

COVINGTON

BEIJING BRUSSELS DUBAI FRANKFURT JOHANNESBURG
LONDON LOS ANGELES NEW YORK PALO ALTO
SAN FRANCISCO SEOUL SHANGHAI WASHINGTON

Covington & Burling LLP
One CityCenter
850 Tenth Street, NW
Washington, DC 20001-4956
T +1 202 662 6000

November 25, 2019

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 No. 11-109; IBFS File
Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090,
and SAT-MOD-20151231-00091, SAT-AMD-20180531-00044,
SAT-AMD-20180531-00045, SES-AMD-20180531-00856

Dear Ms. Dortch:

In its recent letter to the Commission concerning the Modification Applications filed in the above-captioned dockets by Ligado Networks, LLC (“Ligado”), the Department of Defense (“DOD”) urged the FCC to not use the standard of harmful interference as set forth in the Commission’s rules and instead apply its preferred metric, 1 dB C/N₀. The DOD letter goes further and recommends that the Commission use the metric of 1 dB C/N₀ in assessing the use of all “bands adjacent to GPS” and in that regard cites the DOT Adjacent Band Compatibility Assessment (“ABC Report”).¹ It has been well documented in the record that a 1 dB metric is not a standard; hence, 1 dB is measured and reported inconsistently across manufacturers and even by devices made by the same manufacturer; it has never been used for this purpose by spectrum regulators in the U.S. or internationally; and therefore it would be unreasonable and arbitrary and capricious to use it in the context of assessing the Modification Applications.² This filing is being submitted to focus on the consequences that would ensue if the Commission were to follow the DOD recommendation and apply the 1 dB C/N₀ metric to services in bands adjacent to GPS.

¹ Letter from DOD Secretary Esper to Chairman Pai at 1 (Nov. 18, 2019), submitted to the record as an attachment to Letter from Valerie Green, Ligado Networks, LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al.*, at Attachment B (Nov. 21, 2019).

² *See, e.g., id.* at pp. 8-10.

COVINGTON

Ms. Marlene H. Dortch
November 25, 2019
Page 2

As the attached analysis by Roberson and Associates (“RAA”) demonstrates, using 1 dB would impact many bands of vital spectrum that otherwise could be used for 5G. This conclusion comes directly out of the ABC Report referenced in the DOD letter. The ABC Report clearly shows that the 1 dB metric would impose an unworkable power limit on *100 megahertz of vital spectrum beyond the spectrum allocated to Ligado*. As demonstrated in slides 5-6 of the RAA analysis, existing services in the WMTS, AMT, Iridium Certus, L-Band MSS, and AWS-3 Uplink bands currently operate at significantly higher power levels than would be permitted if 1 dB C/N₀ was applied to bands adjacent to the GNSS band at 1559 - 1610 MHz.³

Applying this metric would harm future services as well as existing services. Pursuant to the Spectrum Pipeline Act of 2015, the 1300 - 1350 MHz band is under study for terrestrial wireless service.⁴ This “pipeline spectrum” could enable the commercial wireless sector to expand into additional spectrum and provide additional services. However, in November 2018 the FCC issued a waiver permitting U.S. access to the EU’s GNSS system, Galileo, at its E5 signal at 1164 - 1219 MHz.⁵ The E5 signal is within the RNSS band at 1164 - 1240 MHz, in which the U.S. GPS L5 and L2 signals operate. The RNSS band is *sixty megahertz away* from the pipeline spectrum, and the Galileo E5 signal is *eighty-one megahertz away*. However, as slide 7 of the attached analysis demonstrates, the limitations a 1 dB protection of GPS operations would impose on the pipeline spectrum would significantly reduce its utility and value.

The Commission must consider the current and future services that may be severely impacted by the application of the imprecise and inconsistent metric the DOD advocates, and reject the application of the 1 dB metric to Ligado’s proposed operations.

Please direct any questions to the undersigned.

Respectfully submitted,

/s/

Gerard J. Waldron
Hannah Lepow
Counsel for Ligado Networks LLC

Attachment

³ It obviously would be inconsistent with reasoned decision-making and arbitrary and capricious to apply this metric to Ligado’s spectrum only and not to all bands adjacent to GPS.

⁴ Spectrum Pipeline Act of 2015, Title X of the Bipartisan Budget Act of 2015, Public Law 114-74, 129 Stat. 621 (Nov. 5, 2015).

⁵ See *Waiver of Part 25 Licensing Requirements for Receive-Only Earth Stations Operation with the Galileo Radionavigation-Satellite Service*, Order, IB Docket No. 17-16, (2018).

Implications of 1 dB C/N₀ for Spectrum Adjacent to GNSS

Roberson and Associates, LLC

November 25, 2019



Roberson and Associates, LLC
Technology and Management Consultants®



DoT Adjacent Band Compatibility Study and 1 dB Criterion

- The DoT ABC study developed a recommended Interference Tolerance Mask (ITM) for spectrum adjacent to GNSS (including L1 band signals)
- The ITM is based entirely on a 1dB change in C/N_0 and does not consider any other metric
- Using the 1 dB C/N_0 metric would have significant implications on the ability of bands adjacent to any GNSS band to be productively used

NASCTN Study Observed 1 dB Criterion Is an Inaccurate and Unreliable Measure of Interference

The NASCTN (National Advanced Spectrum and Communications Test Network) study observed the following regarding the 1 dB C/N_0 criterion relied on by the DoT ABC:

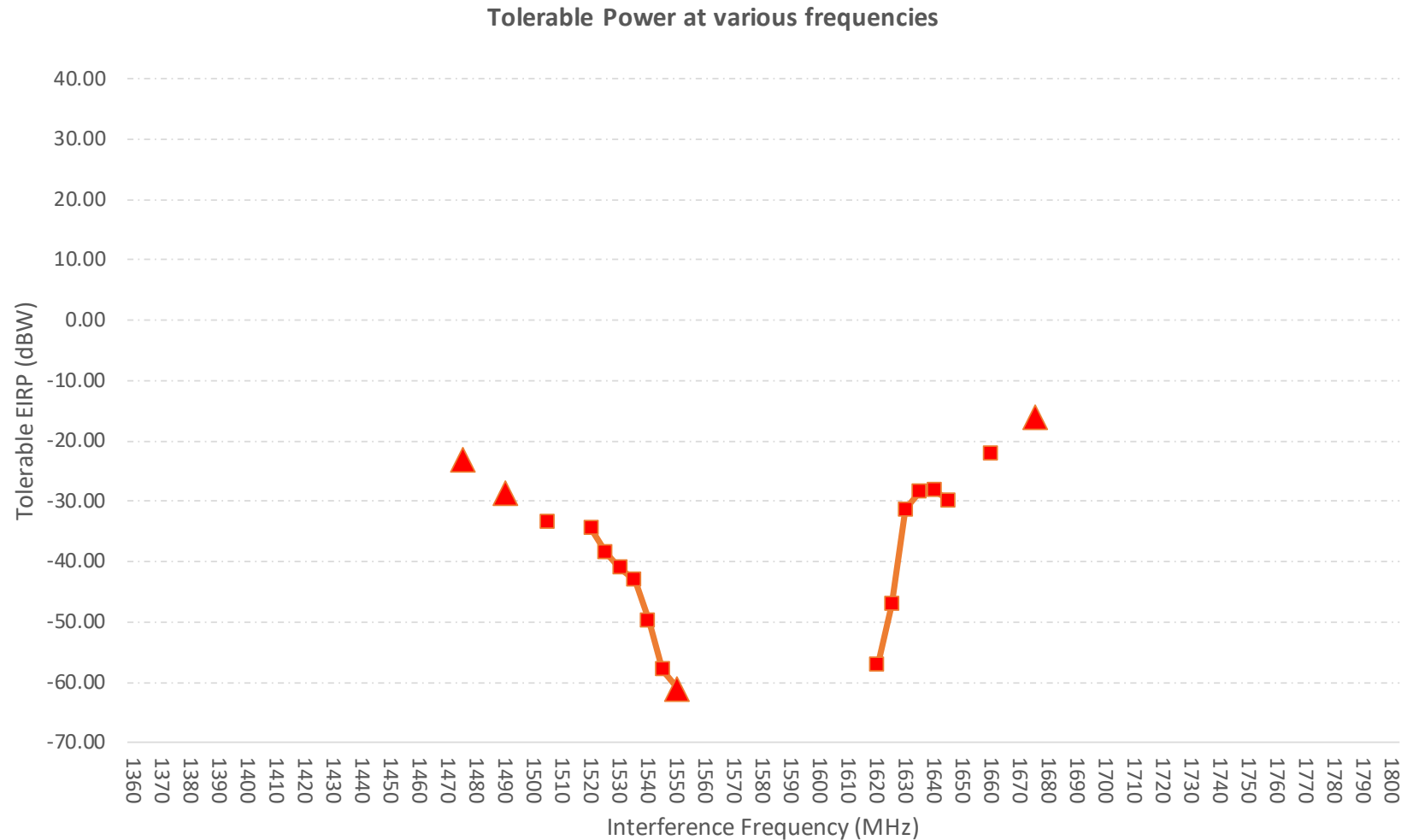
1. There is no standardized method to measure and report C/N_0
2. Device-reported C/N_0 study varies by more than 1 dB in good signal conditions
3. Device-reported C/N_0 for the same interference level *varies from device to device*
4. Most significantly, there is no correlation between GPS device function experienced by the user (i.e. position error) and 1 dB C/N_0 change for a wide variety of devices

Reliance on the 1 dB C/N_0 criterion leads to tolerable transmit power levels that:

- are lower than power levels currently in operation (which do not cause harm)
- unnecessarily restrict future uses in adjacent bands

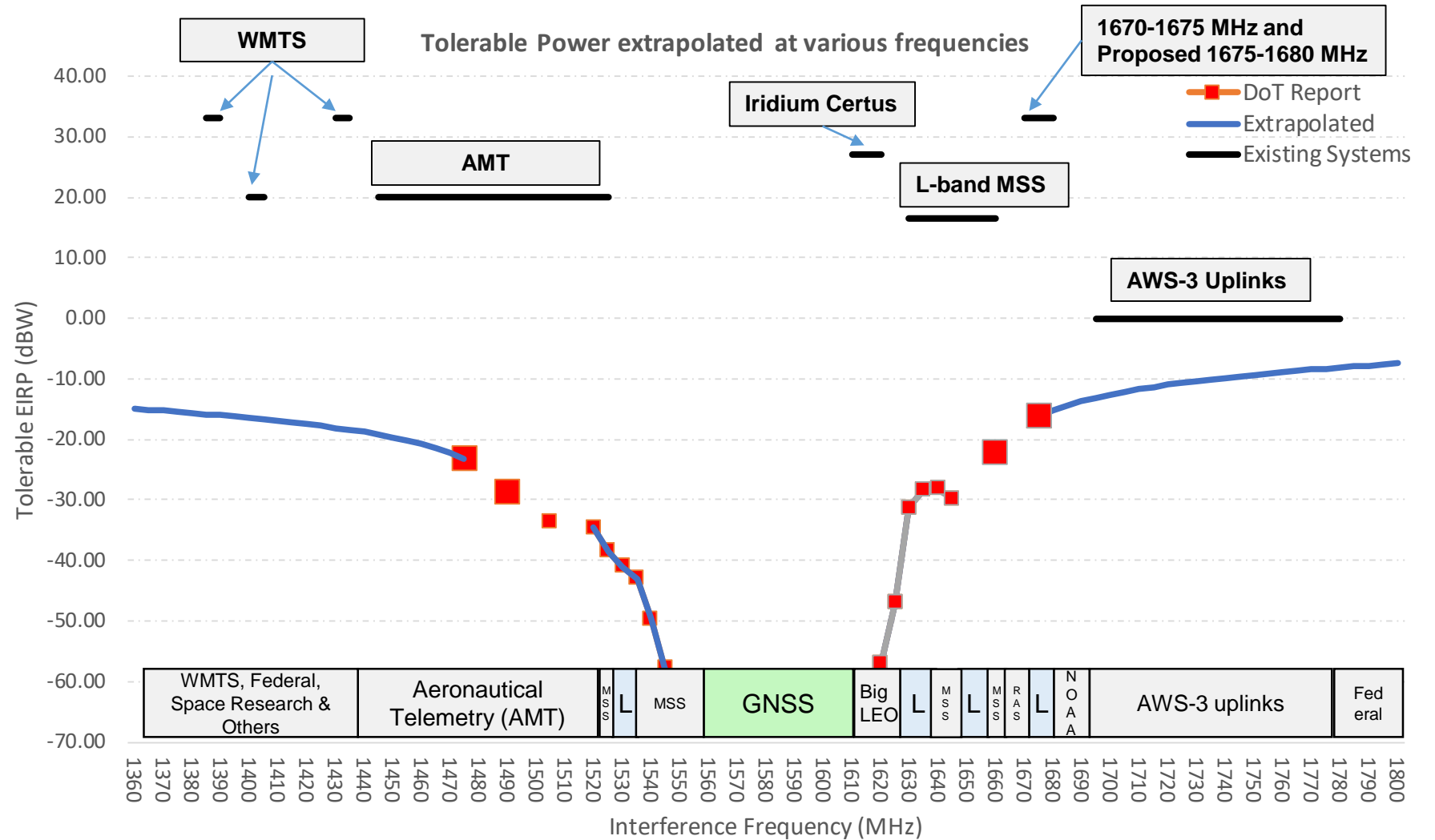
Tolerable Transmit Power (DoT Report Table 4-6 and 4-8) for GPS L1 C/A

DoT Report shows Tolerable Transmit Power values from 1475 MHz to 1675 MHz



Tolerable Transmit Power (DoT Report Table 4-6 and 4-8) Extrapolated for GPS L1 C/A

There are many existing systems that exceed 1 dB C/N₀ criteria now



Power for Existing Systems Versus Power Indicated by DoT Report's 1 dB C/N₀ Criteria

Existing wireless systems operating at significantly higher power levels than suggested by DoT Report's 1 dB C/N₀ criteria

Band	Spectrum Range	Existing Power Limits	Power Limits based on extrapolated DoT Report's 1 dB C/N ₀ Criteria	Existing Limits versus Extrapolated DoT Report's 1 dB C/N ₀ Criteria
WMTS	1390-1392 MHz	33 dBW	-16 dBW	> 80,000 x
WMTS	1392-1395 MHz	20 dBW	-16 dBW	> 4,000 x
WMTS	1432-1435 MHz	33 dBW	-18 dBW	> 140,000 x
AMT	1435-1525 MHz	20 dBW	-38 dBW	> 700,000
Iridium Certus	1616-1626 MHz	27 dBW	-57 dBW	> 200,000,000 x
L-Band MSS	1626-1660 MHz	16.5 dBW	-31 dBW	> 50,000 x
Modeo Band	1670-1675 MHz	33 dBW	-16 dBW	> 80,000 x
Proposed NPRM	1675-1680 MHz	33 dBW	-15 dBW	> 60,000 x
AWS-3 Uplinks	1695-1780 MHz	0 dBW	-13 dBW	> 20 x

Tolerable Transmit Power (DoT Report Table 4-6 and 4-8) Applied to Galileo/GPS 1.2 GHz RNSS Band

Future pipeline spectrum such as 1300 MHz – 1350 MHz would be restricted to a power level of -16 to -11 dBW or 25 to 80 Milliwatts if the 1 dB C/N₀ criteria is applied

