

October 2, 2019

BY ECFS

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW, Room TW-A325
Washington, DC 20554

Re: *Ligado Network Subsidiary LLC, Amendment to License Modification Applications, IBFS File Nos. SAT-AMD-20180531-00045, SAT-AMD-20180531-00044, SES-AMD-20180531-00856; SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091; IB Docket Nos. 12-340, 11-109*

Dear Ms. Dortch:

Pursuant to Section 1.1206 of the Federal Communications Commission's ("Commission's") rules,¹ this letter provides notice that on September 30, 2019, Iridium Communications Inc. ("Iridium") met with Commission staff to discuss the above-captioned proceedings. In addition to the undersigned, representatives for Iridium included Maureen C. McLaughlin, Vice President, Public Policy, Iridium; Brandon Hinton, Spectrum Analysis, LLC; Robert McDowell, Cooley LLP; and, Lynne Montgomery, Wilkinson Barker Knauer, LLP. Office of Engineering and Technology representatives attending the meeting were Julius Knapp, Chief Engineer; Ron Repasi, Deputy Chief; Paul Murray, Associate Chief; Michael Ha, Chief, Policy and Rules Division; and Patrick Forster, Senior Engineer, Policy and Rules Division. International Bureau representatives attending the meeting were Jim Schlichting, Senior Deputy Chief; Jose Albuquerque, Chief, Satellite Division; and Karl Kensinger, Deputy Chief, Satellite Division. Wireless Telecommunications Bureau representatives attending the meeting were Charles Matthias, Associate Bureau Chief; and C. Sean Spivey, Legal Advisor.

Iridium discussed the attached presentation and emphasized its continued technical concerns with Ligado Network Subsidiary LLC's ("Ligado's") request to operate a terrestrial mobile broadband service in the L-Band satellite spectrum neighborhood. Iridium also discussed

¹ 47 C.F.R. § 1.1206.

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how Ligado's ancillary terrestrial component ("ATC") plans have evolved from its predecessor's 2003 proposal to the present, and explained that Ligado's proposal presents serious out-of-band emission ("OOBE") concerns to Iridium's adjacent band Mobile Satellite Service ("MSS") operations. These concerns are detailed in Iridium's previously filed technical analyses, which illustrate the harmful interference impact of Ligado's stand-alone terrestrial operations on Iridium user links and aviation services.² In light of these demonstrations, Ligado's waiver requests should be denied.

Out-of-Band Emission Interference Concerns. In its pending application, Ligado seeks a waiver of the Section 25.253 OOBE limits, which is necessary for its plan to deploy its stand-alone terrestrial network.³ The Commission may only waive its rules in cases where there is good cause,⁴ and good cause may only be found where "particular facts would make strict compliance inconsistent with the public interest."⁵ To satisfy the public interest requirement, "the waiver cannot undermine the purposes of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule."⁶ Ligado has not carried this burden.

In the 2003 *Sua Sponte Reconsideration Order*, the Commission demonstrated its intent to assess ATC applications individually. Revised Section 25.117(f) of the Commission's rules requires that the Commission place "any initial applications for the modification of a space station license to add an ancillary terrestrial component on notice for public comment"⁷ to permit

² Iridium Communications Inc., Technical Analysis of Ligado Interference Impact on Iridium User Links, IB Docket Nos. 11-109 and 12-340, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091 (filed Sept. 1, 2016) ("Iridium User Links Report"); Iridium Communications Inc., Technical Analysis of Ligado Interference Impact on Iridium Aviation Services, IB Docket Nos. 11-109 and 12-340, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091 (Dec. 14, 2016) ("Iridium Aviation Report").

³ Ligado application, Waiver Attachment. *See also* 47 C.F.R. § 25.253.

⁴ *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969) ("*Northeast Cellular*").

⁵ *Northeast Cellular*, 897 F.2d at 1166; *see also* *ICO Global Communications v. FCC*, 428 F.3d 264, 269 (quoting *Northeast Cellular*); *WAIT Radio*, 418 F.2d at 1157-59; *Deere & Company Request for Limited Waiver of Part 15 Rules for Fixed White Space Device*, Order, 31 FCC Rcd 2131, 2134 ¶ 8 (OET 2016) ("*Deere Order*") (quoting *Northeast Cellular*).

⁶ *Deere Order*, 31 FCC Rcd at 2134 ¶ 8; *see also* *WAIT Radio*, 418 F.2d at 1157 (stating that even when the overall objectives of a general rule have been judged to be in the public interest, it is possible that application of the rule to a specific case may not serve the public interest); *Kyma Medical Technologies Ltd.*, Order, 31 FCC Rcd 9705, 9707 ¶ 5 (OET 2016).

⁷ 47 C.F.R. § 25.117(f).

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concerned parties to comment on the application. The Commission found that public interest is served by ensuring that the applications “are subject to transparent public process” by allowing concerned parties to comment on the application and on whether the “applicant has met [the] gating criteria.”⁸ The Public Notice issued April 22, 2016 expressly sought “comment on Ligado’s modified proposals with respect to operating in the 1627.5-1637.5 MHz and 1646.5-1656.5 MHz portions of the MSS uplink band” and on whether Ligado’s proposed parameters “effectively resolve the various interference concerns relating to GPS that previously have been identified in these proceedings, as well as any other interference concerns.”⁹

Iridium first raised concerns about the potential for interference caused by ATC operations into MSS operations in 2002 when the Commission was first considering adopting ATC rules. Iridium noted that while “[t]here is no question that terrestrial operations in the MSS bands – coordinated with satellite operations – are technically feasible,” it was unclear whether such operations could be “conducted on an economically viable basis without threatening, through interference, the viability of the satellite services.”¹⁰

Soon after the Commission adopted the *2003 ATC Order*, MSV (Ligado’s predecessor) applied to deploy an ATC offering. MSV proposed an ATC service offering that would “enable MSV to offer high-quality, affordable mobile services to users inside buildings and in urban areas, in addition to providing MSS in rural areas.”¹¹ MSV sought to provide voice and data services to end users. In the 2004 grant of MSV’s application, the Commission found that MSV’s operations would “provide for thousands of simultaneous nationwide ATC users and MSS users by using ATC assignments in geographic areas where MSS is not capable of being delivered directly by satellite that would otherwise go unused.”¹²

⁸ *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands*, Order on Reconsideration, 18 FCC Rcd 13590, 13596 ¶ 14 (2003).

⁹ *Comment Sought on Ligado’s Modification Applications*, Public Notice, 31 FCC Rcd 3802, 3809 (IB 2016).

¹⁰ Comments of Iridium Satellite LLC, IB Docket No. 01-185, ET Docket No. 95-18 (Mar. 22, 2002).

¹¹ *Mobile Satellite Ventures Subsidiary LLC; Application for Minor Modification of Space Station License for AMSC-1; Minor Amendment to Application for Authority to Launch and Operate a Next-Generation Replacement MSS Satellite; Application for Minor Modification of Blanket License for Authority to Operate Mobile Earth Terminals with MSAT-1*, Order and Authorization, 19 FCC Rcd 22144, 22144 ¶ 1 (2004).

¹² *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands; Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands*, Report and Order and Notice of Proposed Rulemaking, 18 FCC Rcd 1962, 2054 ¶ 186 (2003) (“2003 ATC Order”).

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Ligado's pending proposal differs dramatically from the ATC offerings that the Commission contemplated in 2003. If one contrasts MSV's operations with Ligado's current proposal, an entirely different terrestrial system and a far more threatening interference scenario comes into view. Following its emergence from bankruptcy, Ligado proposes to deploy a standalone terrestrial system that will provide service to millions of users and provide coverage to more than 90 percent of the United States. It proposes to deploy terrestrial operations using omnidirectional antennas with vastly different uses and devices than MSV contemplated, and envisions the potential for tens of millions of such devices. Its current proposal seeks waivers of gating requirements and technical rules and sets out a business model that effectively eliminates the ancillary nature of its proposed services.¹³ When the Commission first adopted ATC rules, the MSS operations were expected to be the dominant service in the L-band with the terrestrial operations envisioned as ancillary to reach areas that the satellite service could not reach. According to the Commission, "[w]e do not intend, nor will we permit, the terrestrial component to become a stand-alone service."¹⁴ But that is essentially what Ligado seeks to do.

It is not only Ligado's vacillating terrestrial proposals that have changed over the course of sixteen years. Iridium's business has also evolved, and that evolution has enhanced its vulnerability to interference from Ligado. Today, Iridium's user base and usage profile are vastly different than in 2003. Iridium has invested billions of dollars in its business, including a \$3 billion investment that culminated in the completion of Iridium's second-generation constellation earlier this year. Today, Iridium supports more than 1.2 million subscribers, many of them using data messaging services. These data services are leveraged by machine-to-machine ("M2M") markets, supervisory control and data acquisition ("SCADA") applications, and personal, asset and vehicle/aircraft tracking applications. The Iridium network currently supports millions of these transactions, with Iridium devices being deployed virtually everywhere throughout the United States, including densely populated areas.

Deployment of Ligado's proposed terrestrial operations would drastically alter Iridium's operating environment. Section 25.255 of the Commission's rules plays a critical role in the protection of MSS operators by placing on Ligado an obligation to prevent and resolve harmful interference concerns prior to commencing ATC operations.¹⁵ In 2003, the Commission believed that interference from ATC operations to an "adjacent MSS or other operator" would be an "unlikely event" in the ATC bands.¹⁶ However, given the number of parties who have continued to express concerns about the detrimental impact Ligado's proposed operations could

¹³ Reply Comments of Iridium, CB Docket No. BO 18-31, at 8-10 (Feb. 20, 2019).

¹⁴ 2003 ATC Order, 18 FCC Rcd 1962 ¶ 1.

¹⁵ 47 C.F.R. § 25.255.

¹⁶ 2003 ATC Order, 18 FCC Rcd 2017 ¶ 104.

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have in its frequency neighborhood, the interference risk has become far more acute. The availability of the Section 25.255 remedy is particularly important in this scenario, where changed circumstances – many of which are a result of Ligado’s changing business plans – have dramatically increased the risk of harmful interference to Iridium and others in the band. The Commission’s ATC regime did not grant Ligado an absolute right to a windfall through wireless broadband use of the 1627.5-1637.5 MHz band, particularly where such operations would require the Commission to ignore the significant harm such operations would cause to Iridium’s customers and multi-billion-dollar investment.

Please direct any questions concerning this submission to the undersigned.

Respectfully Submitted,

/s/ Bryan N. Tramont

Bryan N. Tramont

Counsel to Iridium Communications Inc.

Attachment

cc: Jose Albuquerque
Patrick Forster
Michael Ha
Karl Kensinger
Julius Knapp
Charles Matthias
Paul Murray
Ron Repasi
Jim Schlichting
Sean Spivey



INTERFERENCE RISKS TO IRIDIUM FROM LIGADO PROPOSAL


September 2019





IRIDIUM SERVICES





Iridium is the only
fully global provider
of **mobile voice** &
data services.

Our network
connects vital
services using just
8.725 MHz of
spectrum and 75
in-orbit satellites.

Serving
>1.2 million
Subscribers

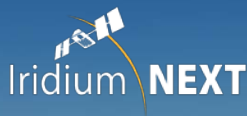
Backed by
300+
Global Distribution
Partners (Wholesale-
only Business)

Business Lines:
Land Mobile
Maritime
Aviation
IOT
Government

A NEW ERA FOR GLOBAL CONNECTIVITY

On **January 11, 2019**, a flight-proven SpaceX Falcon 9 rocket launched from Vandenberg Air Force Base and delivered the final **10 Iridium® NEXT satellites** to low earth orbit (LEO).

This was the **largest satellite constellation replacement** ever.



STRONG U.S. GOVERNMENT RELATIONSHIP

While Iridium's current subscriber base is ~90% commercial, USG was our first customer and remains our largest today



- Serves all DoD branches and US Government agencies
- Strong 15-year relationship under Air Force Space Command's Enhanced Mobile Satellite Service program
Unique capabilities
- Currently more than 125,000 subscribers
- 7-year \$738.5m contract with DoD awarded to Iridium in September 2019



IRIDIUM CORE AVIATION SERVICES

ATC (Air Traffic Control) – *Safety*

- Aeronautical Mobile Satellite (Route) Service must conduct pre-flight check on the ground at domestic airports before clearance is granted for take-off.

AOC (Aeronautical Operational Control) – *Safety*

- Permits ground-to-aircraft communications
- Works in conjunction with VHF connectivity
- Aircraft today are heavily dependent on data for
 - Gate assignments
 - Weight & balance
 - Flight plan

AAC (Aeronautical Administrative Control) – *Non-Safety*

- Permits ground-to-aircraft communications
 - Flight Crew list
 - Passenger list



A QUICK AIREON OVERVIEW

2011

Aireon created in 2011 to provide global, 100%, real-time air traffic surveillance, regardless of location

IRIDIUM NEXT

Cutting-edge constellation with Aireon's ADS-B receivers on each satellite

8 Of 8 LAUNCHES COMPLETED

- Currently 66 Aireon ADS-B payloads active on orbit
- 25B position messages expected monthly

ANSPs

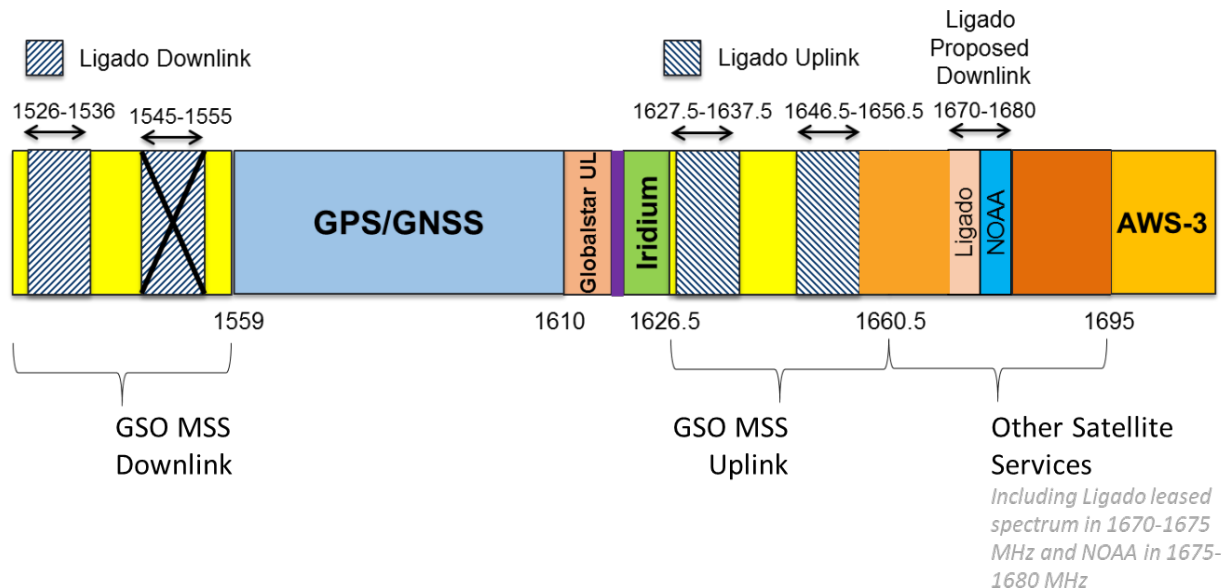
12+ ANSPs + FAA already receiving data

- Aireon fully operational as of April 2019
- North Atlantic Oceanic Operational Trials Began March 2019



THREAT POSED BY LIGADO'S PLAN

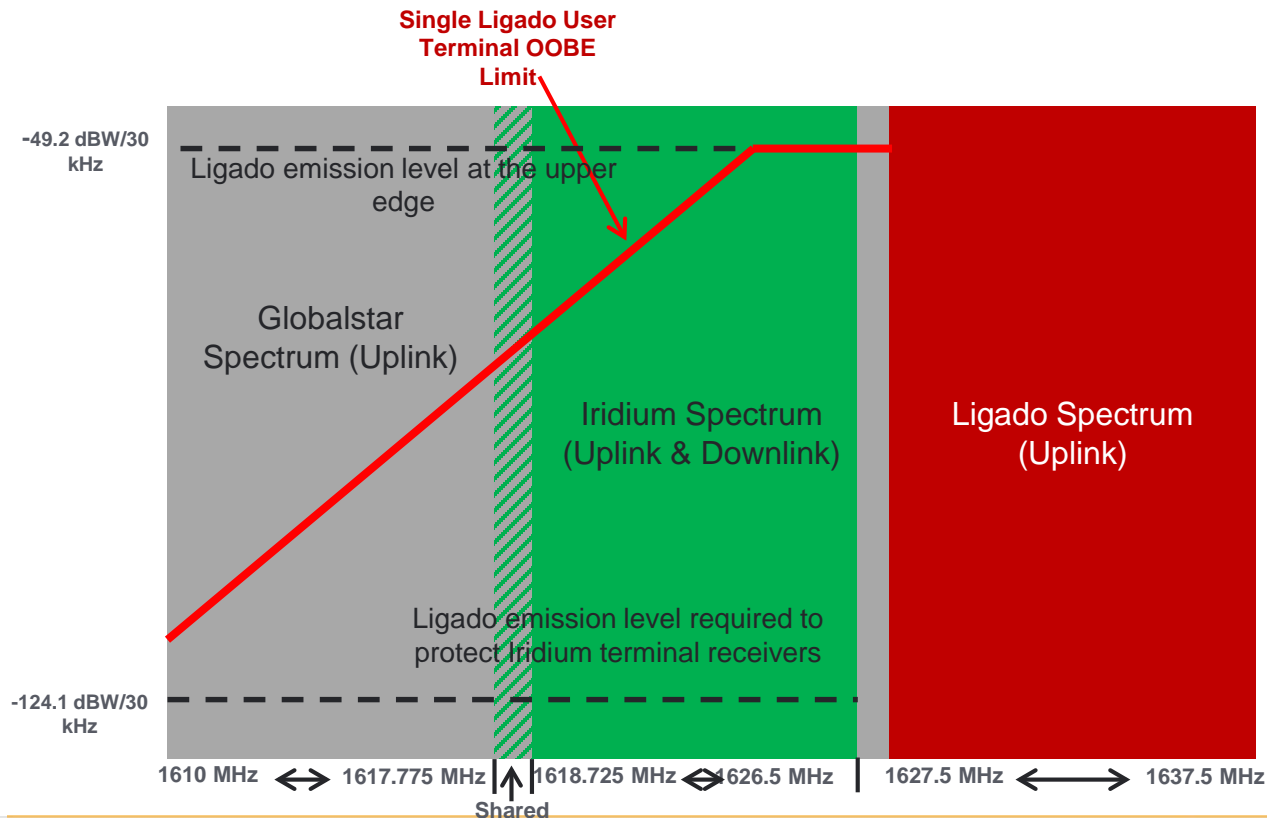
IRIDIUM'S L-BAND NEIGHBORHOOD



- Iridium currently licensed to operate in 1617.775-1626.5 MHz
- 8.725 MHz total spectrum to provide uplink and downlink service links



OUT OF BAND EMISSIONS INTO IRIDIUM SPECTRUM UNDER LIGADO'S PROPOSAL





HARMFUL INTERFERENCE TO IRIDIUM SERVICES FROM LIGADO'S PROPOSED TERRESTRIAL OPERATIONS MUST BE RESOLVED

- Ligado Networks (formerly LightSquared) seeks to operate a modified terrestrial network operating in the L-band, including the 10 MHz adjacent to Iridium at 1627.5-1637.5 MHz
- Iridium's technical analysis (submitted to FCC on Sept. 1, 2016) and aviation-specific technical analysis (submitted to FCC on Dec. 14, 2016) indicates that this terrestrial operation on that 10 MHz of spectrum would result in significant harmful interference to Iridium's mobile terminals, including those used for vital SATCOM aviation services
- Ligado's May 2018 amendment does not address Iridium
- Section 25.255 of the FCC's rules requires Ligado to resolve any harmful interference from their terrestrial operations; purpose of the rule is clear – maximize flexibility consistent with sound spectrum management while providing absolute interference protection for incumbent MSS providers
- The burden is on Ligado to resolve Iridium's concerns; absent resolution, the FCC must not grant Ligado's application with respect to the spectrum at 1627.5-1637.5



INTERFERENCE TO IRIDIUM CAUSED BY OOBЕ FROM LIGADO INTO ADJACENT IRIDIUM BAND

- Ligado's proposed network will have potentially millions of mobile devices transmitting just 1 MHz away from the spectrum that Iridium utilizes for all of its critical uplink and downlink satellite services, including SATCOM aviation services
- Ligado's proposed terrestrial use of 10 MHz at 1627.5-1637.5 MHz will cause significant harmful interference to adjacent-band low-power Iridium terminals
- Ligado's proposed compliance with a substantially relaxed out-of-band emission (OOBE) limit of -58 dBW/4 kHz at 1626.5 MHz offers insufficient interference protection
- Unlike Ligado/GPS interference problem, Ligado's OOBE result in unwanted emissions in the Iridium band and cause interference to Iridium services
- Ligado's proposed OOBE limit at the upper edge of Iridium's band is 70 dB higher than the limit in the RNSS (GPS) band



Maureen C. McLaughlin

Vice President, Public Policy
Iridium Communications, Inc.

Maureen.McLaughlin@iridium.com