

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of	)	
	)	IB Docket No. 11-109
Comment Sought on Ligado’s	)	
Modification Applications	)	SAT-AMD-20180531-00044
	)	SAT-AMD-20180531-00045
To: The Commission	)	

**FURTHER REPLY COMMENTS OF LIGADO NETWORKS LLC**

As numerous commenters noted in their replies, the low-frequency mid-band spectrum Ligado Networks LLC (“Ligado”) would bring to market if its amended license modification applications (“Modification Applications”) were approved will hasten America’s transition to 5G LTE.<sup>1</sup> In these Further Reply Comments, Ligado will address two issues raised by Aviation Spectrum Resources, Inc. (“ASRI”) in its July 24 filing. *First*, the comments address the concerns ASRI raises about SATCOM issues. As we make clear below, Ligado’s obligation to comply with Commission regulations ensures that Ligado will not cause harmful interference to

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<sup>1</sup> See, e.g., Reply Comments of the Free State Foundation, IB Docket No. 11-109; IBFS File Nos. SAT-AMD-20180531-00044, SAT-AMD-20180531-00045, at App’x A (July 19, 2018); Letter from Jonathan Adelstein, President and CEO, Wireless Infrastructure Association, to Marlene H. Dortch, Secretary, Federal Communications Commission, IB Docket No. 11-109; IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, SAT-AMD-20181531-00044, SAT-AMD-20180531-00045, at 2 (July 18, 2018); Support of Competitive Carriers Association to License Modification as Amended, IB Docket Nos. 11-109, 12-340; IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-0091, SES-AMD-20181531-00856, at 4 (July 19, 2018).

Inmarsat's aeronautical devices, and any further issues regarding Inmarsat must be addressed on a global scale.

*Second*, these comments reaffirm Ligado's commitments to defer to the FAA's expertise with regard to protecting aviation safety and certified aviation GPS devices, including with regard to network deployment. Ligado will abide by the recommendations of the Department of Transportation ("DOT") in their April 2018 Global Positioning System (GPS) Adjacent Band Compatibility Assessment ("DOT Report")<sup>2</sup>. The comments also explain that, contrary to the suggestion by ASRI, the Federal Aviation Administration ("FAA") did, in fact, take into account operational considerations regarding Ligado's proposed operations, and ASRI is simply recycling arguments already presented and considered by the FAA.

**I. Concerns Regarding SATCOM Issues Are in Part Baseless and in Part Non-Germane.**

ASRI raises a muddled concern regarding "the impact of Ligado's proposed operations on SATCOM."<sup>3</sup> In doing so, it references comments made by both Iridium<sup>4</sup> and Boeing, which

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<sup>2</sup> U.S. Department of Transportation, *Global Positioning System (GPS) Adjacent Band Compatibility Assessment Final Report*, at 158 (April 2018), <https://www.transportation.gov/sites/dot.gov/files/docs/subdoc/186/dot-gps-adjacent-band-final-reportapril2018.pdf> ("DOT Report").

<sup>3</sup> Reply Comments of Aviation Spectrum Resources, Inc., IB Docket Nos. 11-109, 12-340; IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, SES-AMD-20180531-00856, at 16-18 (July 24, 2018) ("ASRI Reply Comments").

<sup>4</sup> See Letter from Bryan N. Tramont and Patrick R. Halley, counsel to Iridium Communications Inc., to Marlene H. Dotch, Secretary, Federal Communications Commission, IB Docket Nos. 12-340, 11-109; IBFS File Nos. SAT-AMD-20180531-00045, SAT-AMD20180531-00044, SES-AMD-20180531-00856, SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091 (July 9, 2018).

present two entirely different issues.<sup>5</sup> With respect to the alleged concern about Iridium devices, Ligado explained in detail that Iridium's complaints are baseless and should be rejected, since the analysis overseen by the Chief Information Officer of the Department of Defense concluded that Ligado's operations will not cause harmful interference.<sup>6</sup> ASRI's July 24, 2018 submission offers no rebuttal to this (and does not even acknowledge these facts). While ASRI's interest in the issue of how Ligado's operations will interact with Inmarsat's aeronautical receivers is at least understandable, this issue is not germane. Ligado previously addressed this issue briefly;<sup>7</sup> however, given the comments of both ASRI and Boeing, we here explain why Ligado's operations do not pose a concern to Inmarsat's aeronautical receivers that must be resolved by the Commission. Instead, this issue should be addressed through commercial channels.

**A. Ligado's Proposed Operations Comply with the Commission's Rules Regarding Transmissions Near Airports, Which Guard Against Harmful Interference.**

The most straightforward response to concerns regarding interference to Inmarsat's aeronautical receivers is that the Commission's rules already regulate ATC base station transmissions near airports, and thereby serve to protect against harmful interference to Inmarsat's operations. Section 25.253(d)(5) of the Commission's rules specify a  $-56.8 \text{ dBW/m}^2$

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<sup>5</sup> Comments of The Boeing Company, IB Docket Nos. 11-109, 12-340; IBFS File Nos. SAT-AMD-20180531-00044, SAT-AMD-20180531-00045 (July 9, 2018).

<sup>6</sup> Reply Comments of Ligado Networks LLC, IB Docket No. 11-109, IBFS File Nos. SAT-AMD-20180531-00044, SAT-AMD-20180531-00045, at 20-21 (July 19, 2018) ("Ligado Reply Comments").

<sup>7</sup> See e.g., Letter from Gerard J. Waldron and Michael Beder, counsel to Ligado Networks LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, RM-11681; IB Docket No. 11-109; IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, at 6 (Aug. 22, 2016).

on total power flux density at the edges of airport runways and aircraft stand areas from ATC base-station transmissions in the 1525-1559 MHz band, a rule adopted explicitly to protect against this type of interference.<sup>8</sup> While the Commission granted Ligado's predecessor a waiver of this rule, permitting a limit of -26.8 dBW/m<sup>2</sup> receivable by an aeronautical receiver on a runway or aircraft stand area from operation of a Ligado base station within a radius of 1300 meters, this proposed limit applies only *after* Inmarsat aeronautical terminals have been modified or replaced to increase their overload threshold to this higher limit.<sup>9</sup> The order granting the waiver specified that *prior to completion* of such terminal modifications, SkyTerra (now Ligado) would operate instead subject to a proposed interim limit of -56.8 dBW/m<sup>2</sup> on receivable power flux density from base stations within 1300 meters of runways or stand areas. It is Ligado's understanding that not all Inmarsat aeronautical terminals have been updated. Consequently, Ligado would need to comply with the stricter (*i.e.*, -56.8 dBW/m<sup>2</sup>) limit until terminals have been upgraded. Ligado's compliance with this rule—which has been made much easier by the lower EIRP limit in the 1526-1536 MHz band Ligado committed to in its amended Modification Applications<sup>10</sup>—ensures that there is no interference issue here.

**B. The Global Race to 5G May Impact Inmarsat's Operations, but Ligado's Proposed Operations Are on a Parallel Track.**

This is a dynamic time for communications services around the world. As an international communications provider, Inmarsat operates against the backdrop of a rapidly

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<sup>8</sup> 47 C.F.R. § 25.253(d)(5).

<sup>9</sup> *SkyTerra Subsidiary LLC*, Order and Authorization, 24 FCC Rcd. 3043, at ¶ 35 (2010).

<sup>10</sup> *See Amendment to License Modification Applications*, IB Docket No. 11-109 *et al.* (filed May 31, 2018).

evolving wireless ecosystem due to the planned deployment of 5G LTE across the globe.

Ligado's spectrum proposal is just one potential 5G network in a world of others. Therefore, any potential interference that the race to 5G may pose to Inmarsat's operations is simply correlated with Ligado's own proposed operations, rather than caused by it. A global problem requires a global solution, which the Commission could not develop within the bounds of this proceeding.

As way of background, in 2015, the International Telecommunication Union ("ITU") allocated a portion of the L-band adjacent to Inmarsat's operations for mobile communications. The EU successfully harmonized the 1452-1492 MHz band in 2015,<sup>11</sup> and in 2017, issued a mandate to the European Conference of Postal and Telecommunications Administrations to develop harmonized technical conditions for the 1427-1452 MHz and 1492-1518 MHz bands as well.<sup>12</sup> It is Ligado's understanding that Inmarsat recognizes the multi-national nature of this issue and will work with the stakeholders—its customers—to support the launch of 5G networks in the L-band.

Despite the challenging issues that spectrum sharing and reallocation frequently raise, the launch of 5G is moving ahead overseas. This requires balancing many interests, of both nations and industries. Inmarsat needs to be an active participant in determining how to balance 5G deployment with its critical incumbent operations. The Commission and other U.S. spectrum regulators may want to consider taking a page from the book of international regulators, which are rapidly moving 5G technology forward. Any complications in utilizing the L-band for 5G

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<sup>11</sup> *L Band (1427-1518 MHz)*, Agence Nationale des Frequences, <https://planstrategique.anfr.fr/?p=1989> (last visited July 23, 2018).

<sup>12</sup> EUROPEAN CONFERENCE OF POSTAL AND TELECOMMUNICATIONS ADMINISTRATIONS (CEPT), CEPT REPORT 65, 17 (March 2, 2018).

LTE are global, and thus require a global solution. It would not be appropriate to address them within this specific proceeding regarding Ligado's spectrum proposal.

**C. The Commission Should Not Legislate a Commercial Issue Best Left to the Marketplace.**

Depending on how Inmarsat, relevant stakeholders, and international spectrum regulators decide to address any potential interference issues caused by the deployment of 5G around the world, it is Ligado's understanding that updates may be necessary to Inmarsat's aeronautical terminals. The question of how to allocate this cost lies well outside the scope of this proceeding. As a threshold matter, it is far from clear that the Commission has the authority to legislate who should pay for equipment updates by a third-party licensee not before the Commission in the instant proceeding. The Commission should not attempt to exercise a power it does not clearly possess. Additionally, even if the Commission did have such authority, this is a commercial issue best left to the marketplace. The Commission has deep regulatory and technical expertise, but this issue draws on neither. Rather, it relates solely to the expertise of and relationship between Inmarsat and its customers. These parties are already in privity with each other, so this commercial issue is for them to decide.

Deferring to the parties to determine cost allocation aligns with the Commission's repeatedly articulated belief and position of allowing cost allocation issues "to be addressed through marketplace negotiations."<sup>13</sup> "[P]rivate parties are best suited to assess, quantify, and

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<sup>13</sup> *Authorizing Permissive Use of the "Next Generation" Broadcast Television Standard*, R&O and FNPRM, 32 FCC Rcd. 9930, 9970 (2017) ("ATSC 3.0 Order") ("[W]e decline to adopt any new rules regarding retransmission consent in this proceeding and will allow these issues at the outset to be addressed through marketplace negotiations.").

reach agreement on the appropriate sharing of risk.”<sup>14</sup> Voluntary agreements between the parties therefore are “more likely to succeed” without the imposition of guidelines imposed by the Commission.<sup>15</sup> As recently as last November, the Commission declined to allocate costs between broadcasters and MVPDs regarding broadcasters’ transitions to the Next Generation TV standard, also known as ATSC 3.0. Like Inmarsat and its customers, broadcasters and MVPDs were in privity with each other and had ongoing negotiations regarding business costs. In this instance, the Commission did not intervene.<sup>16</sup> Similarly, the Commission did not act to set band clearing payments at a reasonable level when reallocating the 698-746 MHz band.<sup>17</sup> Here too, market forces will be most effective in keeping the total cost of equipment upgrades in check and balancing the potential advantages and disadvantages of upgrade options, accounting both for incentives and risk-tolerance.

## **II. Ligado Reaffirms Its Commitment to Deploy its Network in a Manner Consistent with the FAA’s Recommendations.**

Ligado takes this opportunity to reaffirm its commitment, on which it has never wavered, to conform its operations to the recommendations of the FAA. More than two and a half years

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<sup>14</sup> *Serv. Rules for the 746-764 & 776-794 MHz Bands*, Third R&O, 16 FCC Rcd. 2703, 2723–24 (2001).

<sup>15</sup> *Id.* at 2724.

<sup>16</sup> ATSC 3.0 Order, 32 FCC Rcd. at 9970 (“[W]e decline to adopt any new rules regarding retransmission consent in this proceeding and will allow these issues at the outset to be addressed through marketplace negotiations.”).

<sup>17</sup> *See Reallocation & Serv. Rules for 698-746 MHz Spectrum Band, Television Channels 52-59*, Mem. Op. & Order, 17 FCC Rcd. 11613, 11632 (2002) (market forces should be used to keep band clearing payments at a reasonable level “both because the interests of broadcasters and bidders in these negotiations are not congruent and because bidders that participate in band-clearing arrangements will have to outbid other wireless entities which may be willing to hold licenses for encumbered spectrum.”).

ago, Ligado stated its intent to defer to the FAA on matters relating to the protection of certified aviation GPS devices, and the Amendment reflects the FAA analysis as incorporated in the DOT Report. Accordingly, Ligado is committed to observing the network deployment requirements set forth in the DOT Report, which were developed with regard to and intended to protect helicopter operations<sup>18</sup>:

a hexagonal cellular system . . . consist[ing] of a central tower plus 19 concentric hexagonal rings of towers, all at a particular inter-site distance (ISD) for a total of 1,141 towers with a grid maximum radius of 8.2 km.<sup>19</sup>

With respect to the “particular inter-site distance,” Ligado assumes, based on its analysis of the DOT Report, that the ISD is 433 meters. Ligado will adhere, as it has previously indicated it would, to both the network density and ISD incorporated into the parameters recommended by the DOT.

In its reply comments, ASRI suggests that the FAA has not fully studied the operational implications of the 250-foot standoff cylinder.<sup>20</sup> That claim is not fair to the FAA’s process,

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<sup>18</sup> See DOT Report at 120 (“The derivation of the assessment zone concept was based on engineering and operational assumptions where helicopter operations are the limiting factor.”).

<sup>19</sup> *Id.* at 129; 142.

<sup>20</sup> ASRI Comments at 4. ASRI’s Comments also ignore the conclusion by Declarant James Williams that the model-based approach used by the FAA is more conservative in favor of aviation interests than an operational approach. As Mr. Williams notes, the propagation model the FAA used to test Ligado’s operations “consider[ed] all possible aspects of RF signal propagation, including probability of occurrence of the worst-case interfering signals in extreme environments. In many situations, the FAA addressed the vagaries of RF interference by assuming the worst possible situation, such as assuming the ground around a transmitter is perfectly reflective. The model stacks each of these improbable events on top of one another to assess the theoretical worst call impact of Ligado’s transmissions in these rare situations that would be impossible to create in the real world.” Ligado Reply Comments at Exhibit A, ¶ 8.



because the FAA did, in fact, dedicate significant attention to operational considerations. First, in considering the size of the cylinder, the FAA consulted with the operators and adjusted its views on the cylinder based on feedback received from the operators; the FAA thus utilized a 250-foot radius cylinder after operator input. Then, after the FAA and Ligado spent months developing a model, the FAA sent the Ligado proposal, including the 250-foot cylinder, to RTCA for comments in October of 2016. RTCA enlisted two of its committees: Special Committee 159 on GPS and the Tactical Operations Committee to review the proposal. Special Committee 159 assessed the interference issues, and the Tactical Operations Committee assessed the operational issues.<sup>21</sup> Both the Tactical Operations Committee and Special Committee 159 responded to the FAA in December 2016—the Tactical Operations Committee with 68 specific comments, and Special Committee 159 with 34 specific comments. The FAA reviewed the comments of both committees, and had an opportunity to incorporate these comments as it proceeded with its analysis. As noted above, the FAA continued to use a 250-foot cylinder as it completed the assessment reflected in the DOT Study.

Moreover, this was the *second* time the FAA had formally consulted the industry on both technical and operational elements. The first time was in 2014, when the FAA had likewise engaged both Special Committee 159 and the Tactical Operations Committee. In 2014 as in 2016, the FAA received substantive feedback that informed its analysis. Notably, in 2014, the FAA had actually proposed a 500-foot radius standoff cylinder—twice the distance that Ligado

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<sup>21</sup> The Tactical Operations Committee “provide[d] an open venue for the FAA and those who operate in the National Airspace System (NAS) to work in partnership to identify and resolve operational issues affecting the efficiency of the NAS and recommend resolutions to those issues and challenges.” RTCA, *Tactical Operations Committee (TOC)*, <https://www.rtca.org/content/tactical-operations-committee> (last visited July 26, 2018).

proposed for the most recent analyses. It is worth underscoring that both ASRI and Garmin participated in both the 2014 and 2016 processes.

The FAA thus did take into account the operational implications of the 250-foot standoff cylinder, and after consultation with the aviation industry—including input from ASRI and Garmin—the FAA continued to use a 250-foot standoff cylinder in its analysis. ASRI should not be permitted to re-litigate before the FCC issues that were previously examined by the FAA, as the expert agency and informed by its advisory panel, the RTCA.

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The record in this proceeding is extensive. Ligado respectfully submits that the Commission is now in a position to move forward on the Modification Applications as amended.

Respectfully submitted,

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