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August 12, 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 10, 2020, Valerie Green, Executive Vice President and General Counsel of Ligado Networks, and the undersigned met by teleconference with Will Adams, Legal Advisor to Commissioner Carr.

Ligado 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”)¹ deliberately misstate the effects of Ligado’s operations on GPS. Ligado also discussed some of the recent submissions in the docket, including those by the GPS Innovation Alliance, Lockheed Martin, the “Aviation Representatives,” and Iridium Communications Inc.

None of the filings submitted by Ligado’s opponents change the fundamental conclusion of the Order: the conditions on Ligado’s operations ensure “adjacent band operations, including Global Positioning System (GPS), are sufficiently protected from harmful interference.”² This fact has been evident in the record for at least two years, and there is no new evidence in the

¹ 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 Information Administration, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109, 12-340 (filed June 26, 2020).

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, 3773 ¶ 1 (2020).

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record for the Commission to revise its conclusion. There is also no basis for questioning the Commission's decision making process, which followed the APA at every step and thoroughly analyzed the thousands of pages of evidence submitted as part of this four-year proceeding. Furthermore, even a basic technical analysis of the DoD's and DoT's claims regarding GPS makes clear that these claims are deeply flawed. The attached document highlights the misleading and unsubstantiated nature of these claims.

Please direct any questions to the undersigned.

Sincerely,

/s/ Gerard J. Waldron
Gerard J. Waldron
Counsel to Ligado Networks LLC

Attachment

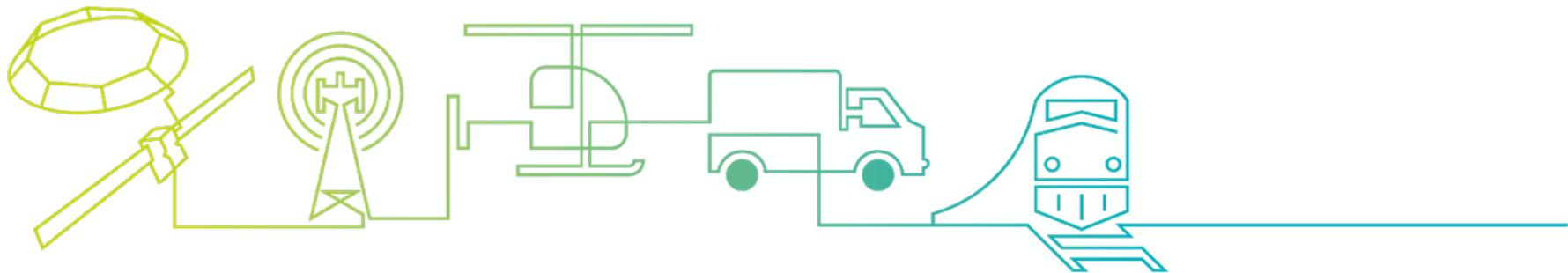
cc: Will Adams

THE TRUTH ABOUT

LIGADO NETWORKS AND GPS:

Studies Show Ligado's Signals Will Coexist with Non-Certified Aviation Devices, UAVs, Timing, 1 dB, and Advance 5G

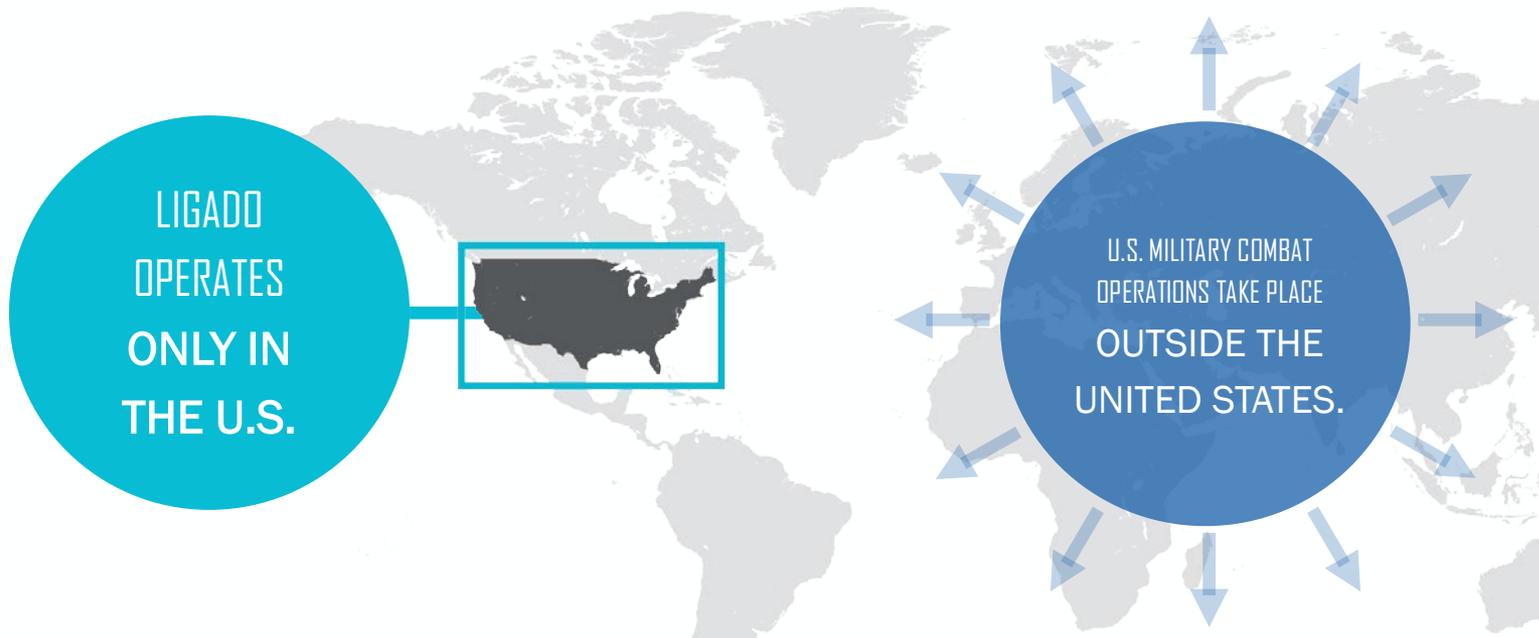
AUGUST 10, 2020



OPPONENTS MISREPRESENT THE REACH OF LIGADO'S OPERATIONS

No, Ligado does not operate in warzones.

- Ligado's license is limited to the United States; therefore, all foreign military operations, systems, personnel, bases, and devices – including military planes, ships, tanks, Humvees, personal devices, and more – could never be impacted by Ligado's network.
- Military GPS devices also use a completely different signal and are far more resilient than civilian devices.
- Inside the U.S., the FCC Order further protects military GPS devices by requiring coordination near military bases and requiring Ligado to repair or replace any devices should there continue to be a concern.
- Any suggestion that U.S. military operations and readiness are jeopardized by Ligado's operations is a blatant effort to mislead and confuse.



OPPONENTS MISREPRESENT THE IMPACT OF LIGADO'S SIGNAL ON GPS

No, the Earth Isn't Flat.

- DoD and DoT's analysis only works if Ligado's signals will travel from its base stations to each and every GPS device in the United States at full power and with nothing in the way.
- For this to be true, Ligado's network would have to exist on a completely flat earth, with no topographical or man-made structures.
- This is not how RF signals actually travel and it ignores the principles of physics to vastly overstate the impact of those signals on any receiver, including GPS receivers.



What DoT/DoD Assumes for its NYC Analysis to be True

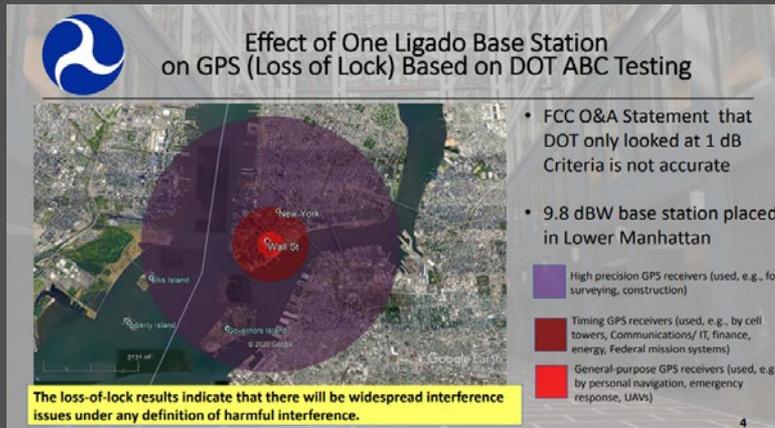


What NYC Really Looks Like

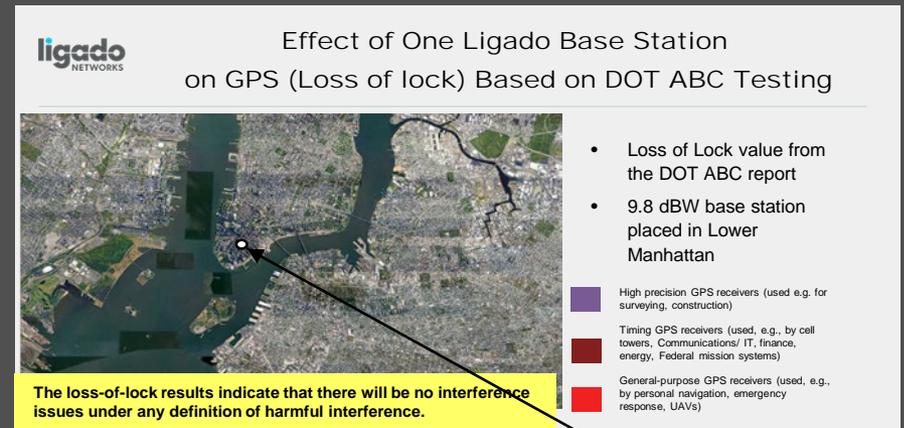
OPPONENTS MISREPRESENT THE IMPACT OF LIGADO'S SIGNALS ON GPS

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

- Because the earth isn't flat, DoD and DoT's slides dramatically exaggerate the potential impact of Ligado's operations.
- 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.



DoT Analysis: New York analysis shows large impact to HP Receivers



Ligado Analysis: New York analysis shows no impact to HP Receivers



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

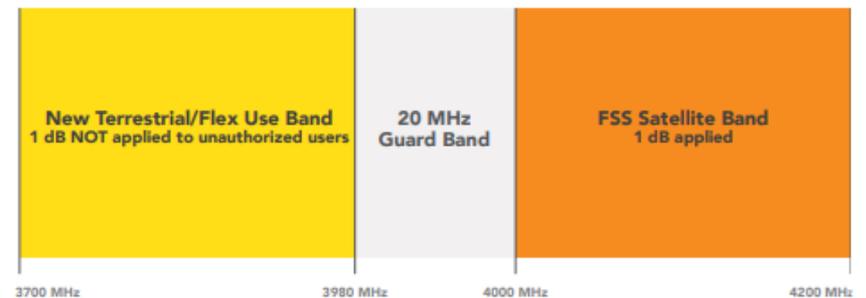
Ligado's opponents claim that 1 dB is required to protect GPS in adjacent bands and has been applied this way historically; there is no FCC precedent to support that false claim.

- 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."