



September 17, 2020

VIA ECFS and IBFS

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

Re: Written Ex Parte Presentation: 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 SES-AMD-20180531-00856

Dear Ms. Dortch:

In its efforts to defend the Commission’s Order granting it authorization to deploy a nationwide terrestrial wireless network in spectrum designated for the Mobile Satellite Service (“MSS”),^{1/} Ligado Networks LLC (“Ligado”) continues to make inaccurate and unfounded statements regarding the positions of Global Positioning System (“GPS”) receiver manufacturers on its modification applications.^{2/} Ligado also claims that recent filings by federal agencies – agencies which are the experts on GPS – “deliberately misstate the effects of Ligado’s operations on GPS.”^{3/} As the GPS Innovation Alliance (“GPSIA”) demonstrates below, Ligado’s defense of the *Ligado Order* is not supported by the record.

Ligado’s Agreements with Certain GPS Receiver Manufacturers Are Not What Ligado Claims

Contrary to Ligado’s assertions, it is Ligado – not the GPS receiver manufacturers – that is attempting to “rewrite . . . history.”^{4/} Ligado claims that it “has entered into agreements with major GPS manufacturers to address their interference concerns, and these agreements demonstrate that these manufacturers’ GPS devices can co-exist with Ligado’s proposed

^{1/} See *LightSquared Technical Working Group Report, et al.*, Order and Authorization, 35 FCC Rcd 3772 (2020) (“*Ligado Order*”).

^{2/} Letter from Gerard J. Waldron, Covington & Burling LLP, Counsel to Ligado Networks LLC, to Ms. Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340, *et al.*, at 2 (filed Aug. 18, 2020) (“*Ligado Aug. 18, 2020 Ex Parte Letter*”).

^{3/} *Id.* at 1.

^{4/} *Id.* at 2 (claiming that Garmin, Deere, and Trimble, “perhaps subject to pressure from the Department of Defense, . . . are suggesting that the Order misconstrues and overstates the significance of these agreements”).

terrestrial operations, as specified by the agreements.”^{5/} As each of GPSIA’s original members – Trimble Inc. (“Trimble”), Garmin International, Inc. (“Garmin”), and Deere & Company (“Deere”) – has separately explained, the settlement agreements into which they entered with Ligado do not evidence their support of grant of the Ligado applications.

Trimble, for example, stated that while its settlement agreement with Ligado contemplated support for certain aspects of Ligado’s applications, including the study of interference issues by the Department of Transportation (“DOT”), **Trimble expressly and categorically did not agree, nor has it ever agreed, to the most problematic downlink (or base station) operations in the 1526-1536 MHz band.**^{6/} Garmin similarly has made clear that it “never entered into a co-existence agreement with Ligado.”^{7/} The technical settlement agreement into which it entered in 2015 resolved ongoing litigation brought against it by Ligado and, consistent with that agreement’s terms, Garmin “does not support or endorse” Ligado’s applications.^{8/} Pursuant to its 2015 settlement agreement, Deere agreed not to object to the deployment of Ligado’s network as long as Ligado complies with the technical parameters set forth in the agreement. However, Deere has emphasized that this arrangement resolving legal claims is not a “co-existence agreement” and in no way should be construed as an affirmative endorsement or support for the Ligado plan.”^{9/}

^{5/} *Id.* at 2.

^{6/} See Petition for Reconsideration of Trimble Inc., IB Docket Nos. 11-109 and 12-340, at 13 (filed May 22, 2020) (“Trimble Petition”) (citing Settlement Agreement *attached to* Letter from Gerard J. Waldron, Covington, Counsel to New LightSquared LLC, to Ms. Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340 (filed Feb. 3, 2016) and adding that Trimble did not agree with Ligado’s proposal to use interference standards other than the 1 dB standard, a linchpin of the FCC’s decision). Ligado’s reference to Trimble’s May 20, 2016 *ex parte* letter as evidence that Trimble expressed support for Commission grant of Ligado’s application is taken out of context and misleading. See Ligado Aug. 18, 2020 *Ex Parte* Letter at 2. Trimble’s May 20, 2020 *ex parte* letter specifically noted that Mr. Kirkland reiterated Trimble’s support “as stated in the letter submitted by Ligado and Trimble on February 3, 2016.” Letter from Russell H. Fox, Mintz, Counsel for Trimble Navigation Limited, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 12-340 and 11-109, *et al.*, at 1 (filed May 20, 2016). In other words, Trimble expressed support for grant of Ligado’s applications only insofar as the grant is consistent with its settlement agreement with Ligado.

^{7/} Letter from Scott Burgett, Director, GNSS and Software Technology, Garmin International, Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340, at 2 (filed May 15, 2020).

^{8/} *Id.* at 2. Garmin has reiterated on a number of occasions that, under the agreement, it retains its right to express concerns about the detrimental effect Ligado’s operations may have on its certified aviation devices and maintains its ability to advocate for use of the 1 dB standard. See, e.g., *id.* at 2-3; Letter from M. Anne Swanson, Wilkinson Barker Knauer, LLP, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340 (filed Apr. 20, 2020). To the extent that this letter refers to any other issues or matters, GPSIA is not authorized, and is not purporting, to speak for Garmin.

^{9/} Comments of Deere & Company, IB Docket Nos. 11-109 and 12-340, at 1-2 (filed June 1, 2020) (“Deere Reconsideration Comments”). In Deere’s Comments in support of the Petitions for Reconsideration of the Commission’s *Ligado Order* with respect to the Commission’s rejection of the 1 dB standard, Deere stated that the *Ligado Order* “inaccurately characterized Deere as affirmatively endorsing and supporting the Ligado plan; Deere does not endorse or support Ligado’s plan. *Id.* To avoid the very mischaracterization that is at issue, the Deere Settlement agreement explicitly states that

In addition to ignoring these statements, Ligado neglects to mention the broader context in which the settlement agreements were reached. Specifically, it omits the fact that each GPS receiver manufacturer entered into its respective settlement agreement with Ligado in order to resolve the ongoing litigation brought against it by Ligado. They were simply not agreements to “address their interference concerns” or demonstrate “co-exist[ence].”^{10/}

Other than Trimble, Garmin, and Deere, the record indicates that only three other manufacturers of GPS receivers have entered into agreements of some sort with Ligado – NovAtel Inc., Topcon Positioning Systems, Inc., and Hexagon Positioning Intelligence (“Hexagon”).^{11/} Because Ligado had already sued three GPS receiver manufacturers making groundless legal claims, these agreements must be viewed in light of the perceived risks of costly litigation that might follow extensive participation in administrative proceedings. Nor do these agreements provide evidence on the critical point Ligado cites them for – as evidence that Ligado’s proposed operations will not cause harmful interference to GPS devices. One receiver manufacturer that entered into an agreement with Ligado explicitly stated this. Hexagon estimated that Ligado’s proposed operations could affect 500,000 of its existing receivers.^{12/} Hexagon further noted that it had made its current receivers more resistant to Ligado’s high-powered terrestrial transmissions’ interference but stated that there would be significant costs to such upgrades of future receivers as well as performance tradeoffs.^{13/} While the Commission

nothing in the agreement “shall constitute an endorsement by Deere of any technical, operational, policy, regulatory or other matter regarding LightSquared’s network and business plan, and . . . LightSquared shall not make any statement or representation to such effect.” Deere Settlement Agreement, at para 14 submitted in New LightSquared, Ex Parte Presentation, IB Docket No. 12- 340; IB Docket No. 11-109; IBFS File Nos. SAT-MOD-20101118-00239; SAT-MOD- 20120928-00160; SAT-MOD-20120928-00161; SES-MOD-20121001-00872; SES-RWL- 20110908-01047; SES-MOD-20141030-00835 (filed Dec. 8, 2015). For the further avoidance of doubt, Deere has argued that the FCC erroneously abandoned the established 1 dB Standard. To the extent that this letter refers to any other issues or matters, GPSIA is not authorized, and is not purporting, to speak for Deere.

^{10/} Ligado Aug. 18, 2020 *Ex Parte* Letter at 2. Deere has advised the Commission that it has never entered into a “co-existence agreement” with Ligado nor its predecessor LightSquared and “[i]n fact, as a technical matter, some Deere receivers will experience interference.” Deere Reconsideration Comments at 2.

^{11/} See *Ligado Order* ¶ 12 (noting that Leica Geosystems also indicated support for Ligado’s proposal, but not reporting that Leica specifically entered into an agreement with Ligado).

^{12/} See Theresa Hitches, *Exclusive GPS Fight Erupts as Trimble Accuses Ligado of “Inaccurate” Claims in FCC Ruling*, BREAKING DEFENSE (May 8, 2020), <https://breakingdefense.com/2020/05/exclusive-gps-fight-erupts-as-trimble-accuses-ligado-of-inaccurate-claims-in-fcc-ruling/> (quoting Hexagon, NovAtel’s Swedish parent firm, as stating “the coming spectrum change may significantly affect more than a half million units of older generation NovAtel receivers that were not designed to handle this new spectrum challenge”).

^{13/} See Letter from Michael Ritter, President, Hexagon Position Intelligence, to Ms. Marlene H. Dortch, Secretary, FCC, RM-11681, *et al.* (filed May 7, 2018) (“This technology helps to maintain high-quality multi-frequency, multi-constellation positioning performance in challenging RF environments, although these mitigation steps do come at a penalty of size, weight, power and cost.”).

took note of this agreement, the *Ligado Order* made no effort to analyze the costs and performance tradeoffs.

Ligado's agreements with receiver manufacturers do not constitute evidence of co-existence or establish that interference will not harm GPS operations. In fact, the contents of the agreements with GPS receiver manufacturers other than those of Deere, Garmin, and Trimble have not been made public, nor has the Commission inquired about their content. Thus, there is no way to know the terms and conditions to which those manufacturers agreed. If, for example, Ligado had agreed to compensate the manufacturers for the costs of upgrading or replacing affected receivers, the willingness of those manufacturers to enter into agreements would not be evidence that Ligado's operations will not interfere with many of the nearly 900 million receivers currently in use.

The fact that a wide array of GPS providers and manufacturers continues to oppose the *Ligado Order*, stating it fails to properly protect vital GPS services, further underscores that Ligado has not ameliorated the GPS industry's concerns, whether by agreement or otherwise. For example, both Lockheed Martin Corporation ("Lockheed Martin") and Collins Aerospace ("Collins"), among others, recently discussed their "mutual concerns" related to the *Ligado Order*, including at the reduced power limits.^{14/} Not only did Lockheed Martin identify the widespread economic benefits that result from access to GPS satellite resources, but it also addressed the Commission's misapplication of how to protect GPS receivers. It emphasized that the use of a 1 dB degradation in the Carrier-to-Noise Power Density Ratio ("C/N₀") as the interference protection criterion for GPS operations, which the *Ligado Order* rejected, has long been recognized and accepted.

Similarly, members of the aviation and aerospace community have continued to urge the Commission to grant their Petitions for Reconsideration and the NTIA Request for Stay.^{15/} They have explained, among other things, that requiring pilots to check a private database of Ligado base station locations before flight is inappropriate and other mitigation options, including notifying Ligado of interference experienced by aircraft, are infeasible and insufficient to ensure aviation safety.^{16/} They have also expressed their full support, based on the experience of the aviation community, for using the 1 dB C/N₀ standard to measure non-Federal Aviation Administration certified GPS device performance when experiencing harmful interference.^{17/}

^{14/} See Letter from Max Fenkell, Aerospace Industries Association, *et al.*, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340 (filed Aug. 21, 2020).

^{15/} See Petition for Reconsideration of the Aerospace Industries Association, *et al.*, IB Docket Nos. 12-340 and 11-109, *et al.* (May 22, 2020); Petition for Reconsideration of Air Line Pilots Association, International, IB Docket Nos. 12-340 and 11-109, *et al.* (May 20, 2020); Petition for Stay of the NTIA, IB Docket Nos. 12-340 and 11-109, *et al.* (May 22, 2020).

^{16/} See Letter from Andrew Roy, Aviation Spectrum Resources Inc. and Max Fenkell, Aerospace Industries Association, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 12-340 and 11-109, *et al.* (filed Aug. 24, 2020).

^{17/} See Letter from Andrew Roy, Aviation Spectrum Resources Inc. and Max Fenkell, Aerospace Industries Association, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 12-340 and 11-109, *et al.* (filed Aug. 5, 2020).

In addition, CalAmp, a global telematics solutions provider with over 20 million GPS-based telematics devices and over 1.3 million software and services subscribers worldwide,^{18/} has expressed its opposition to the *Ligado Order*. As GPSIA recently reported, CalAmp has recognized the “serious harms Ligado Networks’ planned nationwide terrestrial network poses to [the GPS] industry.”^{19/}

Finally, u-blox, which has manufactured 500 million Global Navigation Satellite System (“GNSS”) receivers and sold them to an ever-expanding customer base of 7,200 organizations spread across 22 countries,^{20/} explained that its applications are vulnerable to Ligado’s operations, retrofitting devices is impossible, and the replacement of new devices would be cost prohibitive.^{21/} U-blox’s position is meaningful because it highlights another deep flaw in the *Ligado Order* – that regardless of how the “agreements” with GPS receiver manufacturers are characterized, those manufacturers do not represent a majority of the devices in operation. It also directly contradicts a study by Coleman Bazelon of the Brattle Group that Ligado submitted. According to Bazelon, reaching agreements with Garmin, Trimble, and Deere “would benefit the entire GPS industry by addressing interference concerns for all GPS device manufacturers” because those companies represent the majority of the market.^{22/} This is simply inaccurate. U-blox alone has manufactured far more GPS receivers than Trimble, Garmin, and Deere combined. Accordingly, neither Ligado nor the Commission can accurately claim that interference concerns have been resolved for the vast majority of existing GPS receivers.

^{18/} See CalAmp Corp., Form 10-K, https://www.sec.gov/Archives/edgar/data/730255/000156459019014471/camp-10k_20190228.htm.

^{19/} See Press Release, The GPS Innovation Alliance Welcomes New Member CalAmp, GPS Innovation Alliance (Sept. 17, 2020), <https://www.gpsalliance.org/gpsia-welcomes-calamp>.

^{20/} See ublox, A Sustainable Connected Future, The U-Blox Annual Report 2019, at 4 (2019), <https://www.u-blox.com/en/annual-report-2019>.

^{21/} See Letter from Nikolaos Papadopoulos, President, u-blox America, Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 (filed June 15, 2016); Letter from Nikolaos Papadopoulos, President, u-blox America, Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 (filed May 20, 2016). As Garmin explained in a filing addressing protection of certified aviation devices, while Ligado previously discussed the ability of u-blox technology to overcome the jamming of signals 25 dB stronger than conventional filters, u-blox’s representations of its devices’ effectiveness at combatting jamming relates to in-band jamming signals – not the type of overload interference from adjacent bands that could result from Ligado’s proposed operation; the u-blox technique is only effective on narrow band jammers, not broad band jammers, doing little to assuage real safety-of-life concerns faced by those depending upon GPS devices like certified aviation receivers. See Letter from M. Anne Swanson, Wilkinson, Barker, Knauer, LLP, Counsel to Garmin, IB Docket Nos. 11-109 and 12-340, *et al.*, at 4-5 (filed Sept. 10, 2019).

^{22/} See *Ligado Order* ¶ 31 (citing The Brattle Group, *Putting Mid-Band Spectrum to Work: Sharing Between Ligado Networks and its GPS Neighbors* (May 23, 2016) attached to Comments of Ligado Networks LLC, IB Docket No. 11-109 (filed May 23, 2016)).

The Federal Experts on GPS Accurately Analyzed and Reported on the Impact of Ligado’s Operations on GPS Devices

As GPSIA and its members have demonstrated,^{23/} sound technical analyses were conducted on Ligado’s network by DOT – a neutral third-party U.S. government expert on GPS. And there has been no misrepresentation of that data, which confirm that a substantial number of GPS receivers would suffer interference from Ligado’s terrestrial operations. The data show the percentage of devices in various use categories that would experience interference using the 1 dB C/N₀ standard at the FCC-authorized transmission power of 9.8 dBW. That data is set forth below:

Receiver Category	Examples	Percentage of receivers interfered > 1 dB C/N ₀	
		At a range of 10m	At a range of 100m
General Aviation	Non-certified receivers, including electronic flight bags and unmanned aircraft systems (UAS)	Between 50% to 90%	Between 10% to 50%
General Location & Navigation	Emergency response, asset tracking, and UAS	Between 50% to 90%	Between 10% to 50%
High Precision	Precision farming, machine control, and surveying	Between 50% to 90%	Between 10% to 50%, very close to 50%
Timing	Electric grid, communications networks, point of sale transactions, banking, and finance	Between 10% to 50%, very close to 50%	Between 10% to 50%, closer to 10%

The DOT results measuring interference within 100 meters of a base station further show that substantial numbers of GPS devices will suffer interference in a substantial portion of the coverage area of Ligado’s base station network. These results will occur because the FCC has authorized Ligado to place base stations in a dense network topography of every 433 meters.

^{23/} See Letter from J. David Grossman, Executive Director, GPS Innovation Alliance, to the Hon. Michael O’Rielly, Commissioner, FCC, IB Docket Nos. 11-109 and 12-340 (filed July 30, 2020); Trimble Petition at Exhibit A.

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Pursuant to Section 1.1206(b)(2) of the Commission's rules, an electronic copy of this letter is being filed in the above-referenced dockets. Please direct any questions regarding this filing to the undersigned.

Sincerely,

/s/ J. David Grossman

J. David Grossman
Executive Director
GPS Innovation Alliance