

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)
)
FCC Seeks Comment on Waiver of Part 25)
Licensing Requirement for Receive-Only)
Earth Stations Operating with the Galileo) IB Docket No. 17-16
Radionavigation-Satellite Service)
)
)
)

COMMENTS OF LIGADO NETWORKS LLC

I. INTRODUCTION

The Public Notice seeking comment on the request by the European Commission (“EC”) for a waiver (“the EC Request”) that would permit non-Federal receive-only earth stations within the United States to operate with signals of the Galileo Radionavigation-Satellite Service system (“Galileo”) raises profound questions that the Commission must address before it can consider granting the EC Request.¹ The requested waiver would allow Galileo receivers to operate, *inter alia*, in the 1559-1591 MHz (E1) band.² As the Public Notice recognizes, Ligado holds an MSS license — including ATC authority — for operations in the 1525-1559 MHz band adjacent to the E1 band.³ This adjacency explains Ligado’s profound interest in this proceeding; Ligado takes

¹ *FCC Seeks Comment on Waiver of Part 25 Licensing Requirement for Receive-Only Earth Stations Operating with the Galileo Radionavigation-Satellite Service*, Public Notice, IB Docket No. 17-16, DA 17-18, at 1 (“Public Notice”).

² *Id.* at 2.

³ Public Notice at 10 n.50.

no position on the EC Request with respect to the 1164-1219 MHz (E5) and 1260-1300 MHz (E6) bands.

Over the past two years, Ligado has worked diligently to reach agreements with major GPS manufacturers, among others, allowing for Ligado's proposed terrestrial operations to coexist productively with existing services in adjacent bands. Ligado's applications to modify its ATC authority in accordance with these agreements are pending before the Commission.⁴ In support of these applications, Ligado has submitted extensive details about these agreements⁵, the reduced power and emission levels that Ligado proposes⁶, and sophisticated testing to demonstrate the ability of GPS devices to coexist with Ligado's proposed operations.⁷

⁴ See *id.* (citing *Comment Sought on Ligado's Modification Applications*, IB Docket Nos. 11-109 and 12-340, Public Notice, DA 16-442, 31 FCC Rcd 3802 (IB, OET, WTB, rel. Apr. 22, 2016)).

⁵ See Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al.* (Dec. 8, 2015) (agreement with Deere & Company); Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al.* (Dec. 17, 2015) (agreement with Garmin International, Inc.); Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al.* (Feb. 3, 2016) (agreement with Trimble Navigation Limited); Letter from Doug Smith, Ligado Networks LLC, and Michael Ritter, NovAtel Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al.* (June 27, 2016) (announcing agreement between Ligado and NovAtel); Letter from Doug Smith, Ligado Networks LLC, and Ivan Di Federico, Topcon Positioning Systems, Inc., to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al.* (Nov. 29, 2016) (announcing agreement between Ligado and Topcon).

⁶ See *generally* IBFS File Nos. SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, and SES-MOD-20151231-00981, Description of Proposed Modification and Public Interest Statement (filed Dec. 31, 2015).

⁷ See Roberson and Associates, LLC, "Final Report: GPS and Adjacent Band Co-Existence Study," IB Docket No. 11-109 (filed June 10, 2016); Roberson and Associates, LLC, "Results of GPS and Adjacent Band Co-Existence Study," IB Docket No. 11-109 (filed May 11, 2016). Ligado also filed the detailed dataset underlying Roberson's testing, which includes the detailed listings of the position errors used to produce the Key Performance Indicator graphs shown in the Roberson results report. See Letter from Gerard J. Waldron, Counsel to Ligado Networks, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 *et al.* (filed June 7, 2016).

The National Telecommunications and Information Administration (“NTIA”), in support of the EC Request, states that “granting the requested waiver will enable Galileo signals to supplement GPS signals, thereby bringing significant benefits to the public by increasing service availability, reliability, and resiliency.”⁸ Ligado recognizes the important role of GPS devices, and as a company that provides GPS augmentation services over its satellites, Ligado understands the value of greater precision for GPS.

As the Public Notice also recognizes, however, the EC requests a “broad” waiver of the rule requiring U.S.-based receive-only earth stations to obtain a license before operating with foreign-licensed space stations.⁹ The Public Notice asks important questions about the potential impact of such a broad waiver, and Ligado strongly agrees that such questions must be answered — and any adverse effects on adjacent services appropriately eliminated — before grant of the EC Request can be considered. As the moving party, the EC is responsible for submitting evidence demonstrating the electromagnetic compatibility of Galileo-enabled devices with adjacent band devices, including those that Ligado seeks permission to operate. The Commission also needs similar information from device manufacturers before it can assess the electromagnetic compatibility of Galileo-enabled devices. Ligado urges the Commission not to act on the EC’s request until the record demonstrates that operation of Galileo-enabled devices will be compatible with current and planned satellite and ATC operations in adjacent spectrum.

⁸ Public Notice at 11.

⁹ Public Notice at 1, 3.

II. NO WAIVER SHOULD BE GRANTED UNTIL A COMPLETE RECORD DEMONSTRATES GALILEO'S COMPATIBILITY

A. The EC Has Not Yet Provided Sufficient Information Regarding The Proposed Galileo Technical Parameters.

It is incumbent upon the EC to demonstrate that the blanket authorization of Galileo devices for use within the United States will not cause interference to Ligado's existing and anticipated operations adjacent to the E1 band. In particular, the EC must demonstrate that the proposed Galileo operations will neither cause interference *to* MSS nor require additional interference protections *from* Ligado's existing MSS or proposed ATC operations.

The EC's waiver request has not yet met this standard. The Public Notice itself notes discrepancies between the Galileo E1 signal described in the waiver request and other sources' description of the E1 signal with respect to critical parameters such as bandwidth, frequencies, and power levels.¹⁰ Ligado agrees that the Commission cannot even consider granting the requested waiver until the EC provides "clarification regarding Galileo signal composition ... bandwidth, and power," as well as any other parameters that may affect Galileo's interaction with services in spectrum adjacent to the E1 signal.¹¹

The information available so far about Galileo's operations highlights the potential for Galileo's E1 signal to interfere with adjacent L-band operations. Emissions from Galileo's E1 signals — both the Open Service (OS) signal and the Public Regulated Service (PRS) signal — extend outside the RNSS allocated band, into the MSS band below 1559 MHz, with the PRS signal (located at the upper edge of the MSS band) posing particular concerns. Without efforts by Galileo to filter its out-of-band emissions — which are not specified in the EC's waiver

¹⁰ Public Notice at 4.

¹¹ See Public Notice at 6.

request — the out-of-band emission level of the E1 PRS signal would be only a few dBs below its maximum level. Such strong out-of-band emissions are likely to cause harmful interference to L-band MSS services.

Accordingly, before proceeding any further in its consideration of the EC's waiver request, the Commission must require the EC (1) to resolve the discrepancies the Public Notice identifies between the waiver request and other public documentation regarding Galileo's parameters, and (2) to explain how Galileo will filter its out-of-band emissions to protect services operating in spectrum adjacent to the E1 signal.

B. The Commission Should Collect And Assess Important Information From Makers Of Devices That Would Use Galileo Signals.

In addition to seeking greater clarity about Galileo's proposed technical parameters for U.S. operations, the Public Notice also raises important questions about the design of the receivers that would be using Galileo signals. In particular, Ligado agrees that any assessment of the impact of the EC's waiver request will require consideration of how Galileo receivers' RF front-end filters are designed; how these designs may differ between Galileo-only receivers, GPS-only receivers, and receivers intended to operate with both GPS and Galileo; and how these design choices affect these receivers' ability to operate effectively in the presence of existing and proposed L-band operations, including Ligado's proposed terrestrial operations.¹² The extent to which the addition of Galileo-reception capabilities makes devices more or less resilient to interference from operations in adjacent or nearby bands would be a critical factor in assessing whether the waiver request would serve the public interest in managing spectrum efficiently and productively.

¹² Public Notice at 8-9.

C. Any Authorized Galileo Operations Must Be Capable of Operating in the Same Spectrum Environment as GPS.

Until the Commission obtains the additional technical information discussed above, it would be premature to discuss what specific conditions the Commission should attach to any grant of the EC's waiver request. As a general matter, Ligado agrees that, at a minimum, any waiver must make clear that "the Galileo signals shall not cause harmful interference to authorized operations and operations with the Galileo signals cannot claim protection from harmful interference with respect to authorized operations on frequencies outside of the RNSS allocation."¹³ Ligado cautions, however, that such a condition is no substitute for the Commission's developing in advance a full understanding of the impact of the EC's proposed waiver. Such an understanding is necessary to determine, for instance, whether additional specific conditions — such as explicit out-of-band emission limits — are necessary to ensure that Galileo's operations are compatible with adjacent and nearby spectrum users. In any case, the Commission should make clear that any waiver it grants in response to the EC's instant request is specific to Galileo operations under the parameters established in the record, and that any such waiver should not be construed as supporting waivers for other GNSS systems such as GLONASS or BeiDou.

III. CONCLUSION

Ligado strongly supports efforts to put the nation's limited spectrum resources to their most productive use. To the extent Galileo can serve devices within the United States in a manner compatible with existing and anticipated operations in adjacent or nearby spectrum, Ligado has no objection to the Commission's permitting such operations. Doing so would

¹³ Public Notice at 6.

enable greater precision for GPS, while protecting the substantial public interest benefits from Ligado's MSS and planned ATC operations. But it is incumbent on the EC to demonstrate such compatibility — and on the Commission to ensure it — before the Commission can authorize such operations on a blanket basis.

Respectfully submitted,

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