussed above.[56] Accordingly, there can be no concerns about speculation or spectrum warehousing. In similar situations for other EESS 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

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[53] *See* 47 C.F.R. § 1.3; *see, e.g.*, Stamp Grant, ViaSat, Inc., SAT-LOI-20140204-00013 (granted Jun. 18, 2014) (waiving Schedule S requirements because they were found to be unnecessary for the space station application)

[54] *See Order* ¶ 98.

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

[56] *See supra* § II.B (requesting waiver of the modified processing round rules).

[57] *See, e.g.*, Stamp Grant, Planet Labs Inc., IBFS File No. SAT-MOD-20150802-00053, at Conditions 12-13 (granted Jun. 15, 2016); Stamp Grant, Spire Global, Inc., IBFS File No. SAT-LOA-20151123-00078, at Conditions 6-7 (granted in part Jun. 16, 2016).

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

III. ITU COMPLIANCE

Loft Orbital has prepared the ITU Advance Publication Information submission for its proposed system and is contemporaneously providing this information to the Commission under separate cover. Attached to this application is Loft Orbital's signed ITU cost recovery letter.[59]

Respectfully submitted,

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[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] *See* Attachment F, ITU Cost Recovery Letter.

EXHIBIT 1

CERTIFICATION OF COMPLIANCE WITH PART 25 STREAMLINED RULES

I hereby certify that the satellite system described in the associated application meets the criteria for streamlined processing established under *Streamlining Licensing Procedures for Small Satellites*, Report and Order, IB Docket No. 18-86 (rel. Aug. 2, 2019).

/s/ Alex Greenberg

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