



HEXAGON
POSITIONING INTELLIGENCE

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May 7th, 2018

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

Re: *Ligado Networks*, RM-11681; IB Docket No. 12-340; IB Docket No. 11-109; IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091

Dear Ms. Dortch:

GPS devices face challenges, including from spoofing, jamming, and interference, and this has been a topic of frequent discussion in industry trade groups, before Congress, and with government advisory panels. These types of vulnerabilities will inevitably become more intense as increasingly sophisticated tools against GPS are deployed. The GPS industry is working to harden GPS devices against all forms and sources of interference, including from the bands closest to GPS as these bands are opened for terrestrial uses.

I am the President Hexagon Positioning Intelligence, a leading original equipment manufacturer (OEM) of high precision Global Navigation Satellite System (GNSS) components and subsystems, including receivers, antennas, enclosures and firmware. Because of my role, I have watched intently the debate over the past several years around the use of bands adjacent to GNSS for terrestrial services. Shortly after the Commission put out for comment Ligado's revised spectrum plan in April 2016, our engineering team reviewed Ligado's proposed operating limits and also engaged directly with Ligado to understand better both their spectrum and business plans. The result of our analysis and those discussions was an agreement with Ligado that led us to develop tools to mitigate the impact of intentional or unintentional interference within the GNSS band. 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. Independent of Ligado's proposed operations, GPS device makers must continue to refine their devices and receivers to combat all sources of interference. GPS receivers that incorporate interference mitigation technologies are *more resilient*, not only against adjacent band operations, but also against many sources of possible interference. This position is consistent with sound spectrum management and with the Commission's Technical Advisory Committee's recommendations.

GPS devices with these interference mitigation technologies are able to tolerate more adjacent band operations (within the limits of the license modification) and perform better in the presence of jamming. Accordingly, these improvements have the potential to benefit the entire public.

Thank you for considering these views.

Respectfully submitted,

Michael Ritter
President Hexagon Positioning Intelligence