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August 18, 2020

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Notice of *Ex Parte* Presentation, IB Docket Nos. 11-109, 12-340; IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091, SAT-AMD-20180531-00045, SAT-AMD-20180531-00044, SES-AMD-20180531-00856

Dear Ms. Dortch:

On August 14, 2020, Valerie Green, Executive Vice President and General Counsel of Ligado Networks, and the undersigned met by teleconference with Umair Javed, Legal Advisor to Commissioner Rosenworcel and Diane Holland, Legal Advisor to Commissioner Starks.

Ligado discussed how GPS manufacturers and the “Aviation Representatives”¹ continue to both misrepresent the record in this proceeding and badly misconstrue the Commission’s April 22, 2020 Order and Authorization (the “Order”).² Ligado also reviewed the attached document and discussed how recent filings by the Department of Defense (“DoD”), Department of Transportation (“DoT”), Department of Commerce (“DoC”), and the National Telecommunications and Information Administration (“NTIA”)³ deliberately misstate the effects of Ligado’s operations on GPS.

¹ See Letter from Andrew Roy, Aviation Spectrum Resources Inc. and Max Fenkell, Aerospace Industries Association (on behalf of the Aviation Representatives) to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109, 12-340 (filed Aug. 5, 2020) (“Aviation Representatives *Ex Parte*”).

² *Ligado Amendment to License Modification Applications IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091*, Order and Authorization, 35 FCC Rcd 3772 (2020) (“Order”).

³ See Letter from Kathy Smith, Chief Counsel, National Telecommunications and Information Administration, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109, 12-340 (filed July 10, 2020); Letter from Kathy Smith, Chief Counsel, National Telecommunications and

I. The Order’s Power Limits on Ligado Are *Much Stricter* Than What the Major GPS Manufacturers Specifically Required Ligado to Submit to the Commission.

As the Order states, Ligado 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 terrestrial operations, as specified by the agreements.⁴ Apparently, Garmin, Deere, and Trimble are now trying to rewrite this history, perhaps subject to pressure from the Department of Defense,⁵ and are suggesting that the Order misconstrues and overstates the significance of these agreements. That argument ignores the history reflected in the docket and rightfully relied on by the Commission. To review that history: each of the major GPS companies independently and specifically bargained for the specific power limits and other restrictions that these agreements impose on Ligado.

As a condition of settlement, each of Garmin and Deere independently bargained for a requirement that Ligado’s base station power levels not exceed 32 dBW in the 1526-1536 MHz band (the “Lower Downlink”).⁶ These limits were so important to Deere and Garmin that each also bargained for a requirement in the agreement that Ligado ask the FCC to amend its licenses in order to ensure that these specific limits would be imposed on Ligado by the FCC, rather than just by the contract between the parties.⁷ Similarly, Trimble bargained for specific uplink power levels and required Ligado to seek to amend its FCC licenses accordingly.⁸ In addition, Trimble later submitted a filing to the record stating that the company *supported* a grant of Ligado’s license modification applications. As Trimble’s May 20, 2016 *ex parte* states: “Mr. Kirkland reiterated *Trimble’s support for Commission grant of the applications* for modification submitted by Ligado Networks, LLC”⁹ Given Trimble’s explicit and unqualified statements of support in 2016 and that there is no scientific basis, it is difficult to imagine what—other than pressure from its biggest customers—could have caused Trimble to make statements now that are completely inconsistent.

Information Administration, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109, 12-340 (filed July 10, 2020).

⁴ Order at ¶ 26.

⁵ See, e.g., John Hendel, *Pentagon ramps up pressure campaign to block Ligado 5G plans*, POLITICO, May 6, 2020 (“The Pentagon’s allies include . . . GPS companies like Garmin.”).

⁶ See Deere Agreement at 3 (“EIRP Power not to exceed 32 dBw”); Garmin Agreement at 22 (“Garmin will not object . . . to [Ligado’s] use of the 1526-1536 MHz spectrum up to and including power levels at 32 dBw . . .”).

⁷ See Deere Agreement at 3; Garmin Agreement at 19.

⁸ See Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109, at 2 (filed Feb. 3, 2016).

⁹ See Letter from Russell H. Fox, Counsel for Trimble Navigation Limited, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109, at 1 (filed May 20, 2016)) (emphasis added).

Finally, the power limits imposed by the Order at 1526-1536 MHz actually reflect a 99.3% reduction from the power limits specifically bargained for more than four years ago. These parties' arguments that they somehow never endorsed these power limits, or that these power limits that are much lower than what they specifically bargained for are not sufficient to protect their interests, is revisionist history and is not based on science.

In short, Ligado submitted a license modification in December 2015 with the emission and power levels dictated by the GPS companies. With respect to the Lower Downlink, the GPS manufacturers dictated to Ligado a power level of 32 dBW, nearly an order of magnitude higher than what the Commission imposed by adopting 9.8 dBW. It is Alice-in-Wonderland for those same companies to now suggest that they did not mean what they said and put in writing, and instead wish those words away because some greater power is leaning on them.

II. The Order's Conditions to Protect Certified Aviation Were Proposed by the FAA and the Commission Should Reject Any Request to Overrule the FAA.

As the Order states, Ligado "worked with the FAA to define the operating scenarios necessary to protect certified aviation receivers from harmful interference."¹⁰ The Order "accept[ed] the FAA's standards-based analyses . . . and condition[ed] Ligado's ATC operations accordingly."¹¹ When the Aviation Representatives demand that the FCC reconsider these decisions, they are asking the Commission to overrule the judgment of the FAA.

The Order's parameters to protect certified aviation were fully studied by the FAA. Ligado spent nearly a year in discussions with the FAA before reaching the proposal of a maximum EIRP for a tower at a level that protects certified aviation GPS receivers operating at any point outside of a "standoff cylinder" with a 250-foot radius from the subject tower and extending 30 feet above the antenna. This proposal was submitted to the RTCA in September 2016, which provided its comments on the methodology to the FAA in December 2016. (As the Aviation Representatives note, they were involved in the RTCA process, and raised the issues they raise again now at that time.¹² Asking the FCC to consider them is an attempt to re-litigate a case that was already properly judged by the FAA.)

Applying the methodology developed in consultation with the FAA would result in a maximum EIRP in the lower downlink of 13 dBW, with a lower EIRP required under certain circumstances. The DoT's own analysis, which is contained in the same DOT ABC Study that the Aviation Interests are so fond of quoting on 1 dB but seem to want to ignore on certified aviation devices, concluded that an EIRP limit of 9.8 dBW at 1531 MHz would protect certified aviation receivers operating in accordance with applicable MOPS even under "the most

¹⁰ *Order* at ¶ 65.

¹¹ *Id.* at ¶ 71.

¹² Aviation Representatives *Ex Parte* at 2.

restrictive of the certified aviation scenarios examined,” *i.e.* helicopters.¹³ Demonstrating that this is the case, Metro Aviation, a leading provider of air medical services, has filed in this proceedings stating that Ligado’s network operations will not interfere with the safe operation of aircraft.¹⁴ Ligado accordingly filed an amendment to its license modification application seeking an EIRP limit of 9.8 dBW at 1531 MHz. The Order adopts this limit.¹⁵

Finally, Ligado remains committed to establishing a database of base station information for the aviation community. As the Order notes, Ligado previously offered to fund ASRI-led efforts to create such a database, but ASRI refused.¹⁶ That offer still stands. However, in any event Ligado is fully committed to either making the database available itself, or working with interested parties to ensure that it is available to protect aviation safety.

* * *

In sum, the recent filings of Ligado’s opponents make clear that there is no new data or evidence that would justify the Commission revisiting its Order. The claims raised in these filings have already been addressed, and recent attempts to misrepresent Ligado’s operations are easily refuted.

¹³ U.S. Department of Transportation, “Global Positioning System (GPS) Adjacent Band Compatibility Assessment,” Final Report, at VI, 118-19, 149, 152-53 (April 2018), available at <https://www.transportation.gov/sites/dot.gov/files/docs/subdoc/186/dot-gps-adjacent-band-final-reportapril2018.pdf>. [This is the same DOT report that Ligado’s opponents—including the Aviation Representatives—hold as sacrosanct for its support of their argument that 1 dB is required to protect GPS in adjacent bands. It is interesting that in this case they think the outcome of the report should be questioned.]

¹⁴ See Letter from Mike Stanberry, President, Metro Aviation, and Jim Arthur, Director of Operations, Metro Aviation, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 (filed July 9, 2018).

¹⁵ Order at ¶¶ 71-72.

¹⁶ Order at ¶ 70 n.254; Ligado July 26, 2018 Further Reply Comments (“[M]ore than a year ago, Ligado specifically asked ASRI to help create and manage [a] database, and offered to finance the building and maintenance of this database. ASRI declined then yet now complains that there is no mechanism for a database.”).

Ms. Marlene H. Dortch

August 18, 2020

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Please direct any questions to the undersigned.

Sincerely,

 /s/

Gerard J. Waldron

Counsel to Ligado Networks LLC

Attachment

cc: Umair Javed
Diane Holland

OPPONENTS MISREPRESENT THE IMPACT OF LIGADO'S SIGNALS ON GPS

The Earth Still Isn't Flat; GPS Will Work in Lower Manhattan and in Washington, D.C.

- 0 Because the earth isn't flat, DoD and DoT's slides dramatically exaggerate the potential impact of Ligado's operations.
- 0 In reality, Ligado analysis using DoT's loss of lock receiver thresholds from the DoT ABC Report shows no impact to high-precision, timing, and GLN receivers from Ligado's 9.8-dBW downlink operations.

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THE FACTS: NON-CERTIFIED AVIATION RECEIVERS CO-EXIST WITH LIGADO'S SIGNAL

Ligado's opponents assert non-certified aviation devices need more protection than the FCC Order granted; FAA safety regulations and testing reveal the truth.

FAA REGULATION

- The 'non' in 'non-certified' is there for a reason. Under FAA regulations, pilots are not permitted to rely on non-certified devices to protect safety of life.
- Relying on a device that the FAA has determined cannot be relied on for air safety violates FAA rules and is considered unsafe. This is no different than a speeding driver arguing that the only way to avoid collisions is to keep everyone else off the road.

TESTING AND LOSS OF LOCK

- Testing data shows that non-certified aviation devices, including some made by Garmin, will not suffer harmful interference at power levels even higher than the 10-Watt transmit power of Ligado's base stations. In addition, Garmin agreed in 2015 not to object to levels that are more than *165 times higher* than the FCC-approved power level.
- Non-certified aviation devices performed the same or better than certified aviation devices, which the FCC concluded are not at risk. See [Ligado Order at 71](#).
- DoT's own Adjacent Band Compatibility Assessment Final Report acknowledges that non-certified aviation receivers will not experience loss of lock at power levels much higher than those expected from Ligado's base stations. See [DoT ABC Report, Appendices A-F at 16, 18](#).

THE FACTS: UAVs (DRONES) AND LIGADO

Ligado's opponents make false claims that UAVs will be disrupted; the facts and history reveal the truth.

Drone technologies are specifically designed to withstand interference and other environmental factors; they have everything they need to co-exist with Ligado.

- Receivers on UAVs are designed to co-exist with onboard transmitters that, by virtue of the fact that these devices are very small, are located very close to the GPS antenna. UAVs must be able to communicate with their pilots on the ground. Thus, UAVs are like smartphones—they have both a communications capability and a GPS capability. And like in smartphones, these capabilities co-exist in UAVs due to robust filtering. That filtering would also filter out Ligado's signal.
- UAVs already operate near utility lines and towers that present *far greater* energy than Ligado's operations, and UAV manufacturers design their systems to withstand these emissions.
- As new technologies, UAV systems are rapidly improving and adapting to new operating conditions. Although current systems face no risk of harm, future systems will be even more resilient.
- See Ligado and UAV demonstration [here](#).

UAVs (drones) do not solely rely on GPS for positioning and navigation.

- Many UAVs incorporate other technologies (including magnetic compasses, gyroscopes, accelerometers, sensor imaging, and LIDAR) for these purposes, and future generations of UAVs will use navigation technologies that do not rely on GPS.

THE FACTS: TIMING INSTRUMENTS ALSO CO-EXIST WITH LIGADO'S SIGNAL

Ligado's opponents claim that timing instruments embedded in many network systems will be disrupted; the facts and testing show that's simply wrong.

- Results of the National Advanced Spectrum and Communications Test Network (NASCTN), Alliance for Telecommunications Industry Solutions (ATIS), and Nokia Bell Labs studies demonstrate that concerns related to the performance of GPS timing and its applications in banking and other industries are wrong. Ligado's operations will not harm GPS timing, or disrupt electronic payments and render ATMs inoperable. Claims to the contrary are false and intended to scare.
- NASCTN thoroughly tested the effects of Ligado's lower downlink and uplink operations on GPS timing. The results show that Ligado's operations will not cause any harmful effects to GPS timing.
- In a 2017 technical report on GPS timing vulnerability, ATIS listed no known examples of adjacent band transmitters acting as a degradation source for GPS timing. For perspective, ATIS noted that the incorrect installation of antennas is a far greater threat to GPS timing. See [GPS Vulnerability, Technical Report, at 7](#).
- Testing conducted by Nokia Bell Labs shows that Ligado's lower downlink and uplink operations present no harm to GPS timing at significantly stronger power levels than the levels proposed for Ligado's base stations.

THE FACTS: 1 dB, THE FCC, THE C-BAND, AND LIGADO

Ligado's opponents claim that 1 dB is required to protect GPS in adjacent bands and has been applied this way historically; there is no FCC precedent to support that false claim.

- GPS Innovation Alliance's (GPSIA) July 21, 2020 letter to the Senate Commerce Committee suggests that the FCC used 1 dB to protect satellite operations in the C-band and yet did not use 1 dB to protect GPS. This is absolutely false.
- The FCC used 1 dB to protect GPS operations in the GPS band in the same exact way the FCC used 1 dB to protect satellite operations in the C-band.
- If the FCC had offered fixed satellite services (in orange below) the 1 dB level of protection in the spectrum repurposed for wireless (in yellow below), then the entirety of that 280 MHz of spectrum would be unusable for wireless operations. If 1 dB were applied, there would be no auction of the C-band, and this mid-band spectrum would be unusable for 5G.

ILLUSTRATION I: L-BAND SPECTRUM MAP

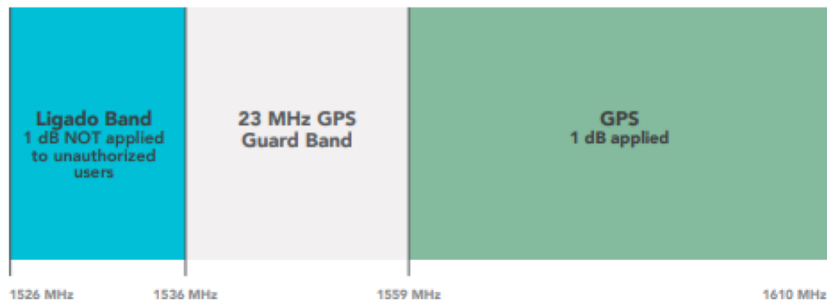
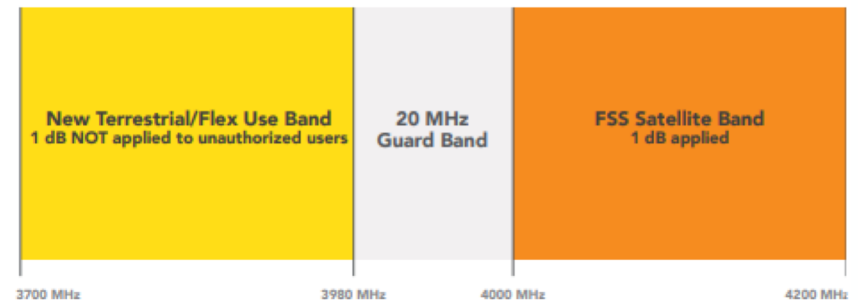


ILLUSTRATION II: C-BAND SPECTRUM MAP



THE FACTS: LIGADO'S SPECTRUM CAN ADVANCE THE TRANSITION TO 5G

Ligado's opponents claim that Ligado's spectrum is not relevant for 5G; the facts and testing data reveal the truth.

- The two primary competitors to China's Huawei and ZTE in 5G infrastructure, Nokia and Ericsson, have demonstrated in the FCC's record that Ligado's spectrum will support and enhance the deployment of 5G services here in the U.S. They are working with Ligado to support 5G services with features that could improve coverage, capacity, inter-network operability, and lower latency.
- Nokia studied Ligado's proposed use of its spectrum as deployed in the FCC Order and found that the "combined use of spectrum in the lower mid-band and higher mid-band categories offers significant economic and operational advantages for 5G as compared to higher mid-band only alternatives."
- Ericsson found that using Ligado's spectrum as deployed in the FCC Order in conjunction with higher-band spectrum would deliver "user experience benefits and performance improvements for 5G as compared to a higher mid-band only deployments."