

September 6, 2019

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 4, 2019, a coalition of organizations representing entities that provide and rely upon critical Global Positioning Service ("GPS") and satellite communications ("SatCom") services (the "Coalition"), met with Aaron Goldberger, Wireless and International Advisor to Chairman Pai; Erin McGrath, Legal Advisor for Wireless, Public Safety, and International to Commissioner O'Rielly; Will Adams, Legal Advisor for Wireless to Commissioner Carr; Umair Javed, Legal Advisor for Wireless and International to Commissioner Rosenworcel; and Randy Clarke, Acting Legal Advisor for Wireline and Public Safety to Commissioner Starks. The Coalition discussed their unresolved concerns with Ligado Network Subsidiary LLC's ("Ligado's") request to operate a terrestrial mobile broadband service in the L-Band satellite spectrum neighborhood. In addition to the undersigned, representatives from Airlines for America, Aircraft Owners and Pilots Association, Aviation Spectrum Resources, Inc., Iridium Communications Inc., Lockheed Martin Corporation, and NENA – The 9-1-1 Association participated in the meetings.²

The Coalition countered numerous misstatements of Ligado and stressed the points in the attached presentation. The Coalition emphasized that Federal agencies and private stakeholders – including those represented by the Coalition – do not support Ligado's proposal to deploy terrestrial services in a critical satellite spectrum band and remain concerned about harmful

¹ 47 C.F.R. § 1.1206.

² A list of the individuals present in each meeting is attached.

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interference that would be caused by these services, in spite of Ligado's repeated assertions to the contrary. The Commission's rules allow Mobile Satellite Service ("MSS") operators to provide an *ancillary* terrestrial service ("ATC") while Ligado seeks to operate standalone terrestrial services. In addition, the ATC rules require an ATC operator to resolve any harmful interference to incumbent MSS providers from their terrestrial operations.³ Therefore, the burden remains on Ligado to demonstrate sufficient protection for other satellite services; they continue to fail this test.

The Coalition underscored the importance of GPS to the United States and highlighted the recent Department of Commerce-sponsored study that detailed the massive economic benefits of GPS. Members also stressed the critical SatCom services that would be put in jeopardy by the Ligado proposal. Taken together, the Coalition demonstrated the critical importance of American space leadership – and the centrality of L-band satellites to that goal. In short, the potential damage to this critical sector from Ligado's purported ATC proposal is far too significant and dramatically outweighs any benefits derived from Ligado's years-long arbitrage scheme, to convert this spectrum to terrestrial.

Ligado has not resolved industry concerns about interference. The L-band in which Ligado proposes to deploy a disruptive terrestrial service has been a satellite neighborhood for decades. The L-band is critical to the Coalition members and harmful interference from Ligado has the potential to upend the reliability of GPS, SatCom, and weather data collection. Despite Ligado's repeated efforts to sweep away interference concerns, there remain significant unresolved issues with Ligado's proposed operations. Detailed below are the particular concerns highlighted by each meeting participant:

Aircraft Owners and Pilots Association: The Aircraft Owners and Pilots Association ("AOPA") is very concerned about the current Ligado proposal and its impact on GPS. Over 90 percent of the 200,000 general aviation aircraft in the United States use GPS for situational awareness and as a primary means of navigation. Interference with the GPS signal poses a significant safety risk and unless Ligado can show it has addressed the substantive GPS interference concerns, the proposal should not move forward.

Airlines for America: Airlines for America ("A4A") is an airline trade association that advocates on behalf of its members to shape crucial policies and measures that promote safety, security and a healthy U.S. airline industry. A4A works collaboratively with airlines, labor, Congress, the U.S. Administration and other groups to improve aviation for the travelling and shipping public. Our members fly the vast majority of the passengers and cargo in the U.S. A4A is very concerned by Ligado's proposal to operate a modified ancillary terrestrial network. Our concerns are related to safety of flight systems such as the Terrain Awareness and Warning

³ 47 C.F.R. § 25.255.

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System, and the GPS which provides essential communication, navigation and surveillance (“CNS”) information to enable precise CNS for the entire planet. Moreover, unresolved interference issues with Inmarsat SatCom for air traffic control and other safety-of-life communications used by the commercial and general aviation industry are of grave concern to our members. While interference from Ligado’s network could be avoided through a process to retrofit airplanes with new CNS avionics, this is by no means an easy solution. The retrofit could take a decade or more to accomplish at a huge cost to airlines. In addition, the Ligado proposal poses potential interruptions to the introduction of unmanned aerial vehicles into the national airspace system and industry’s ability to access timely weather data and forecasts. A4A views the Ligado proposal as a detriment to the safety of flight.

Aviation Spectrum Resources, Inc.: Aviation Spectrum Resources, Inc. (“ASRI”) is the communications company of the U.S. commercial aviation industry and is owned by the airlines and other airspace users. As sponsor of the U.S. Aeronautical Frequency Committee, ASRI brings together expertise from across the aviation sector to promote the safe and effective operation of commercial aviation radio communications and navigation systems. Ligado’s proposal does not resolve the harmful interference to certified aviation GPS receivers and other commercial-grade GPS receivers used in aviation, the likely degradation of SatCom essential to aviation operations, the impact to Unmanned Air Systems (“UAS”), and the continuity of and access to satellite weather data. These failures have now persisted for several years with minimal progress on some fronts and seemingly none on others.

Iridium Communications Inc.: Iridium Communications Inc. (“Iridium”) is the only fully global MSS operator and operates in 8.725 megahertz of spectrum for uplink and downlink in the 1617.775-1626.5 MHz band. Iridium’s success as a U.S. company depends on its stable FCC spectrum allocation and support from federal government partners, as well as U.S. efforts to ensure international harmonization of spectrum. Iridium has emphasized its concerns about harmful out-of-band emissions from Ligado’s proposed operations in the adjacent 1627.5-1637.5 MHz band and has submitted detailed interference studies in the record.⁴ Iridium’s interference concerns are driven by Ligado’s potential introduction of millions of mobile consumer handsets into the band adjacent to Iridium’s system, and the fact that such widespread terrestrial use was not contemplated when the L-band was divided among existing satellite services. While Ligado has claimed that the harmful interference issues are no longer an issue, these issues remain.

⁴ Letter from Bryan N. Tramont & Patrick R. Halley, Counsel to Iridium Communications Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340, at 2 (filed Mar. 27, 2017); Letter from Bryan N. Tramont & Patrick R. Halley, Counsel to Iridium Communications Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340, at 6-7 (filed Dec. 14, 2016); Letter from Bryan N. Tramont, Counsel to Iridium Communications Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340 (filed Sept. 1, 2016).

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Lockheed Martin Corporation: Representatives from Lockheed Martin Corporation (“Lockheed Martin”) discussed the numerous critical operations that are already conducted in the L-band frequencies adjacent to those in which Ligado proposes to operate its terrestrial network. Lockheed Martin manufactures a wide variety of traditional fixed-wing and rotorcraft airframes, both for military and civil customers, all of which rely upon uninterrupted GPS navigation functionality for safe flight, as well as for flight testing. In addition, Lockheed Martin is at the forefront of the design of next generation unmanned aircraft systems, which are also expected, at certain altitudes of operation, to rely heavily upon GPS for safe, effective navigation. Finally, as a satellite designer and manufacturer, Lockheed Martin has built for the U.S. Air Force GPS satellites — including the recently-launched GPS III satellites — and the GOES weather information delivery satellite network for NOAA. The maintenance of these critical systems is indisputably in the public interest.

NENA – the 9-1-1 Association: NENA: The 9-1-1 Association (“NENA”) represents the nation’s over 100,000 public safety telecommunicators and dispatchers, as well as Public Safety Answering Point management and 9-1-1 decision makers at all levels of government — not to mention numerous industry partners and 9-1-1 consultants. NENA improves 9-1-1 through research, standards development, training, education, outreach, and advocacy; our vision is a public made safer and more secure through universally-available, state-of-the-art 9-1-1 systems and trained 9-1-1 professionals. NENA reiterated the importance of GPS availability and signal integrity to public safety operations, especially the timely and accurate location of 9-1-1 callers. Of the over 300 million 9-1-1 calls made every year, 80% of them come from mobile phones; of these over 240 million calls, over 50% are located using GPS. GPS is an indispensable asset to 9-1-1, and any detriment to its function would hinder 9-1-1’s ability to save lives.

The Commission Must Protect Satellite Services and Scarce L-Band Satellite Spectrum. The U.S. Government built the foundation for the success of satellite operations in the L-band decades ago by providing stable spectrum allocations, protecting allocated spectrum from harmful interference, and defending L-band satellite interests around the globe. Through these efforts, the L-band today includes three key satellite services: the GPS, the NOAA Geostationary Operational Environmental Satellites (“GOES”), and satellite communications services provided by companies like Iridium. Each of these services has operated in its current frequency bands for years and considerable amounts of capital have been invested into each service. This investment has resulted in corresponding benefits to consumers, the United States, and the global economy,⁵ and such economic benefits would not have occurred had satellite

⁵ See, e.g., NTIA, RTI International, *Economic Benefits of the Global Positioning System (GPS)* (Jun. 2019) (“RTI GPS Report”), https://www.rti.org/sites/default/files/gps_finalreport.pdf (Attached to this *ex parte* submission).

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operators been unable to rely on stable spectrum allocations and operational rules that limit the potential for harmful interference to their operations.

Despite the recognized benefits of L-band satellite services, for years Ligado's proposals have threatened to upend the delicate balance among these L-band services. Sharing between satellite and terrestrial services, both on an adjacent band and co-frequency basis, is complex at the best of times, and even more so when the terrestrial operations are added after the satellite services are established. The current L-band neighborhood balances the interests of a variety of incumbent stakeholders, but Ligado's proposed terrestrial network will destabilize this balance, cause harmful interference to existing satellite services, and create uncertainty for the future viability of satellite operations. Rather than risk compromising the future of all of these satellite services, the Commission should reject Ligado's proposals and preserve scarce satellite spectrum in the L-band for satellite use.

Government Voices Consistently Express Concern About Ligado. Ligado's claim that government agencies have signaled support for its proposals is belied by facts. The PNT Advisory Board ("PNTAB") – led by the nation's foremost GPS experts – has actively reviewed the effects Ligado's proposed operations on GPS. In a 2018 letter to the PNT Executive Committee ("PNT EXCOM"), the PNTAB "strongly recommend[ed]" the PNT EXCOM's "opposition to the Ligado proposal."⁶ On June 6, 2019, Mr. Parkinson, the 1st Vice-Chair of the PNTAB, reiterated that "[t]he PNTAB has strongly recommended disapproval of [the Ligado] proposal. Nothing has changed – our recommendation still stands."⁷

The PNTAB is not alone in its concerns about Ligado's proposal. In the Adjacent Band Compatibility Assessment, the Department of Transportation and Federal Aviation Administration reviewed the adjacent band compatibility of Ligado's proposed operations with certified GPS receivers.⁸ The *DOT ABC Study* found that Ligado's service would cause harmful interference for all classes of GPS and that high-precision GPS are more vulnerable than certified

⁶ Letter from Bradford W. Parkinson, 1st Vice-Chair, on behalf of the PNT Advisory Board, to Patrick M. Shanahan, Deputy Secretary of Defense and Jeffrey A. Rosen, Deputy Secretary of Transportation, Co-Chairs, National Executive Committee for Space-based Positioning, Navigation and Timing, at 3 (Aug. 10, 2018), <https://www.gps.gov/governance/advisory/recommendations/2018-08-letter-to-excom.pdf> (Attached to this *ex parte* submission).

⁷ Brad Parkinson Stanford, Summary for New Members and Update: A Grave threat to GPS, Presentation by Brad Parkinson at 23rd PNTAB Meeting, at 6 (June 6, 2019), <https://www.gps.gov/governance/advisory/meetings/2019-06/parkinson.pdf>.

⁸ See U.S. Department of Transportation, "Global Positioning System (GPS) Adjacent Band Compatibility Assessment," Final Report, (Apr. 2018), <https://www.transportation.gov/sites/-dot.gov/files/docs/subdoc/186/dotgps-adjacent-band-final-reportapril2018.pdf> ("*DOT ABC Study*").

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aviation receivers. The *DOT ABC Study* also found that “the transmitter power that can be tolerated by certified aviation may cause interference with, or degradation to, most other categories of GPS/GNSS receivers including those used for General Aviation and drones.”⁹ In short, Ligado’s operations would leave a GPS receiver “unpredictable in its ability to meet the accuracy, availability, and integrity requirements of its intended application.”¹⁰

GPS provides critical services to the United States and has a significant impact on the U.S. economy. The National Institute of Standards and Technology of the Department of Commerce commissioned RTI to conduct an extensive assessment of the positive impact that GPS has had on the U.S. economy. The study was completed in June 2019 and estimates the significant costs associated with even a temporary loss of GPS service. Given the scope of the RTI Study and the important economic impact of GPS service, the Coalition believes that it should be considered in connection with the Commission’s consideration of the above captioned proceedings.

The RTI Study is a comprehensive look at the economic benefits of the GPS system, and relies on the combined insight of nearly 200 experts to reach its conclusions. Since GPS became available for civilian use starting in the 1980s, the RTI Study estimates that GPS has generated \$1.4 trillion in U.S. economic benefits, with roughly 90% of those benefits accruing only in the past 10 years.¹¹ According to the RTI Study, many industries have benefitted immensely from use of GPS, including telecommunications, telematics, location-based services, surveying, and precision agriculture.

In addition to assessing the positive economic impact of GPS, the RTI Study also estimates the significant impact a GPS outage could have on the U.S. economy. Such an outage could cost the U.S. economy as much as \$1 billion per day, with a 30-day outage having a \$45 billion economic impact if it occurred during the critical planting season for farmers. Given such dire cost estimates from a GPS outage, it is critical that the Commission carefully consider any actions regarding Ligado that could compromise GPS operations.

Ligado is Not 5G. Ligado and its predecessors have a long history of claiming to be providing whatever wireless standard is in vogue, and lately Ligado claims to be 5G — the reality is that Ligado is not 5G. The Commission has never included Ligado’s spectrum in its 5G FAST Plan.¹² Ligado’s spectrum is not harmonized internationally for terrestrial use, nor has it

⁹ *DOT ABC Study* at VIII.

¹⁰ *Id.* at IV.

¹¹ *See RTI GPS Report.*

¹² *See* FCC, The FCC’s 5G FAST Plan (Sept. 28, 2018), <https://docs.fcc.gov/public/attachments/DOC-354326A1.pdf>.

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ever been included as part of 3GPP or any other recognized standard for 5G. Even if the FCC granted Ligado's applications, the handful of non-contiguous frequency bands that Ligado could bring to market are fragmented and impaired. And contrary to Ligado's claims, there is nothing "new" about Ligado's technology or proposed service that would justify a grant under Section 7 authority.¹³ As the Commission looks towards the 5G future, there is no reason to look to Ligado.

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: Aaron Goldberger
Erin McGrath
Will Adams
Umair Javed
Randy Clarke

¹³ See Opposition of Coalition of Aviation, SATCOM, and Weather Information Users, IB Docket Nos. 11-109 and 12-340, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, SAT-AMD-20180531-00044, SAT-AMD-20180531-00045, and SESAMD-20180531-00856 (filed Jul. 25, 2019).

Attachment

Meeting with Aaron Goldberger

- Dan Henry, NENA – The 9-1-1 Association
- Paul McGraw, Airlines for America
- Robert McDowell, Cooley LLP
- Maureen C. McLaughlin, Iridium Communications, Inc.
- Lynne Montgomery, Wilkinson Barker Knauer LLP
- Andrew Roy, Aviation Spectrum Resources, Inc. (ASRI)
- Melissa Rudinger, Aircraft Owners and Pilots Association
- Ryan Terry, Lockheed Martin Corporation
- Bryan Tramont, Wilkinson Barker Knauer LLP

Meeting with Umair Javed

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- Melissa Rudinger, Aircraft Owners and Pilots Association
- Ryan Terry, Lockheed Martin Corporation
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Meeting with Erin McGrath

- Dan Henry, NENA – The 9-1-1 Association
- Paul McGraw, Airlines for America
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- Ryan Terry, Lockheed Martin Corporation
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Meeting with Will Adams

- Paul McGraw, Airlines for America
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- Maureen C. McLaughlin, Iridium Communications, Inc.
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- Andrew Roy, Aviation Spectrum Resources, Inc. (ASRI)
- Melissa Rudinger, Aircraft Owners and Pilots Association
- Bryan Tramont, Wilkinson Barker Knauer LLP
- Jennifer Warren, Lockheed Martin Corporation

- Dan Henry, NENA – The 9-1-1 Association (Although Mr. Henry was not present at this meeting, he followed up with Mr. Adams to underscore NENA’s points and support for the Coalition)

Meeting with Randy Clarke

- Paul McGraw, Airlines for America
- Robert McDowell, Cooley LLP
- Maureen C. McLaughlin, Iridium Communications, Inc.
- Lynne Montgomery, Wilkinson Barker Knauer LLP
- Melissa Rudinger, Aircraft Owners and Pilots Association
- Bryan Tramont, Wilkinson Barker Knauer LLP
- Jennifer Warren, Lockheed Martin Corporation
- Dan Henry, NENA – The 9-1-1 Association (Although Mr. Henry was not present at this meeting, he followed up with Mr. Clarke to underscore NENA’s points and support for the Coalition)