Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	File Nos. SAT-LOA-20190807-00072;
	)	SAT-AMD-_____
Loft Orbital Solutions Inc.	)	
	)	Call Sign: S3052
Amendment Application for Authority to Launch and Operate a Non-Geostationary Satellite Orbit System in the Earth-Exploration Satellite Service	)	

AMENDMENT APPLICATION

Loft Orbital Solutions Inc. ("Loft Orbital") hereby amends its above-captioned application[1] regarding the YAM constellation. In this application, Loft Orbital reduces the number of satellites in the constellation to one (YAM-2), requests authority to transmit in the 400.05-400.15 MHz band (space-to-Earth) and receive in the 864-925 MHz band (Earth-to-space), and updates the satellite mass and launch date for YAM-2 in the orbital debris assessment report.[2] Except as stated in this amendment application (the "Amendment"), all other technical parameters for the YAM constellation remain as described in the Application.[3]

In the Application, Loft Orbital identified a customer Internet-of-Things ("IoT") payload on-board YAM-2 capable of transmitting in the 400.15-401 MHz band[4] and receiving in the 864-925 MHz band (hereafter, the "IoT Payload").[5] The customer's operation of the IoT Payload

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[1] *See* Application of Loft Orbital, File No. SAT-LOA-20190807-00072 (filed Aug. 7, 2019) ("Application").

[2] Attached to this application is a comprehensive Schedule S that includes all of these changes.

[3] Attachment 1 (Updated Ownership Exhibit) reflects changes in the disclosable shareholders of Loft Orbital.

[4] Loft Orbital incorrectly identified the transmit frequency band in the Application as 400.15-401 MHz, rather than 400.05-400.15 MHz. This Amendment corrects that error.

[5] *See* Application, Narrative at 6; *see also* Application, Technical Annex at 1-2.

would be licensed by the French administration, Agence Nationale des Fréquences ("ANFR"), and pursuant to a French International Telecommunication Union ("ITU") filing, F-SAT-NG-8.[6] All operations of the payload would be effectively directed by the customer, pursuant to a commercial agreement with Loft Orbital.

Pursuant to discussions with the Federal Communications Commission ("FCC"), Loft Orbital now requests authority for the YAM-2 satellite to transmit in the 400.05-400.15 MHz band (space-to-Earth) and receive in the 864-925 MHz band (Earth-to-space).[7] Operations of the IoT Payload would continue to be directed by the customer and subject to its French license and associated ITU filing. Loft Orbital understands that the grant of the Application, as amended, will reflect that the FCC has no objection to its customer submitting an ITU notification bringing into use the F-SAT-NG-8 filing with respect to the 400.05-400.15 MHz band.

I. DESCRIPTION OF IOT PAYLOAD

The IoT Payload is dedicated for performing various technical and proof-of-concept testing:

- to determine the best wireless configuration for the payload;
- to optimize network quality and service level using prototype devices; and
- end-to-end assessment of the service with potential customers, who will be able to conduct their experimentation with prototype devices or develop their own device.

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[6] *See* Application, Narrative at 6 and n.7.

[7] Loft Orbital is amending its ITU filing for YAM-2, USASAT-30J, to include reception in the 864-925 MHz band. The French ITU filing, F-SAT-NG-8, includes the 400.05-400.15 MHz band.

Possible commercial service will only start after successful completion of the tests. The IoT Payload downlink transmission is a beacon signal intended for general reception which could be used to enhance the performance of terrestrial IoT systems. The IoT Payload will also receive emissions from authorized terminals or shortrange radiofrequency devices ("SRDs") in various countries around the world (possibly including the United States).[8] The information collected and received by YAM-2 will vary, but Loft Orbital understands that much of the IoT data will be sensor information, *e.g.*, temperature, rainfall, wind, soil conditions, etc.[9] Loft Orbital will downlink the IoT data to a gateway station and provide the data to the customer.[10]

All SRDs will be operated by the customer's partners, which will ensure that those devices comply with applicable national administration regulatory requirements (based on the SRD's location). Such requirements would include operating technical parameters, such as field strength or radiofrequency output power limits, use restrictions, duty cycles, and/or specific operating frequencies or frequency bands.[11]

A. 400.05-400.15 MHz

The IoT Payload uses the 400.05-400.15 MHz band for downlink beacon transmissions of precise frequency and/or accurate time information to enhance the performance of terrestrial IoT systems. The beacon signal will be represented by a set of non-modulated "tones" at reference frequencies or by a modulated signal containing accurate time information with a

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[8] The attached Technical Annex details the IoT Payload's operational characteristics (*i.e.*, duty cycle, channel selections, power levels, and antenna types/parameters).

[9] *See* Application, Narrative at 13.

[10] *See* Application, Narrative at 7, 13-14.

[11] *See* ITU, Technical and operating parameters and spectrum use for short-range radiocommunication devices, Report ITU-R SM.2153-7 at Annex 2 (Jun. 2019), https://bit.ly/2NgFGZV ("Report ITU-R SM.2153") (identifying a number of administrations that permit SRD use and the applicable operating technical parameters).

bandwidth of up to 50 kHz. The signals will also indicate service information such as a status of the IoT Payload. Specific waveforms and functionality, which should be compatible with the partnering IoT systems, are currently under development.[12] Finalized signal configurations could be directly uploaded to the IoT Payload after its deployment on orbit because it uses a software defined radio. The IoT Payload will also be equipped with a Global Positioning System ("GPS") receiver that will obtain highly accurate time signals from GPS satellites, which then may be retransmitted in the beacon. To comply with ITU Radio Regulations footnote 5.261, all beacon emissions will be confined in a band within +/- 25 kHz of 400.1 MHz.[13]

Transmission of precise frequency and/or accurate time information could allow position determination for the low-cost IoT terminals not equipped with GPS receivers. Because the signal transmitted from the IoT Payload is received essentially simultaneously by devices and base stations within the satellite footprint, it enhances calibration and more efficient interaction within the IoT network. These frequency and/or accurate time information signals also will be available to the public on an unrestricted basis.

This proposed use is consistent with the Standard Frequency and Time Signal-Satellite Service allocated for the band in the ITU and U.S. Table of Frequency Allocations. The service is defined as a "radiocommunication service for scientific, technical and other purposes, providing the transmission of specified frequencies, time signals, or both, of stated high precision, intended for general reception."[14] The IoT Payload downlink transmission satisfies each element of the definition. It is intended for technical and other purposes (IoT network

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[12] Initially, the UHF beacon signal will be a programmable I/Q sampled waveform that lasts for 1s and is transmitted every 5s. *See* Technical Annex at 1.

[13] *See* 47 C.F.R. § 2.106 n.5.261.

[14] *See* ITU Radio Regulations Nos. 1.53-1.54.

optimization); transmits specified frequencies, time signals, or both; possesses high-precision time and frequency transmissions (targeted deviation is less than 0.1 parts per billion, or ppb, for the frequency and 1 millisecond for the time signals); and may be received by the general public on an unrestricted basis (*i.e.*, by IoT network receivers throughout the coverage area rather than individual receive stations). For these reasons, the proposed use of this band is consistent with the streamlined processing rules.[15]

B. 864-925 MHz

The IoT Payload will receive IoT signals in the frequency band 864-925 MHz and store the digitized data into memory for subsequent data processing.[16] The proposed reception of such SRD transmissions, by its nature, is consistent with the U.S. and ITU Table of Frequency Allocations and will not cause harmful interference to other authorized services. Although there is no defined radio service for SRD transmissions in the 864-925 MHz band,[17] the ITU acknowledges that national administrations, at their discretion, may authorize SRDs for a wide variety of uses in their respective countries using frequencies within this band.[18]

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[15] *See* Application, Narrative at 9-11 (requesting processing under the FCC's new streamlined rules for small satellites); *see also Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077 (2019) ("*Streamlining Order*").

[16] *See* Technical Annex at 2.

[17] This frequency range includes various allocations including, but not limited to, the Fixed, Mobile, and Land Mobile services, none of which are applicable to SRD transmissions.

[18] *See* Report ITU-R SM.2153 at 6 (noting the use of SRDs "is continuously evolving to reflect the many changes that are taking place in the radio environment; particularly in the field of technology"); *see also* ITU, Global harmonization of short-range devices categories, Recommendation ITU-R SM.2103-0 at 1 (Sept. 2017), https://bit.ly/2pWNDLX ("[T]here is an increasing demand for and use of SRDs for a wide variety of applications throughout the world[.]"); CEPT, Relating to the use of Short Range Devices (SRD), Recommendation CEPT/ERC/REC 70-03 at 6-14 (last updated Jun. 7, 2019), https://bit.ly/2zXOgKb.

In the United States, the SRDs will operate consistent with the FCC's Part 15 regulations governing unlicensed devices.[19] In other countries, the customer's partners will be responsible for ensuring that the transmission of an SRD signal are permitted by relevant national administrations. Further, under the operating technical parameters established by many national administrations, SRD transmissions cannot cause harmful interference to other services and cannot preclude any other party from also transmitting or receiving in the same bands.[20] Accordingly, the proposed use of the band is consistent with the streamlined processing rules, and Loft Orbital submits that it should be authorized to receive transmissions in this band, as discussed above. To the extent necessary, however, Loft Orbital requests waiver of the applicable FCC regulations.[21]

II. WAIVER REQUESTS

The FCC may waive any of its rules if there is "good cause" to do so.[22] Generally, 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.[23] The FCC will grant a waiver of its rules in a particular case if the relief requested would not

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[19] *See* 47 C.F.R. Part 15.

[20] *See, e.g.*, Report ITU-R SM.2153 at 6 ("If an SRD does cause interference to authorized radiocommunications, even if the device complies with all of the technical standards and equipment authorization requirements in the national rules, then its operator will be required to cease operation.").

[21] *See infra* Part II.A.1 (seeking waiver of the U.S. Table of Frequency Allocations to receive transmissions from authorized SRDs operating in the 864-925 MHz band).

[22] *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).

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

undermine the policy objective of the rule in question and would otherwise serve the public interest.[24] Loft Orbital submits that good cause exists to waive the following rules.

A. U.S. Table of Frequency Allocations

1. 864-925 MHz (Earth-to-Space)

To the extent necessary, Loft Orbital requests a waiver of the U.S. Table of Frequency Allocations to receive transmissions in the 864-925 MHz band from authorized SRDs.[25] The operation of authorized SRDs will comply with applicable regulations implemented by the relevant national administration. For example, in the United States the devices will comply with the FCC's Part 15 regulations regarding unlicensed devices. As another example, in Brazil, SRDs will conform to SRD regulations implemented by the Brazilian administration including, for example, field strength limits, use restrictions, and frequency channel restrictions.[26] In each case, the relevant administration has already determined that SRD operations, consistent with established operating technical parameters, will not cause harmful interference to other authorized services.[27] For the above reasons, grant of the waiver request is justified.

B. Modified Processing Round Rules

In the event the FCC does not process the Application, as amended, under the FCC's new streamlined rules for small satellites,[28] Loft Orbital requests waiver of Sections 25.156 and 25.157 of the FCC's rules, which require the processing of "NGSO-like satellite systems" under

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

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

[26] *See* Report ITU-R SM.2153, Attachment 6 to Annex 2.

[27] Moreover, SRDs generally operate on a non-interference and unprotected basis. *See supra* note 20.

[28] *See Streamlining Order*; *see also* Application, Narrative at 9-11.

a modified processing round framework,[29] and incorporates by reference its previously submitted waiver request.[30] As additional support for grant of the waiver request, Loft Orbital submits that the IoT Payload operations will not preclude future entrants from using the 400.05-400.15 MHz band or the 864-925 MHz band.

With respect to the 400.05-400.15 MHz band, such transmissions are low duty cycle, low-powered beacon signals, and such use is consistent with ITU and applicable national frequency allocations. Additionally, as discussed above, the frequency and/or accurate time information signals will be available to the public on an unrestricted basis.

With respect to the 864-925 MHz band, Loft Orbital requests authority only to receive signals in this band from authorized SRDs, as discussed above. Such SRDs are governed in most cases by operating technical parameters that would not preclude any other party from also transmitting or receiving in the same bands and would ensure that SRDs do not cause harmful interference to other authorized services.[31]

Accordingly, waiving Sections 25.156 and 25.157 will not undermine the policy objectives of these rules (to preserve opportunities for competitive entry in the same frequency bands), and the grant of the waiver request is justified.

C. Default Service Rules

In the event the FCC does not process the Application, as amended, under the FCC's new *Streamlined Rules*,[32] Loft Orbital requests a waiver of the default service rules[33] as applied to the

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

[30] *See* Application, Narrative at 12-14.

[31] *See supra* notes 20 and 27.

[32] *See Streamlining Order*; *see also* Application, Narrative at 9-11.

[33] *See* 47 C.F.R. § 25.217(b).

IoT Payload and incorporates by reference its prior waiver request.[34] The FCC has not adopted band-specific rules for the services to be provided by the IoT Payload or for the proposed use of the frequencies at issue. Because the proposed uses will not cause harmful interference or preclude other parties from using the same frequencies, as discussed above, grant of the waiver request is justified.

III. CONCLUSION

For the reasons stated above and in the Application, Loft Orbital submits that the public interest would be served by expeditious grant of the Application, as amended.

Respectfully submitted,

/s/ Alex Greenberg

Alex Greenberg
Chief Operating Officer
LOFT ORBITAL SOLUTIONS INC.
715 Bryant Street, Suite 202
San Francisco, CA 94107
+1-410-382-5050

Tony Lin
George John
HOGAN LOVELLS US LLP
555 13th Street, NW
Washington, DC 20004
+1-202-637-5795

Counsel for Loft Orbital Solutions Inc.

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[34] *See* Application, Narrative at 14-15.

ATTACHMENT 1

Updated Ownership Information
(as of May 27, 2020)

The following are shareholders with 10% or more of the equity and voting stock in Loft Orbital Solutions Inc. ("Loft Orbital").

Shareholder	Citizenship/ Country of Incorporation	Percentage (equity and voting)
Foundation Capital IX, L.P. Foundation Capital IX Principals Fund, LLC[1]	United States	20.000%
Antoine de Chassy	United States of America, France	13.196%
Pierre-Damien Vaujour	France	13.196%
SoftTech VC V, L.L.C.[2]	United States	10.000%

The following individuals are directors of Loft Orbital:

Antoine de Chassy
Jean-Francois Clavier
Alex Greenberg
Pierre-Damien Vaujour
Steven Vassallo

The following individuals are officers of Loft Orbital:

Antoine de Chassy (Co-founder, Co-Chief Executive Officer, and Board Chairman)
Pierre-Damien Vaujour (Co-founder, Co-Chief Executive Officer)
Alex Greenberg (Co-founder and Chief Operating Officer)
Pieter van Duijn (Chief Technology Officer)

All of the directors and officers of Loft Orbital may be reached at the following address:

Loft Orbital Solutions Inc.
715 Bryant Street, Suite 202
San Francisco, CA 94107

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[1] Foundation Capital IX, L.P. and Foundation Capital IX Principals Fund, LLC are affiliates, and accordingly, Loft Orbital has aggregated their interests for disclosure purposes.

[2] SoftTech VC V, L.L.C. is also known as Uncork Capital.