

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

In the Matter of)	
)	
Application of Loft Orbital Solutions Inc.)	File Nos. SAT-LOA-20190807-00072
for Authority to Launch and Operate a)	SAT-AMD-20200527-00063
Non-Geostationary Satellite Orbit Space)	
Station in the Earth-Exploration Satellite)	
Service)	

PETITION TO DENY OF IRIDIUM CONSTELLATION LLC

In the above-captioned Application, Loft Orbital Solutions Inc. (“Loft”) seeks a license for a new non-geostationary satellite orbit (“NGSO”) space station, YAM-2, in the Earth-Exploration Satellite Service. Among other things, Loft proposes to operate intersatellite links (“ISLs”) that would transmit from its satellites to satellites in the Globalstar system using frequencies in the 1613.8-1626.5 MHz portion of the Big LEO band. There is no allocation for ISLs in the 1613.8-1626.5 MHz band, and Loft seeks a waiver to permit its operations in the band.

I. INTRODUCTION AND SUMMARY

Iridium Constellation LLC (“Iridium”) hereby petitions to deny the portion of Loft’s Application that proposes these ISL operations. Loft’s ISL proposal has interference implications for Iridium, which operates a 66 satellite Big LEO system in low earth orbit.¹ Iridium’s service links are in the 1617.775-1626.5 MHz part of the Big LEO band. Iridium shares 1617.775-1618.725 MHz with Globalstar and has an exclusive

¹ See, e.g., *Application of Iridium Constellation LLC for Modification of License to Authorize a Second-Generation NGSO MSS Constellation*, Order and Authorization, 31 FCC Rcd 8675 (IB 2016).

license for 1618.725-1626.5 MHz.² In other words, the 1613.8-1626.5 MHz band Loft proposes to use for ISLs includes frequencies that are co-channel with Iridium's service links as well as frequencies that are adjacent to Iridium's service links.³

The Commission should deny this proposal for the following reasons:

- Loft's application is internally inconsistent, leaving it unclear whether Loft proposes to use the entire 1613.8-1626.5 MHz band, or only 1615.65 MHz and 1616.88 MHz, for ISLs.
- Loft's interference discussion for its ISLs is inadequate. Loft appears to rely on an international standard that applies to earth-to-space transmissions, not space-to-space transmissions like Loft's proposed ISLs. Because Loft's YAM-2 low earth orbit satellite would be much closer to Iridium's space stations than would an earth station, the satellite has greater potential for causing interference to Iridium's satellites than an earth station covered by the international standard.
- Loft's ISL request is incomplete; Loft never acknowledges that as a non-conforming use the ISLs would have to operate on an unprotected, non-interference basis.

II. LOFT'S APPLICATION IS INTERNALLY INCONSISTENT

Loft gives conflicting information as to the Big LEO frequencies it is proposing to use for ISLs. Loft's Schedule S identifies the entire 1613.8-1626.5 MHz band. Loft's legal and technical narratives, on the other hand, contain references both to the entire band and to two discrete frequencies within the band, 1615.65 MHz and 1616.88 MHz.⁴

The internal conflicts in Loft's Application already are creating confusion. The Public Notice accepting Loft's Application for filing, which understandably may have

² *Id.* at n. 9.

³ *Id.* at 3.

⁴ *See, e.g.*, Loft Legal Narrative, p. 17; Loft Technical Narrative, Section 13.

taken Loft's Schedule S at face value, states that Loft is requesting authority to operate in the entire 1613.8-1626.5 MHz band.

It is difficult for Iridium to comment meaningfully on Loft's ISL proposal when it cannot be certain which frequencies are included in the proposal. There is a world of difference between a co-channel interference analysis and an adjacent channel interference analysis.

Iridium has done the best it can in this Petition with the confusing information it has been given. But the Commission should not process Loft's Application until the Application has been amended to state clearly and consistently which frequencies Loft proposes to use for ISLs. The Commission should put any such amendment on public notice so that Iridium has an opportunity to update its Petition in response to changing facts. Basic fairness requires no less.

III. LOFT'S INTERFERENCE DISCUSSION IS INADEQUATE

Loft asserts its "YAM constellation will not cause harmful interference into Iridium."⁵ Loft does not, however, provide any technical analysis in support of its assertion. Rather, Loft relies on a claim that "[t]he Globalstar modem" that will be housed on Loft's YAM-2 space station "meets the international standards governing out-of-channel emissions."⁶

Loft does not even identify which "international standards" it purports to meet and makes no effort to show how these standards might protect Iridium. It is assumed

⁵ Loft Technical Narrative, Section 13.

⁶ Loft Technical Narrative, Section 13.

Loft is referring to ITU-R M.1343-1, which the Commission has not incorporated into its rules, and which specifies out-of-band emissions (“OOBE”) limits for MSS terminals operating in the 1610-1618.25 MHz band.⁷

ITU-R M.1343-1, however, is directed at the potential for MSS terminals on the Earth to interfere with MSS satellites in space. The recommendation is inapplicable to OOBE between satellites in low earth orbit, like Loft’s satellite and Iridium’s satellites, which are in closer proximity.

The interference analysis in Table 1 below illustrates this critical distinction.

Table 1: Interference analysis of proposed Loft satellite emissions into Iridium satellites

Parameter	Value	Units	Comments
Globalstar terminal (onboard YAM satellite) EIRP	4.00	dBW	From Loft Schedule S Tech Report
Globalstar terminal channel bandwidth	1.23	MHz	From Loft Schedule S Tech Report
Globalstar terminal EIRP density	-56.90	dBW/Hz	From Loft Schedule S Tech Report
OOBE EIRP density (dBW/30kHz)	-32.00	dBW/30kHz	Rec. M.1343-1 Table 9 limit, based on use of Globalstar channel upper band edge of 1617.495 MHz, specified in dBW/30kHz
OOBE EIRP density (dBW/Hz)	-76.77	dBW/kHz	
Minimum separation distance between YAM and Iridium satellites	230.00	km	Loft Schedule S Tech Report indicates YAM satellite apogee of 550 km; Iridium orbit altitude of 780 km
Path loss (at 1618 MHz)	143.81	dB	Calculated free space path loss
Iridium satellite antenna gain	23.00	dBi	Typical, varies with spot beam
Received interference power density at Iridium satellite	-197.59	dBW/Hz	Calculated
Iridium satellite noise density	-201.60	dBW/Hz	Iridium satellite noise floor
Io/No	4.01	dB	Calculated
Resulting decrease in Iridium user link margin	5.47	dB	Calculated

As can be seen, an MSS modem that satisfies the OOBE of ITU-R M.1343-1, and so may be compatible with Iridium when the modem is located on the Earth,

⁷ See ITU-R M.1343-1, Table 9.

nevertheless can interfere with Iridium when the modem is housed on a Loft space station that is in low earth orbit. Table 1 shows that a single YAM-2 transmission could be responsible for an interference-to-noise (I/N) ratio of +4.0 dB at Iridium's satellite receiver, effectively raising the receiver's noise floor and eliminating 5.5 dB of Iridium's user link margin. This increased interference far exceeds typical aggregate I/N thresholds of -6 dB (i.e., an increase in the receiver noise floor by 1 dB) for mobile satellite services.

Accordingly, Loft's assertion that its OOB E will "meet international standards" for OOB E is insufficient.⁸ These international standards apply to ground-based operations, not space-based operations, and an analysis that takes into account the differences between the two shows that Loft's space-based ISL proposal would cause unacceptable interference.

Loft also claims there is precedent for its ISL proposal based on the grant of an application filed by Astro Digital.⁹ In making this claim, however, Loft omits a critical fact: Astro Digital committed to using modems that suppress OOB E by at least 24 to 32 dB more than specified in Recommendation ITU-R M.1343-1.¹⁰ Grant of an application that proposes one suppression level is no precedent for an application that proposes a different suppression level that is less protective.

⁸ Iridium's interference analysis in this section assumes Loft's ISL operations will be limited to 1615.65 MHz and 1616.88 MHz signals. If Loft were to use the entire 1613.8-1626.5 MHz band for ISLs, Loft would be co-channel with Iridium and the potential for interference to Iridium would increase significantly.

⁹ Astro Digital U.S., Inc., IBFS File No. SAT-LOA-20170508-00071.

¹⁰ See Astro Digital's Consolidated Opposition and Response, SAT-LOA-20170508-00071 (Oct. 11, 2017), at 5.

For all these reasons, Loft's interference discussion is inadequate.

IV. LOFT'S WAIVER REQUEST IS INCOMPLETE

Although Loft requests a waiver to operate ISLs in the 1613.8-1626.5 MHz portion of the Big LEO band,¹¹ it glosses over the implications of its waiver request. ISLs lack an allocation in this band, and so ISLs are a non-conforming use.

Non-conforming operations are required to be on an unprotected, non-interference basis.¹² Loft never acknowledges this requirement and never commits to appropriate conditions to implement the requirement. The Commission should not act on Loft's Application unless and until Loft makes this commitment.

CONCLUSION

For the reasons stated herein, the Commission should deny the portion of Loft's Application that proposes to operate ISLs in the 1613.8-1626.5 MHz band.

Respectfully submitted,

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¹¹ See Loft Legal Narrative at 17.

¹² See, e.g., *Inmarsat Mobile Networks, Inc., Application to Operate a Fixed-Satellite Service Gateway Earth Station Facility in Lino Lakes, Minnesota with the Inmarsat-5 F2 Space Station*, Order and Authorization and Declaratory Ruling, DA 15-382 (IB rel. Mar 30, 2015) at ¶ 21, *on reconsideration*, DA 15-815 (July 14, 2015) at ¶ 5.

DECLARATION OF MAUREEN C. MCLAUGHLIN

1. I am Vice President Public Policy for Iridium Constellation LLC.
2. I have reviewed the foregoing Petition to Deny. All statements of fact made therein are true and correct to the best of my knowledge, information, and belief.

I declare under penalty of perjury that the foregoing is true and correct.

By: /s/Maureen C. McLaughlin
Maureen C. McLaughlin

Date: August 3, 2020

CERTIFICATE OF SERVICE

I hereby certify that on this 3rd day of August, 2020, a copy of the foregoing Petition to Deny of Iridium Constellation LLC was sent via electronic mail to the following:

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