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FILED ELECTRONICALLY

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Iridium Satellite LLC, File No. SES-MOD-20170413-00388
Iridium Carrier Services LLC, File No. SES-MOD-20170413-00389

Dear Ms. Dortch:

Iridium Satellite LLC and Iridium Carrier Services LLC (collectively, "Iridium") have filed the above-referenced applications (the "Applications") seeking authority to operate a new terminal that will provide Iridium Certus℠ service via Iridium NEXT, Iridium's second-generation satellite system. Iridium Certus terminals will offer innovative voice and data capabilities to Iridium's commercial, civilian, and military users and, as shown in the Applications, the terminals fully comply with the Commission's requirements.

On October 3, 2017, Ligado Networks Subsidiary LLC ("Ligado") filed an *ex parte* letter (the "Ligado Letter") reflecting arguments it had made concerning the Applications in a meeting it had with representatives of the International Bureau. These arguments are so flawed that one must conclude Ligado is simply attempting to delay Iridium's next generation services to gain an improper advantage in separate Commission proceedings.[1] Just last year, Ligado made a similar

[1] *See In the Matter of Ligado Networks LLC Application to Modify its Ancillary Terrestrial Component Authorization*, IB Docket Nos. 11-109 & 12-340; IBFS File Nos. SAT-MOD-20151231-00090, SAT-MOD-20151231-00091 & SAT-MOD-20151231-00981.

attempt to delay Iridium's application for authority to launch Iridium NEXT. The Bureau properly rejected Ligado's tactic, concluding that the issues raised by Ligado "are better suited for treatment in those separate proceedings."[2] As before, the Commission should promptly dispatch Ligado's attempt to use this proceeding to gain an advantage elsewhere.

These, in brief, are the obvious and fatal flaws with Ligado's arguments:

- Ligado's claim that its satellite receivers will be interfered with is baseless.
  - Ligado's own MSS signals are more than 4200 times more powerful than out-of-band emissions ("OOBE") from Iridium Certus terminals.
  - Ligado's satellite receivers already operate in the presence of Inmarsat signals that are 3.4 times more powerful than a maximum power Iridium Certus signal, and most Iridium Certus signals will not be maximum power signals.
  - Ligado does not take into account the millions of ATC terminals it proposes to operate.
- Ligado mischaracterizes the Commission's ATC holding and its OOBE requirements.
- The Commission already has resolved the issues Ligado attempts to raise concerning the use of Iridium's downlink band for safety services.
- Ligado's claim that Iridium should coordinate with adjacent band services conflicts with the Commission's OOBE rule and a previous Commission decision.
- Ligado's assertions concerning the geographic scope of Iridium's AMS(R)S authority are incoherent, because Iridium has sought no change to this geographic scope.
- Ligado's request for new conditions is unwarranted and nothing more than a transparent attempt to delay Iridium's next generation services.[3]

I. LIGADO'S INTERFERENCE CLAIM IS BASELESS

In its letter, Ligado claims that transmissions from Iridium Certus terminals "could pose a significant risk of interference into … Ligado's satellite receivers." This claim is based on a chart which shows that the total EIRP in the two-carrier, highest bandwidth case for Iridium Certus terminals exceeds the corresponding values for Iridium's already-licensed MSS terminals.

Ligado never specifies whether it is claiming its MSS signals would be interfered with from Iridium Certus terminal OOBE or is claiming its satellite receiver would be overloaded from Iridium Certus transmissions within the Iridium band. Either claim is demonstrably false.

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[2] *Iridium Constellation LLC Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation*, Order and Authorization, 31 FCC Rcd. 8675 ¶ 43 (IB 2016).

[3] Iridium is not addressing in this filing two additional arguments Ligado has made before, *i.e.,* Ligado questions whether Iridium's network can distinguish between priority and non-priority traffic and maintains that the Commission should have to wait for FAA and ICAO approvals before acting on Iridium's Applications. *See* Ligado Letter at 2. Iridium responded fully to these arguments previously and hereby incorporates by reference its responses. *See* the Consolidated Response of Iridium in the above-captioned proceeding (Sept. 18, 2017) at 15-17.

OOBE. If Ligado is asserting its satellite receivers would be interfered with from Iridium Certus OOBE, it is addressing the wrong variable. Ligado's chart focuses on EIRP. But the potential for interference to Ligado's satellite receivers from OOBE is a function of EIRP density, not EIRP, and the EIRP density for the Iridium Certus terminals is well within the FCC limit.[4]

Ligado, moreover, has somehow ignored the strength of its own transmissions. Interference potential is relative, and as shown in the attached appendix, the signals Ligado's satellite will receive from a Ligado earth station transmission *are over 4200 times more powerful than the worst-case OOBEs the satellite will receive from Iridium Certus terminals.* Put another way, it would take more than 4200 Iridium Certus terminals transmitting simultaneously to equal the signal strength of a single Ligado MSS terminal.

Any suggestion that Ligado's satellites cannot receive Ligado uplink transmissions because of Iridium Certus OOBEs that are weaker than Ligado uplink signals by a factor in excess of 4200 is preposterous.

Overload. If Ligado is claiming its satellite receivers would be overloaded by Iridium Certus uplink transmissions, the claim does not withstand scrutiny. The RF power Ligado's satellites will receive from Iridium Certus transmissions, which fully comply with the FCC's power limits, pales in comparison to the RF power the satellites are subject to from other sources.

Ligado complains about the 27.7 dBW maximum EIRP for one particular class of Iridium Certus service, which is for a dual-carrier transmission. But Ligado had no objection when Inmarsat, which operates in Ligado's band, applied for and received a blanket license for terminals that have a maximum EIRP of 33 dBW.[5]

Inmarsat's maximum EIRP is 5.3 dB above Iridium Certus', which means a maximum EIRP Inmarsat signal produces 3.4 times the power of the maximum EIRP from Iridium Certus. Ligado's satellite receivers, therefore, already are functioning in the presence of Inmarsat's far more powerful signals. Simply put, any overload argument lacks credibility.

Ligado also, somehow, fails to take its proposed ATC terminals into account. There could be millions of these terminals, and their omnidirectional antennas will direct RF power toward Ligado's satellites 100% of the time the ATC terminals are transmitting. Iridium Certus' phased array antennas, on the other hand, only will direct RF power of any significance toward Ligado's

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[4] The highest Iridium Certus mean EIRP density, which is produced by the Iridium Certus waveform associated with emission code 41K7Q7W, is below the FCC limit by 0.9 dB. See Amendments filed on July 26, 2017, File Nos. SES-AMD-20170726-00812 and SES-AMD-20170726-00813, Answers to Questions from the International Bureau at 3. And that 41K7Q7W signal will be attenuated in Ligado's band in accordance with Section 25.202(f) of the FCC's rules.

[5] *See* File No. SES-MOD-20111228-01505, call sign E090032. Inmarsat terminals would be communicating with a satellite at a different GSO orbital location, but Iridium understands that many L-band GSO terminals have limited directivity. We also note that the Inmarsat 4 F3 satellite and Ligado's Skyterra 1 satellite are closely located on the GSO arc.

satellites during the limited and brief intervals when an Iridium non-geostationary satellite aligns with Ligado's geostationary satellite.

Finally, most Iridium Certus signals will be less than maximum power signals. The two-carrier, maximum EIRP (27.7 dBW) Iridium Certus emission type on which Ligado's interference argument is based is only one of six different Iridium Certus carriers. There ordinarily will be a mix of Iridium Certus emission types in use in any given area, most of which will be transmitting at power levels well below the maximum. And only some of those carriers will be transmitting in the portion of Iridium's band that is adjacent to Ligado's band.

If Ligado is making an overload argument, it is a frivolous one.

II. LIGADO MISCHARACTERIZES THE COMMISSION'S ATC HOLDING AND ITS OOBE REQUIREMENTS

Ligado asserts the *2003 ATC Order* established a receiver tolerance requirement regarding OOBE received in Iridium's Big LEO band.[6] This assertion is false. The focus of the passage Ligado apparently relies on is transmitted OOBE levels, not receiver capabilities.[7] The Commission did not adopt requirements in the *2003 ATC Order* for OOBE rejection capabilities of mobile earth terminal ("MET") receivers.

Similarly, the Commission's Part 25 OOBE rule, Section 25.202(f),[8] imposes no OOBE rejection standards for MET receiver performance. Instead, the rule sets OOBE limits for transmitting terminals. All of Iridium's terminals, legacy and new, are designed to operate in the presence of transmitting terminals producing permitted OOBE in the Iridium band.

The Commission already has authorized Iridium's legacy terminals, with no examination of their OOBE rejection performance, and the terminals have operated successfully in this OOBE environment for two decades.[9] These legacy terminal authorizations are precedents for authorizing the Iridium Certus terminals, whose receivers have the same OOBE rejection capabilities as Iridium's legacy receivers.

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[6] *See* Ligado Letter at 3.

[7] Although Ligado provides no citation for its claim, it appears to be referring to ¶ 178 of the *2003 ATC Order*. *See Flexibility for Delivery of Communications by Mobile Satellite Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band*, Report and Order and Notice of Proposed Rulemaking, 18 FCC Rcd 1962, 2050-2051, ¶ 178 (2003).

[8] 47 C.F.R. § 25.202(f).

[9] Ligado also attempts to equate how Iridium Certus terminals will perform in the presence of adjacent band MET transmitters with how they will perform in the presence of Ligado's adjacent band ATC transmitters. *See* Ligado Letter at n.8. Ligado is comparing apples to oranges. ATC transmissions, unlike MET transmissions, involve high-density terrestrial operations. It is perfectly consistent, therefore, for Iridium to have interference issues with some of Ligado's ATC proposals but not to have interference issues with Ligado's MSS operations, assuming they comply with Section 25.202(f).

III. LIGADO MISCHARACTERIZES THE STATUS OF IRIDIUM'S SAFETY SERVICE OPERATIONS

Ligado claims that positions Iridium is taking in WRC-19 preparatory discussions relating to maritime safety services are indicative of "attempt to leverage the protection of safety services into some type of spectrum use priority."[10] This claim is both untrue and irrelevant.

Ligado appears to be questioning how Iridium can use its downlink frequencies for AMS(R)S, which is the only safety service for which Iridium seeks authority in this proceeding. But the Commission has recognized that "[t]he 1610-1626.5 MHz [Big LEO] band is … allocated for AMS(R)S on a primary basis regardless of the direction of transmission."[11] Iridium, therefore, is using primary downlinks, not secondary downlinks, to provide safety service.[12]

The positions Iridium is taking in the run-up to WRC-19 relating to maritime safety services, which are consistent with the AMS(R)S allocation framework, are not at issue in this proceeding. What is at issue in this proceeding are the FCC's rules and policies, and Iridium has shown that the Iridium Certus terminals comply with these rules and policies. Accordingly, Iridium's Applications should be granted.

IV. LIGADO'S REQUEST TO REQUIRE ADJACENT BAND COORDINATION CONFLICTS WITH THE COMMISSION'S RULES AND A PREVIOUS COMMISSION RULING

Ligado claims Iridium should be required "to complete coordination with adjacent band operators."[13] Ligado's position, however, conflicts with the Commission's Part 25 rules, which rely on out-of-band emission limits, not coordination, to manage compatibility between adjacent bands. Section 25.202(f) specifies limits for out-of-band MSS emissions in the bands adjacent to Iridium's Big LEO frequencies, and these limits establish the co-existence environment in which MSS receivers in adjacent bands must operate.[14] Ligado's attempt to

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[10] Ligado Letter at 3.

[11] *Iridium Constellation LLC, Application For Authority To Modify License For A Low Earth Orbit Mobile Satellite System*, Call Sign S2110, File Nos. SES-AMD-20150923-00612, SES-AMD-20150923-00620, SES-MOD-20130416-00322, and SES-MOD-20130416-00323, Memorandum Opinion and Order, 28 FCC Rcd 964 (IB 2013) ("*Iridium AMS(R)S Order*") at ¶ 3.

[12] Iridium does not, however, have super primary status. Despite what Ligado implies, *see* Ligado Letter at 3, the Commission has held that Iridium's AMS(R)S grant does not give it any additional protection against interference from previously-authorized MSS operations in adjacent frequency bands. *See id.* at ¶ 11.

[13] Ligado Letter at 4, citing *Iridium AMS(R)S Order* at ¶ 5.

[14] Different considerations apply to out-of-band emissions from Ligado's proposed ancillary terrestrial component ("ATC") service, which has a different regulatory status and substantially different operational characteristics than Ligado's MSS service. Iridium has opposed part of Ligado's ATC proposal on interference grounds. See, e.g., Iridium Communications Inc., Technical Analysis of Ligado Interference Impact on Iridium User Links, IB Docket Nos. 11-109 and 12-340 (filed Sept. 1, 2016); Letter from Bryan N. Tramont and Patrick R. Halley, Counsel for Iridium, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340 (filed Aug. 3, 2017); Letter from Bryan N. Tramont and Patrick R.

create a novel coordination requirement that would conflict with the Commission's rules demonstrates nothing more a desire to delay Iridium's service to gain leverage in another proceeding.

Moreover, Ligado's suggestion that Iridium should have to coordinate with MSS operators in adjacent bands[15] is inconsistent with the Commission decision granting Iridium AMS(R)S authority. The Commission held that Iridium only would need to coordinate with MSS operators in adjacent frequency bands if it were seeking additional protection.[16] Iridium is not seeking additional protection for Iridium Certus terminals; it is satisfied with the protection afforded by Section 25.202(f).

V. IRIDIUM SEEKS NO CHANGE TO THE GEOGRAPHIC SCOPE OF ITS AMS(R)S AUTHORITY

Ligado states that any AMS(R)S authority for Iridium Certus should be limited to the oceanic, polar, and remote regions covered by Iridium's existing AMS(R)S authority.[17] This statement is a *non sequitur;* Iridium has not sought to modify the geographic scope of its AMS(R)S authority. In any event, Iridium hereby confirms that it expects to operate within existing geographic parameters.[18]

VI. THE COMMISSION SHOULD REJECT LIGADO'S REQUEST FOR NEW CONDITIONS

Ligado asks that the Commission impose three new conditions to Iridium Certus terminals, in addition to the conditions that already apply to earth stations covered by Iridium's blanket license.[19] There is no basis, however, for adopting any of these conditions.

First, Ligado seeks a condition "[r]equiring Iridium's downlink operations to be compatible with Ligado's L-band operations."[20] To the extent Ligado is addressing the transmit side of Iridium's downlink operations, its argument constitutes an untimely petition for reconsideration of the Commission's grant of Iridium's application for authority to operate its Iridium NEXT space

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Halley, Counsel for Iridium, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340 (filed Mar. 27, 2017); Letter from Bryan N. Tramont and Patrick R. Halley, Counsel for Iridium, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340, at 10 (filed Dec. 14, 2016).

[15] Ligado's suggestion is based on a statement Iridium's predecessor-in-interest, Motorola, made 20 years ago, and Ligado, then known as AMSC, took issue with. *See Iridium AMS(R)S Order*, ¶ 5 & nn. 18, 19.

[16] *See id.* at ¶ 11.

[17] Ligado Letter at 4.

[18] The Commission has defined the oceanic and polar regions within which Iridium may provide AMS(R)S and has left the definition of remote areas to countries and airspace authorities based on their individual circumstances, such as availability of traditional ground-based VHF infrastructure. *See Iridium AMS(R)S Order* at ¶ 10 & n. 31.

[19] *See* Ligado Letter at 4.

[20] *Id.*

stations.[21] To the extent Ligado is addressing the receive side of Iridium's downlink operations, its argument should be rejected because: (1) so long as Ligado's *MSS* transmissions comply with the Commission's OOBE limits, they will be compatible with Iridium's legacy and Iridium Certus earth station receivers, which are designed to operate in the presence of compliant OOBE signals; and (2) whether Ligado's *ATC* transmissions will interfere with Iridium's earth station receivers is under consideration in another proceeding and is beyond the scope of this proceeding.[22]

Second, Ligado requests a condition "[r]equiring Iridium to complete coordination with adjacent band operators … ."[23] But as noted, requiring coordination would conflict with both the Commission's rules and its decisions.

Finally, Ligado asks for a condition "[c]onfirming that any grant of AMS(R)S authority does not alter Iridium's current regulatory status with respect to other spectrum users."[24] This condition is unnecessary, too, because the status of Iridium's AMS(R)S operations vis-à-vis other spectrum users is well established, and Iridium seeks no changes to this status.

CONCLUSION

Ligado's filing is replete with frivolous claims, irrelevancies, assertions that conflict with the Commission's rules and policies, and arguments that are contradicted by the Commission's precedents. The Commission should disregard these arguments and grant Iridium's Applications without delay.

Respectfully submitted,

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[21] *Iridium Constellation LLC Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation*, Order and Authorization, 31 FCC Rcd. 8675 (IB 2016).
[22] *See supra* note 14; *see also* 47 C.F.R § 25.255.
[23] Ligado Letter at 4.
[24] Ligado Letter at 4.

APPENDIX SHOWING THAT LIGADO'S MSS SIGNALS ARE OVER 4200 TIMES MORE POWERFUL THAN IRIDIUM CERTUS SIGNALS AT LIGADO'S SATELLITE RECEIVERS

Ligado's transmissions are in-band. That is, they are transmitted in channels within Ligado's satellite receiver passband. The maximum EIRP density of the signals Ligado itself is transmitting to its satellites is 16.5 dBW/4 kHz.[1]

Iridium Certus transmissions, on the other hand, are out-of-band, and the power they produce in Ligado's band must be attenuated in accordance with Section 25.202(f) of the FCC's rules.[2] The maximum out-of-band emissions an Iridium Certus terminal would produce in Ligado's band consistent with Section 25.202(f) attenuation[3] is -19.8 dBW/4 kHz, which is derived by taking the maximum EIRP density for an Iridium Certus terminal of 5.2 dBW/4 kHz and reducing it by the minimum attenuation of 25 dB that is required by Section 25.202(f)(1) of the rules (the additional attenuation required by Section 25.202(f)(2) and (3) would increase the disparity between the Ligado and Iridium Certus EIRP densities).

Ligado's maximum EIRP density, therefore, is 36.3 (i.e. 16.5 - (-19.8)) dB greater than the worst-case emissions an Iridium Certus transmission will produce in Ligado's band. This means Ligado's transmissions in its band are over 4200 times more powerful than the worst-case out-of-band emissions from Iridium Certus.

[1] *See* File No. SES-MOD-20121001-00888 (call sign E930367), File No. SES-MOD-20121001-00889 (call sign E980179).
[2] 47 C.F.R. § 25.202(f)(1).
[3] In practice, Iridium expects Iridium Certus terminals to perform better than this, i.e., to have greater attenuation in Ligado's band than Section 25.202(f) requires.