June 26, 2020

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


Dear Ms. Dortch:

Notwithstanding Section 1.1204(a)(5) of the Commission’s Rules,¹ this letter provides notice on behalf of the Department of Transportation (DOT) and Department of Commerce (DOC) that DOT and DOC officials met with Chairman Ajit Pai and Commissioners Jessica Rosenworcel, Michael O’Rielly, and Geoffrey Starks, as well as the Commission staff and other individuals as set forth in Enclosure 1. The DOT officials presented and discussed the material with regard to the above-referenced proceedings as set forth in Enclosure 2. The meetings took place concurrently with classified meetings held with officials from the Department of Defense on related subjects in the above-referenced proceedings, which are addressed in a separate notice. A meeting with Commissioner Brendan Carr is being scheduled.

Respectfully submitted,

Kathy Smith
Chief Counsel

Enclosures (2)

cc: The Honorable Ajit Pai
    The Honorable Jessica Rosenworcel
    The Honorable Michael O’Rielly
    The Honorable Geoffrey Starks

¹ See 47 CFR § 1.1204(a)(5), which generally exempts from disclosure presentations made by an agency or branch of the Federal Government or its staff and involves a matter over which that agency or branch and the Commission share jurisdiction.
ENCLOSURE 1 - MEETINGS

June 19, 2020

Federal Communications Commission: Chairman Ajit Pai; Nicholas Degani, Senior Counsel to the Chairman; Michael Carlson, Deputy General Counsel; William Richardson, Deputy Associate General Counsel; Ronald Repasi, Acting Chief Engineer, Office of Engineering & Technology; Michael Ha, Chief, Policy & Rules Division, Office of Engineering & Technology; Charles Mathias, Associate Chief, Wireless Telecommunications Bureau; Donald Stockdale, Chief, Wireless Telecommunications Bureau

Department of Defense: The Honorable David Norquist, Deputy Secretary of Defense; The Honorable Dana Deasy, Chief Information Officer; Lt. General Bradford Shwed, Director for Command, Control, Communications, and Computers/Cyber, and Chief Information Officer, Joint Staff; General John Raymond, U.S. Space Force; Misty Finical, Lead GPS Integration Planning Engineer, U.S. Space Force

Department of Commerce: Rob Blair, Director, Office of Policy and Strategic Planning; Doug Kinkoph, Performing the Delegated Duties of the Assistant Secretary of Commerce for Communications and Information

Department of Transportation: The Honorable Joel Szabat, Assistant Secretary for Aviation and International Affairs and performing the functions and duties of the Under Secretary of Transportation for Policy; Karen Van Dyke, Director for Positioning, Navigation, and Timing and Spectrum Management

June 22, 2020

Federal Communications Commission: Commissioner Jessica Rosenworcel; William Richardson, Deputy Associate General Counsel; Ronald Repasi, Acting Chief Engineer, Office of Engineering & Technology

Department of Defense: The Honorable Dana Deasy, Chief Information Officer; Lt. General Bradford Shwed, Director for Command, Control, Communications, and Computers (C4)/Cyber, and Chief Information Officer, Joint Staff; Lt. General David Thompson, Vice Commander, U.S. Space Force; Misty Finical, Lead GPS Integration Planning Engineer, U.S. Space Force; Dr. Thomas Powell, Principal Dir for GPS User Systems, U.S. Space Force

Department of Commerce: Charles Cooper, Associate Administrator, Office of Spectrum Management (OSM), National Telecommunications and Information Administration (NTIA); Derek Khlopin, Senior Adviser, Office of the Assistant Secretary, NTIA

Department of Transportation: The Honorable Joel Szabat, Assistant Secretary for Aviation and International Affairs and performing the functions and duties of the Under Secretary of Transportation for Policy; Karen Van Dyke, Director for Positioning, Navigation, and Timing and Spectrum Management

June 22, 2020

Federal Communications Commission: Commissioner Michael O’Rielly

Department of Defense: The Honorable Dana Deasy, Chief Information Officer; Lt. General Bradford Shwed, Director for Command, Control, Communications, and Computers/Cyber, and Chief Information Officer, Joint Staff; Lt. General David Thompson, Vice Commander, U.S. Space Force; Misty Finical, Lead GPS Integration Planning Engineer, U.S. Space Force; Dr. Thomas Powell, Principal Dir for GPS User Systems, U.S. Space Force

Department of Commerce: Charles Cooper, Associate Administrator, NTIA/OSM; Peter Tenhula, Deputy Associate Administrator, NTIA/OSM

Department of Transportation: The Honorable Joel Szabat, Assistant Secretary for Aviation and International Affairs and performing the functions and duties of the Under Secretary of Transportation for Policy; Diana Furchtgott-Roth, Deputy Assistant Secretary of Transportation
Federal Communications Commission: Commissioner Geoffrey Starks (via telephone)
Department of Defense: The Honorable Dana Deasy, Chief Information Officer; Lt. General Bradford Shwedo, Director for Command, Control, Communications, and Computers/Cyber, and Chief Information Officer, Joint Staff; Lt. General David Thompson, Vice Commander, U.S. Space Force; Misty Finical, Lead GPS Integration Planning Engineer, U.S. Space Force; Dr. Thomas Powell, Principal Dir for GPS User Systems, U.S. Space Force
Department of Commerce: Charles Cooper, Associate Administrator, NTIA/OSM; Peter Tenhula, Deputy Associate Administrator, NTIA/OSM
Department of Transportation: The Honorable Joel Szabat, Assistant Secretary for Aviation and International Affairs and performing the functions and duties of the Under Secretary of Transportation for Policy; Diana Furchtgott-Roth, Deputy Assistant Secretary of Transportation for Research and Technology; Karen Van Dyke, Director for Positioning, Navigation, and Timing and Spectrum Management; Kenneth Alexander, Chief Scientific and Technical Advisor for Satellite Navigation Systems, Aviation Safety, Federal Aviation Administration

DOT Briefing to FCC

Concerns Over Ligado Order & Authorization

June 2020
FCC Identified Benefits, Neglected Costs

- Costs to Federal Users—Tens of Billions of Dollars
- Costs to Private Users—Tens of Billions of Dollars
- Lives Lost
- People Injured
Emergency Response Scenario

Interference or degradation includes increased GPS and Global Navigation Satellite System (GNSS) satellite acquisition times, reduced position accuracy, false position information, or loss of signal lock resulting in no position solution.
Effect of One Ligado Base Station on GPS (Loss of Lock) Based on DOT ABC Testing

- FCC O&A Statement that DOT only looked at 1 dB Criteria is not accurate
- 9.8 dBW base station placed on National Mall

The loss-of-lock results indicate that there will be widespread interference issues under any definition of harmful interference.

High precision GPS receivers (used, e.g., for surveying, construction)

Timing GPS receivers (used, e.g., by cell towers, Communications/IT, finance, energy, Federal mission systems)

General-purpose GPS receivers (used, e.g., by personal navigation, emergency response, UAVs)
Effect of Many Ligado Base Stations on GPS (Loss of Lock) Based on DOT ABC Testing

The loss-of-lock results indicate that there will be widespread interference issues under any definition of harmful interference.

- FCC O&A Statement that DOT only looked at 1 dB Criteria is not accurate
- 9.8 dBW base stations separated by 433 m in hexagonal grid on National Mall

- High precision GPS receivers (used, e.g., for surveying, construction)
- Timing GPS receivers (used, e.g., by cell towers, Communications/ IT, finance, energy, Federal mission systems)
- General-purpose GPS receivers (used, e.g., by personal navigation, emergency response, UAVs)
Effect On GPS of Many Ligado Base Stations (1 dB)

- 9.8 dBW base stations separated by 433 m in hexagonal grid
- Blanketed Impact for All Receiver Categories

- High precision GPS receivers degraded (used, e.g., for surveying, construction)
- General-purpose GPS receivers degraded (used, e.g., by personal navigation, emergency response, UAVs)
- Timing GPS receivers degraded (used, e.g., by cell towers, Communications/IT, finance, energy, Federal mission systems)
General Aviation Left Unprotected

- General Aviation GPS (Non-IFR) Will Be Affected Up to One Kilometer

- Helicopter Terrain Awareness and Warning System (H-TAWS) Could Be Severely Harmed
  - Operational effects of possible loss of non TSO certified GPS H-TAWS capability over large geographic areas have not been assessed.

- 350,000 Installed and Portable Visual Flight Rule GPS and Electronic Flight Bag Devices Would be Affected
1 dB CNR Degradation
Interference Protection Criteria

- Dispute over interference standard based on papers prepared by TAC, chaired by Ligado consultant Roberson, inconsistent with Administration standards.

- Intent of the 1 dB IPC is to preserve the accuracy and integrity of timing/ranging and position information – **Essential for safety-critical applications of GPS**

- FAA uses interference mask for certified avionics, **more restrictive than the 1 dB criteria**.

- 1dB-Criteria Supported by the GPS Receiver Manufacturers

- FCC’s March 2020 C-band Report & Order includes adjacent-band interference requirement to protect satcom I/N of -6 dB (which equates to a 0.97 dB C/No degradation).

- International Standard: Recommendation ITU-R M.1903
# Maximum Tolerable Power Level for GPS/GNSS Receivers at 1530 MHz

At proposed Ligado spacing, power must be reduced from 10 Watts to about one milliwatt (factor of 10,000) to protect all existing receivers.

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<th>Deployment</th>
<th>Stand off distance (m)</th>
<th>Max Tolerable EIRP (dBW)</th>
<th>Max Tolerable EIRP</th>
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Summary of DOT Concerns

- The DOT GPS Adjacent Band Compatibility (ABC) test results clearly demonstrate there will be widespread disruption to GPS receivers.

- DOT serves as the Civil Lead for GPS and is concerned about the millions of receivers that will experience interference
  - The majority of civil GPS receivers are not U.S. Government devices and will not qualify for repair or replacement paid for by Ligado.

- FCC should thoroughly assess and account for the economic costs and burdens that will result.
  - Many GPS/GNSS receivers are hermetically sealed so it is not possible to retrofit them with new antennas.
  - Furthermore, many receivers are integrated into end-user applications making adversely affected GPS users unable to retrofit or replace their GPS receivers.