



PUBLIC NOTICE

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April 22, 2016

COMMENT SOUGHT ON LIGADO'S MODIFICATION APPLICATIONS

IB Docket No. 11-109; IB Docket No. 12-340

Comments/Petitions to Deny Due: May 23, 2016

Oppositions Due: June 6, 2016

Replies Due: June 16, 2016

On December 31, 2015, New LightSquared (hereinafter referenced as Ligado, its new name)¹ submitted new applications to modify the ancillary terrestrial component (ATC) of its L-band mobile-satellite service (MSS) networks (hereinafter, "Applications"), and withdrew a prior request filed in 2012.² In the Applications, Ligado proposes that certain additional operational restrictions, in the form of license conditions, be placed on its ATC authorization in an effort to address interference concerns that have been raised by the Global Positioning System (GPS) industry in these proceedings.³ Ligado also proposes another license condition to address interference concerns relating specifically to the aviation sector's use of GPS.⁴ These conditions are consistent with agreements that Ligado recently has reached with three companies (Deere & Company, Garmin International, Inc., and Trimble Navigation Limited) in the GPS industry.⁵ Ligado states that adoption of these license modifications and specified conditions

¹ In this Public Notice, we use the term "Ligado" to refer to New LightSquared LLC and its subsidiary, LightSquared Subsidiary LLC. On February 10, 2016, New LightSquared was rebranded as Ligado Networks LLC (Ligado). Following LightSquared's emergence from bankruptcy in December 2015, many filings by these entities in these proceedings have been submitted under the name "New LightSquared" while the most recent filings have been submitted by Ligado.

² Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 12-340 and 11-109; IBFS File Nos. SAT-MOD-20120928-00160, SAT-MOD-20120928-00161, and SES-MOD-20121001-00872, at 1 (filed Dec. 31, 2015) (Ligado Dec. 31, 2015 *Ex Parte*); Applications of LightSquared Subsidiary LLC, Narrative, IBFS File Nos. SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, and SES-MOD-20151231-00981 (Applications). The Applications include a "Description of Proposed Modification and Public Interest Statement" (Applications, Description of Proposed Modification). The "L-band" is a general designation for frequencies from 1 to 2 GHz.

³ Ligado Dec. 31, 2015 *Ex Parte* at 1-3; Applications, Description of Proposed Modification at 1-7 (including diagram of the proposed technical operating parameters).

⁴ Ligado Dec. 31, 2015 *Ex Parte* at 4; Applications, Description of Proposed Modification at 7, 10-12.

⁵ Ligado Dec. 31, 2015 *Ex Parte* at 1 & n.1. Prior to reaching these agreements and the set of conditions proposed in them, these three companies had filed numerous comments in these proceedings expressing interference concerns and objecting to LightSquared's proposed terrestrial operations, both in their respective company capacities and as members of two GPS industry organizations, the U.S. GPS Industry Council and the GPS Innovation Alliance (in which they are founding members).

would enable the Commission to determine that Ligado could proceed with deploying its terrestrial broadband network.⁶ Through this Public Notice, we seek comment on Ligado's Applications.

Background. Ligado's licenses include an authorization to provide ancillary terrestrial mobile services using portions of the frequency bands in which it is licensed to provide MSS.⁷ In January 2011, the International Bureau adopted an Order that conditioned operation of the terrestrial mobile network on addressing potential interference concerns relating to GPS operations in the 1559-1610 MHz band allocated to the Radionavigation-Satellite Service (RNSS). That Order established a working group process wherein LightSquared⁸ would work with the GPS industry, the National Telecommunications and Information Administration (NTIA), and other appropriate federal agencies to analyze and address potential interference concerns. That Order provided that before LightSquared could commence terrestrial operations, the Commission, after consultation with NTIA, must conclude that the interference concerns have been satisfactorily resolved.⁹

In June 2011, IB Docket 11-109 was opened to invite comment on technical studies resulting from this working group process.¹⁰ The studies, which focused on LightSquared's originally proposed ATC mobile downlink operations in the 1526-1536 MHz and 1545-1555 MHz portions of its L-band license, demonstrated potentially significant interference between LightSquared's operations in the 1545-1555 MHz band and various GPS receivers, and identified some interference issues concerning operations in the 1526-1536 MHz band.¹¹ In February 2012, NTIA submitted additional studies¹² and expressed its

⁶ In its Applications, Ligado also requested that the Commission move forward with the reallocation and auction of the 1675-1680 MHz band, and further requested that consideration of these issues be addressed in a combined docket with the satellite modification applications. Ligado states that it intends to be an active bidder in such an auction, and would seek to combine use of this spectrum with the 1670-1675 MHz band to create a 10-megahertz downlink that would be part of a broadband network utilizing spectrum associated with the ATC authorizations. Ligado Dec. 31, 2015 *Ex Parte* at 1, 4-5. Ligado's requests concerning the proposed allocation of the 1675-1680 MHz band are addressed in a separate proceeding (RM-11681) and Public Notice. *See Comment Sought to Update the Record on Ligado's Request that the Commission Initiate a Rulemaking to Allocate the 1675-1680 MHz Band for Terrestrial Mobile Use Shared with Federal Use*, RM-11681, Public Notice, DA-16-443 (rel. April 22, 2016) (*1675-1680 MHz Band Allocation Comment PN*).

⁷ *LightSquared Subsidiary LLC Request for Modification of its Authority for an Ancillary Terrestrial Component*, Order and Authorization, 26 FCC Rcd 566 (IB 2011).

⁸ In this public notice, "LightSquared" generally refers collectively to the LightSquared companies prior to its emergence from bankruptcy in December 2015.

⁹ *LightSquared Subsidiary LLC Request for Modification of its Authority for an Ancillary Terrestrial Component*, Order and Authorization, 26 FCC Rcd at 587, para. 43.

¹⁰ *Comment Deadlines Established Regarding the LightSquared Technical Working Group Report*, Public Notice, 26 FCC Rcd 9284, 9284 (IB 2011) (citing the final report of the working group that was formed to study the GPS interference issues (TWG Report)).

¹¹ *See id.* (citing TWG Report). The working group included subgroups that examined seven categories of GPS receivers – aviation, cellular, general location/navigation, high precision, timing, networks, and space-based receivers. Trimble, Garmin, and Deere were active participants in the working group process. The working group participants (LightSquared, the GPS industry, and others) did not always agree on the testing methodology and analyses, or how best to interpret the results with respect to potential interference. *See generally id.* On July 6, 2011, NTIA submitted an additional report prepared by the National Space-Based Positioning, Navigation, and Timing Systems Engineering Forum (NPEF) on behalf of the National Executive Committee for Space-Based Positioning, Navigation and Timing (EXCOM) ("Assessment of LightSquared Terrestrial Broadband System Effects on GPS Receivers and GPS-dependent Applications").

¹² The Commission, in consultation with NTIA, determined that additional testing was needed. *See Status of Testing in connection with LightSquared's Request for ATC Commercial Operating Authority*, Public Notice, 26 FCC Rcd 12913 (IB/OET 2011). Additional studies submitted by NTIA included: the study requested by NTIA prepared by

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continued concern about potential interference from LightSquared's proposed mobile network operations.¹³ Noting that the process had not been successfully completed and that potential interference concerns had not been resolved, the Bureau sought comment on whether LightSquared's ATC authorizations should be suspended indefinitely.¹⁴ LightSquared opposed suspending these authorizations,¹⁵ while many commenters from the GPS industry, as well as other stakeholders, objected to LightSquared's proposed mobile operations, expressing concern that those operations would cause interference to and adversely affect GPS operations.¹⁶

In the fall of 2012, LightSquared filed applications to modify its ATC authorization.¹⁷ IB Docket 12-340 was opened to invite comment on the applications.¹⁸ Specifically, LightSquared proposed permanently relinquishing its authority to deploy terrestrial downlink operations at 1545-1555 MHz,¹⁹ and stated that it would voluntarily not deploy terrestrially in the 1526-1536 MHz downlink band during the pendency of a rulemaking proceeding that it had requested to develop revised rules for terrestrial operations in that spectrum.²⁰ With respect to its proposed terrestrial wireless user equipment operations in the MSS

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NPEF ("Follow-on Assessment of LightSquared Ancillary Terrestrial Component Effects on GPS Receivers"); the "Cellular Device Test Report"; and the Federal Aviation Administration's "Status Report Assessment of Compatibility of Planned LightSquared Ancillary Terrestrial Component Transmissions in the 1526-1536 MHz Band with Certified Aviation Receivers."

¹³ Letter from Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Dept. of Commerce, to Julius Genachowski, Chairman, FCC (filed Feb. 14, 2012) (attaching additional studies). Based on its "independent evaluation" of the testing and analysis performed, NTIA concluded that LightSquared's then-planned mobile network would impact GPS services and that there was "no practical way," at that time, to mitigate the potential for interference. *Id.* at 1.

¹⁴ *International Bureau Invites Comment on NTIA Letter Regarding LightSquared Conditional Waiver*, Public Notice, 27 FCC Rcd 1596, 1599 (IB 2012).

¹⁵ *See, e.g.*, LightSquared Comments in Opposition (filed Mar. 16, 2012) (contending that there were major flaws in aspects of the testing methodologies and analyses in certain studies relied upon by opponents to its terrestrial operations).

¹⁶ Among these GPS industry commenters were the U.S. GPS Industry Council (of which Garmin, Trimble, and Deere were members) and Deere. *See* Comments of the U.S. GPS Industry Council, IB Docket 11-109 (filed March 16, 2012); Comments of Deere & Company, IB Docket No. 11-109 (filed Mar. 16, 2012).

¹⁷ Modification Application of LightSquared Subsidiary LLC, IBFS File Nos. SAT-MOD-20120928-00160, SAT-MOD-20120928-00160, and SES-MOD-20121001-00872 (filed Sept. 28, 2012 and Oct. 1, 2012 with identical narrative text) (2012 Modification Application Narrative).

¹⁸ *Federal Communications Commission Invites Comment on LightSquared Request to Modify Its ATC Authorization*, Public Notice, 27 FCC Rcd 14290 (IB/OET/WTB 2012).

¹⁹ 2012 Modification Application Narrative at 2, 10. LightSquared proposed permanently relocating these operations to the 1670-1680 MHz band. Modification Application Narrative at 11. On November 2, 2012, LightSquared filed a petition for rulemaking seeking allocation of the 1675-1680 MHz band for commercial terrestrial use. LightSquared Subsidiary LLC Petition for Rulemaking to Allocate the 1675-1680 MHz Band for Terrestrial Mobile Use, RM-11681 (filed Nov. 2, 2012). Comment was sought on that petition in RM-11681. *Consumer & Governmental Affairs Bureau Reference Information Center Petition for Rulemaking Filed*, Public Notice, Report No. 2967 (CGB 2012), 2012 WL 5505997; *see also 1675-1680 MHz Band Allocation Comment PN*.

²⁰ 2012 Modification Application Narrative at 2. On September 28, 2012, LightSquared filed its petition for rulemaking on the operating parameters of terrestrial use of the 1526-1536 MHz band, indicating that the rulemaking could resolve interference concerns that would allow LightSquared to deploy its network using that spectrum. LightSquared Subsidiary LLC Petition for Rulemaking to Revise the Commission's Technical Rules, RM-11683 (filed Sept. 28, 2012). Comment was sought on that petition in RM-11683. *Consumer & Governmental Affairs Bureau Reference Information Center Petition for Rulemaking Filed*, Public Notice, Report No. 2968 (CGB 2012), 2012 WL 5862448. Ligado withdrew this petition on February 8, 2016. Letter from Gerard J. Waldron,

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uplink band, LightSquared indicated that it planned to operate in the 1627.5-1637.5 MHz and 1646.7-1656.7 MHz under the parameters of its existing ATC authorization.²¹

In July 2013, LightSquared submitted a report providing an “overview of assessments” concerning the proposed use of LightSquared’s terrestrial wireless user equipment within the MSS uplink band, including technical analyses of potential interaction of these devices with GPS devices.²² Comment was sought on these assessments.²³ Among the commenters, representatives of the GPS industry – including Trimble, Garmin, and Deere, through the GPS Innovation Alliance – expressed concern about potential interference from the proposed operations.²⁴ In addition, in July 2014, NTIA noted that federal agencies were not in complete agreement that the LightSquared assessments had adequately addressed concerns of interference from these operations.²⁵

Ligado’s Applications. In its December 31, 2015, letter and new satellite modification applications, Ligado proposes a specific set of operational parameters (a combined set of both power limits and emissions limits) for terrestrial wireless operations in portions of the spectrum included in its MSS L-band authorization.²⁶ Approval of these proposals as license conditions, Ligado states, will

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Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 10-142; IB Docket Nos. 12-340 and 11-109; IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091; RM-11681 (filed Feb. 8, 2016).

²¹ 2012 Modification Application Narrative at 4.

²² Letter from John P. Janka, Counsel for LightSquared Subsidiary LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 12-340 and 11-109; IBFS File Nos. SAT-MOD-20120928-00160, SAT-MOD-20120928-00161, SAT-MOD-20101118-00239, and SES-MOD-20121001-00872; RM-11681; WT Docket No. 12-327 (filed Jul. 15, 2013).

²³ *Comments Sought on LightSquared Subsidiary LLC Ex Parte Filing*, Public Notice, 28 FCC Rcd 11764 (IB/OET/OSP/WTB 2013).

²⁴ Comments of the GPS Innovation Alliance, IB Docket Nos. 12-340 and 11-109; IBFS File Nos. SAT-MOD-20120928-00160, SAT-MOD-20120928-00161, SAT-MOD-20101118-00239, and SES-MOD-20121001-00872; RM-11681; WT Docket No. 12-327 (filed Sept. 6, 2013).

²⁵ Letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA, to Julius P. Knapp, Chief, Office of Engineering and Technology, FCC, IB Docket Nos. 12-340 and 11-109; IBFS File Nos. SAT-MOD-20120928-00160, SAT-MOD-20120928-00161, SAT-MOD-20101118-00239, and SES-MOD-20121001-00872; RM-11681; WT Docket No. 12-327 (filed July 1, 2014). The NTIA letter also attached a letter from the Department of Transportation (DOT) expressing its concerns about possible effects on GPS, including concerns about LightSquared’s handset proposal and its underlying assumptions. NTIA also cited the concerns expressed by the GPS Innovation Alliance. *Id.*

²⁶ *See generally* Ligado Dec. 31, 2015 *Ex Parte*; Applications, Description of Proposed Modification. With the filing of the Applications, Ligado withdrew its 2012 ATC modification applications in IB Docket No. 12-340. Ligado Dec. 31, 2015 *Ex Parte* at 1. Ligado also has withdrawn certain petitions related to its ATC authorization. Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 10-142; IB Docket Nos. 12-340 and 11-109; IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091; RM-11681 (filed Feb. 8, 2016) (withdrawing a petition for rulemaking regarding the 1526-1536 MHz band in RM-11683, filed September 28, 2012, and a petition for declaratory ruling regarding use of the L-band filed December 20, 2011, in IB Docket No. 11-109 and ET Docket No. 10-142); Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 12-340 and 11-109; IBFS File Nos. SAT-MOD-20101118-00239, SAT-MOD-20120928-00160, SAT-MOD-20120928-00161, SES-MOD-20121001-00872, SES-RWL-20110908-01047, and SES-MOD-20141030-00835 (filed Dec. 8, 2015) (Dec. 8, 2015 *Ex Parte* and Deere Agreement) (withdrawing LightSquared petition for rulemaking regarding GPS receiver standards filed February 7, 2012).

address the “core concerns” raised by the GPS industry in these proceedings.²⁷ In addition, Ligado proposes that concerns relating specifically to the aviation sector’s use of GPS be addressed by a separate license condition.²⁸ Ligado states that the conditions proposed in the Applications are the result of recent agreements that Ligado has reached separately with Deere²⁹ and Garmin³⁰ (prior to filing the Applications) and Trimble³¹ (subsequent to the filing) that resolve concerns that they have raised in these proceedings regarding the potential incompatibility between GPS receivers and Ligado’s proposed operations in the MSS L-band.³²

Specifically, Ligado proposes in the Applications to abandon its authority for terrestrial operations in the 1545-1555 MHz portion of the MSS downlink band,³³ and to operate in three other L-band segments – base stations in the 1526-1536 MHz portion of the MSS downlink band and user equipment in the 1627.5-1637.5 MHz and 1646.5-1656.5 MHz portions of the MSS uplink band – under a more restrictive set of operational parameters (a combined set of power limits and out-of-band emission (OOBE) limits, including newly proposed OOBE limits) than currently authorized.³⁴ (See the Appendix, which sets forth a summary of the proposed modifications as well as a chart prepared by Ligado showing proposed technical operating parameters associated with different portions of the MSS L-band, the RNSS band, and adjacent spectrum bands.³⁵) Ligado asserts that its abandonment of the use of the 1545-1555 MHz portion of the MSS L-band downlinks for terrestrial operations addresses a critical concern of the GPS industry, and that when considered with other features of the proposal, GPS receivers are in effect provided a “significant guard band” from terrestrial services.³⁶ To protect certified aviation GPS devices, Ligado proposes that its license be conditioned on power limitation requirements for operation in the 1526-1536 MHz band as necessary to achieve compatibility with current and future Minimum

²⁷ Ligado Dec. 31, 2015 *Ex Parte* at 1-2; Applications, Description of Proposed Modification at 3. Ligado states that these concerns do not include any concerns relating to cellular devices; it notes that the vast majority of GPS devices in use today are found in smartphones, and states that the mobile phone industry has not suggested that LightSquared’s operations were incompatible with smartphones. *Id.* at 3.

²⁸ Ligado Dec. 31, 2015 *Ex Parte* at 1, 4.

²⁹ Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 (filed Dec. 8, 2015) (Dec. 8, 2015 *Ex Parte* and Deere Agreement).

³⁰ Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 (filed Dec. 17, 2015) (Dec. 17, 2015 *Ex Parte* and Garmin Agreement).

³¹ Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket No. 11-109 (filed Feb. 3, 2016) (Feb. 3, 2016 *Ex Parte* and Trimble Agreement).

³² Ligado Dec. 31, 2015 *Ex Parte* at 2 (discussing Deere and Garmin Agreements); Ligado Feb. 3, 2016 *Ex Parte*, Letter Attachment at 1 (joint statement by New LightSquared and Trimble states that the agreement involves an integrated package of recommendations “to resolve pending policy issues” involving LightSquared spectrum).

³³ As noted above, in its 2012 modification applications LightSquared had similarly proposed to permanently relinquish its authority to conduct terrestrial operations in the 1545-1555 MHz band. 2012 Modification Application Narrative at 2, 10.

³⁴ Applications, Description of Proposed Modification at 4-7 (setting forth the particular technical details of the proposal). We note that Ligado’s proposed modifications with respect to the power limits are the same levels (32 dBW equivalent isotropically radiated power (EIRP) in the downlink and -7 dBW in the uplinks) that were used in previous studies beginning in 2011.

³⁵ Applications, Description of Proposed Modification at 4-7.

³⁶ Applications, Description of Proposed Modification at 4-7 (detailing the specific operational parameters that are proposed). *Id.* As noted above, in 2012 LightSquared also had proposed permanently relinquishing its authority for terrestrial operations in the 1545-1555 MHz band. 2012 Modification Application Narrative at 2, 10.

Operational Performance Standards that are incorporated into an active Technical Standard Order from the Federal Aviation Administration.³⁷

In their respective agreements, Deere and Garmin have agreed that they will not object to Ligado's terrestrial deployment in the 1526-1536 MHz, 1627.5-1637.5 MHz, and 1646.5-1656.5 MHz frequency bands under the conditions Ligado now proposes in the Applications, except that the Garmin agreement does not address potential interference concerns relating to certified aviation devices.³⁸ Trimble also does not oppose Ligado's proposed operations in the 1627.5-1637.5 MHz and 1646.5-1656.5 MHz frequency bands; as for operations in the 1526-1536 band, Trimble along with Ligado, supports the continued consideration of terrestrial use of the 1526-1536 MHz band in the currently pending DOT "Adjacent Band Compatibility (ABC) Assessment."³⁹

In its Applications, Ligado contends that, in light of the resolution of interference concerns with Deere and Garmin, which it states collectively produce equipment in many GPS device categories, the proposed modifications "should effectively resolve the concerns of the GPS industry as a whole."⁴⁰ Ligado states that grant of the Applications will secure the compromises reached under the agreements with Deere and Garmin by giving the benefit associated with the more restrictive technical parameters for LightSquared's proposed operations to all other parts of the GPS community.⁴¹ Ligado asserts that grant of the license modifications will serve the public interest by establishing a path forward for its deployment of a terrestrial wireless broadband network, substantially advancing the goal of making more spectrum available that could bring the benefits of a new mobile broadband network to the public.⁴²

In more recent submissions, Ligado provided additional information regarding the types of GPS devices produced by Deere and Garmin, as well as Trimble, to supplement its contention that reaching agreements with these companies about the newly proposed set of operating parameters would benefit the GPS industry.⁴³ In addition, on February 24, 2016, Ligado submitted a letter and presentation concerning

³⁷ Applications, Description of Proposed Modification at 10-12.

³⁸ *Id.* at 2-3; Deere Agreement at § 3; Garmin Agreement at §§ 9-10; *see also* Garmin Agreement at 3 ("Garmin believes that any potential interference with existing (a) Garmin non-aviation receivers and (b) Non-Certified Garmin [Global Navigation Satellite System] Aviation Equipment will be mitigated if the Planned LightSquared Network is authorized and operated subject to the restrictions set forth in this Settlement Agreement [and proposed in the Applications].").

³⁹ Trimble Agreement at 2-3 (also indicating that both support the use of the National Advanced Spectrum and Communications Test Network (NASCTN) laboratories to test interference issues arising from the terrestrial use of spectrum in the 1526-1536 MHz band); Feb. 3, 2016 *Ex Parte* at 1-2 (same). The Deere and Garmin Agreements permit those GPS parties to participate in the DOT Adjacent Band Compatibility Assessment regarding the 1526-1536 MHz band. Deere Agreement at § 17; Garmin Agreement at § 10(c). On September 9, 2015, DOT published in the Federal Register its draft ABC Assessment test plan concerning operations adjacent to the 1559-1610 MHz RNSS band. *See* <https://federalregister.gov/a/2015-22634>. In October 2015, DOT received comments from several entities, including the GPS Innovation Alliance and LightSquared. *See* <http://www.gps.gov/spectrum/ABC/>. In March 2016, DOT issued its final test plan, and stated that it would be testing devices pursuant to that plan in April 2016. *See id.*

⁴⁰ Applications, Description of Proposed Modification at 3.

⁴¹ *Id.* at 3.

⁴² *Id.* at 4, 8-15.

⁴³ On January 11, 2016, Ligado met with FCC, NTIA, FAA, and DOT representatives to provide further details on its license modification applications, including the various categories in which Deere, Garmin, and Trimble produce GPS devices. *See* Letter from Gerard J. Waldron, Counsel to New LightSquared LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 12-340 and 11-109, Attach. B (filed Jan. 13, 2016) (Ligado Jan. 13, 2016 *Ex Parte*). Ligado notes that Garmin, Trimble, and/or Deere GPS devices "populate nearly all of the different categories of

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its recent testing that examines whether terrestrial operations under the set of operating parameters that Ligado proposes in the 1526-1536 MHz, 1627.5-1637.5 MHz, and 1646.5-1656.5 MHz bands would affect the operations of certain Garmin and non-Garmin GPS devices.⁴⁴ Ligado asserts that the testing results demonstrate that the general navigation devices tested showed no degradation in performance, and that the smartphones showed no degradation and have become more resilient over time.⁴⁵ Ligado also contends that the testing demonstrates that the metric that DOT has proposed to use in its ABC Assessment does not accurately predict the impact of adjacent band signals on GPS positioning performance.⁴⁶ On April 14, 2016, Ligado indicated that the testing is complete and that the analysis is near complete, and that it expects to file the final report in early May 2016.⁴⁷

Comment sought. We invite comment on Ligado’s Applications, including the extent to which the set of operational parameters and conditions would address GPS interference concerns. We seek comment on the specific components of the proposed operational parameters and the proposed license conditions. In particular, we seek comment on the specifics of Ligado’s proposal relating to its operations in the portions of the MSS L-band spectrum below 1559 MHz, including its abandonment of any terrestrial authorization in the 1545-1555 MHz portion, and its limiting of terrestrial operations to the 1526-1536 MHz portion of the MSS L-band under the proposed set of license conditions. We also seek comment on Ligado’s modified proposals with respect to operating in the 1627.5-1637.5 MHz and 1646.5-1656.5 MHz portions of the MSS uplink band. In addition, we invite comment on the significance to our considerations of the agreements between Ligado and Deere, Garmin, and Trimble. Further, we specifically invite comment on Ligado’s most recent submissions that supplement its Applications and associated claims relating to interference concerns. In sum, we request comment on whether the proposed set of operational parameters for operations in the 1526-1536 MHz, 1627.5-1637.5 MHz, and 1646.5-1656.5 MHz bands, along with the proposed license conditions, effectively resolve the

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GPS devices” – specifically general location/navigation (several subcategories), high precision, and timing. *Id.* Attachment B. With regard to the aviation category of GPS devices, Ligado asserted that potential concerns would be addressed by its proposed license condition pertaining specifically to certified aviation devices. *Id.* at 1 and Attachment C. With regard to the smartphone category, it stated that no one had raised any interference issues. *Id.* at 1-2. On February 11, 2016, Ligado submitted a presentation asserting that Garmin is an industry leader in the consumer GPS ecosystem leader, contending that the operational limits that are appropriate for Garmin will benefit other GPS device manufacturers because of the integrated nature of the GPS industry supply chain.

⁴⁴ Letter from Gerald J. Waldron, Counsel to Ligado Networks, LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 12-340 and 11-109, RM-11681 (filed Feb. 24, 2016) (attaching presentation entitled “GPS and Adjacent Band Co-existence Study: Illustration of Method and Selected Results,” summarizing its testing of general navigation and smartphones devices, as well as the test plan it used, entitled “GPS Sensitivity Measurement Plan”) (Ligado Feb. 24, 2016 *Ex Parte*). Ligado had provided the presentation to representatives of DOT, the Department of Defense, and NTIA in a meeting held on February 5, 2016. *Id.* at 2. Ligado also tested the impact of its proposed operations in the 1670-1680 MHz band. *Id.* Ligado stated that other testing had been conducted, with consistent results, and that complete results and analysis would be shared as necessary and appropriate. *Id.* at 3. Ligado’s test plan lists 28 GPS devices that Ligado is testing (which includes general navigation, cellular, and high precision devices). *Id.*, “GPS Sensitivity Measurement Plan.”

⁴⁵ Ligado Feb. 24, 2016 *Ex Parte* at 2-3.

⁴⁶ *Id.* at 3 (objecting to DOT’s “1 dB proposal”; Ligado states that its testing demonstrates “no correlation between 1 dB and GPS device performance”). We note that in earlier submissions LightSquared objected to any reliance on a 1 dB metric for assessing harmful interference. *See, e.g.*, LightSquared Comments in Opposition (filed Mar. 16, 2012).

⁴⁷ Letter from Gerald J. Waldron, Counsel to Ligado Networks, LLC, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 12-340 and 11-109 (filed April 14, 2016) (Ligado April 14, 2016 *Ex Parte*). Ligado also indicated that it would be filing a final report in early May 2016 relating to the use of a 1 dB metric. *Id.*

various interference concerns relating to GPS that previously have been identified in these proceedings, as well as any other interference concerns.

We seek specific comment on whether there remain any unresolved concerns of potential harmful interference to GPS receivers and devices should Ligado operate a terrestrial mobile network on the 1526-1536 MHz, 1627.5-1637.5 MHz, and 1646.5-1656.5 MHz MSS L-band frequencies in accordance with the operational parameters in the Applications that reflect the technical parameters set forth in the agreements.⁴⁸ Considering that the wideband GPS signal is transmitted within the 1560-1591 MHz range of the RNSS allocation, approximately 20 megahertz of frequency separation would exist between the GPS signals in the allocation and Ligado's proposed terrestrial operations below 1536 MHz, and a frequency separation of approximately 35 megahertz would exist between GPS receivers and mobile devices operating above 1627.5 MHz. To the extent any commenter asserts that there remains potential for harmful interference from the proposed terrestrial operations (under the agreed-upon technical parameters) in the 1526-1536 MHz, 1627.5-1637.5 MHz, and 1646.5-1656.5 MHz bands, we seek information on the basis for these concerns and what actions would be necessary to mitigate such potential (e.g., frequency offset, power limits, OOB limits). We request that such commenters supply specific relevant technical information about affected GPS receivers (e.g., receiver category, receiver bandwidth) and their performance or functioning (e.g., break lock, loss of tracking, specific effects on location and timing accuracy) that support their assertion that additional measures would be necessary to resolve remaining concerns of potential harmful interference should Ligado operate a terrestrial mobile network in accordance with the specified set of technical parameters proposed.

EX PARTE STATUS

This proceeding is a "permit-but-disclose" proceeding in accordance with the Commission's ex parte rules.⁴⁹ Persons making ex parte presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral ex parte presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the ex parte presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during ex parte meetings are deemed to be written ex parte presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written ex parte presentations and memoranda summarizing oral ex parte presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's ex parte rules.

⁴⁸ The Commission defines "harmful interference" as "[i]nterference which endangers the functioning of a radionavigation service or other safety of life services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with Radio Regulations." 47 C.F.R. § 2.1(c).

⁴⁹ 47 CFR § 1.1200 *et seq.*

GENERAL INFORMATION

The applications in IBFS File Nos. SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, and SES-MOD-20151231-00981, referred to in this Public Notice, have been found acceptable for filing upon initial review. The Commission reserves the right to return any application if, upon further examination, it is determined to be defective and not in conformance with the Commission's rules or policies.

Interested parties must file comments or petitions to deny the applications no later than **May 23, 2016**. Persons and entities that timely file comments or petitions to deny may participate fully in the proceeding. Responses to comments or oppositions to petitions must be filed no later than **June 6, 2016**. Replies to responses or oppositions must be filed no later than **June 16, 2016**. All filings concerning matters referenced in this Public Notice should refer to **DA 16-442 and IB Docket No. 11-109**, as well as the specific file numbers of the individual applications or other matters to which the filings pertain.

Under the Commission's procedures for the submission of filings and other documents, submissions in this matter may be filed electronically (i.e., through ECFS) or by hand delivery.

- **Electronic Filers:** Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) at <http://fjallfoss.fcc.gov/ecfs2>. See Electronic Filing of Documents in Rulemaking Proceedings, 63 FR 24121 (1998).
- **Paper Filers:** Parties who choose to file by paper must file an original and one copy of each filing. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.
- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington, DC 20554.

Persons with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to FCC504@fcc.gov or call the Consumer & Governmental Affairs Bureau at (202) 418-0530 (voice), (202) 418-0432 (TTY).

For further information, contact: Robert Nelson, at Robert.Nelson@fcc.gov or (202) 418-2341 (International Bureau); Paul Murray, at Paul.Murray@fcc.gov or (202) 418-0688 (Office of Engineering and Technology); or Charles Mathias, at Charles.Mathias@fcc.gov or (202) 418-7147 (Wireless Telecommunications Bureau).

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APPENDIX -- LIGADO'S PROPOSED TECHNICAL OPERATIONAL PARAMETERS

The specifics of Ligado's proposal are set forth below and in the attached table.⁵⁰

Base Station Operations (Downlinks) in the 1526-1536 MHz Band

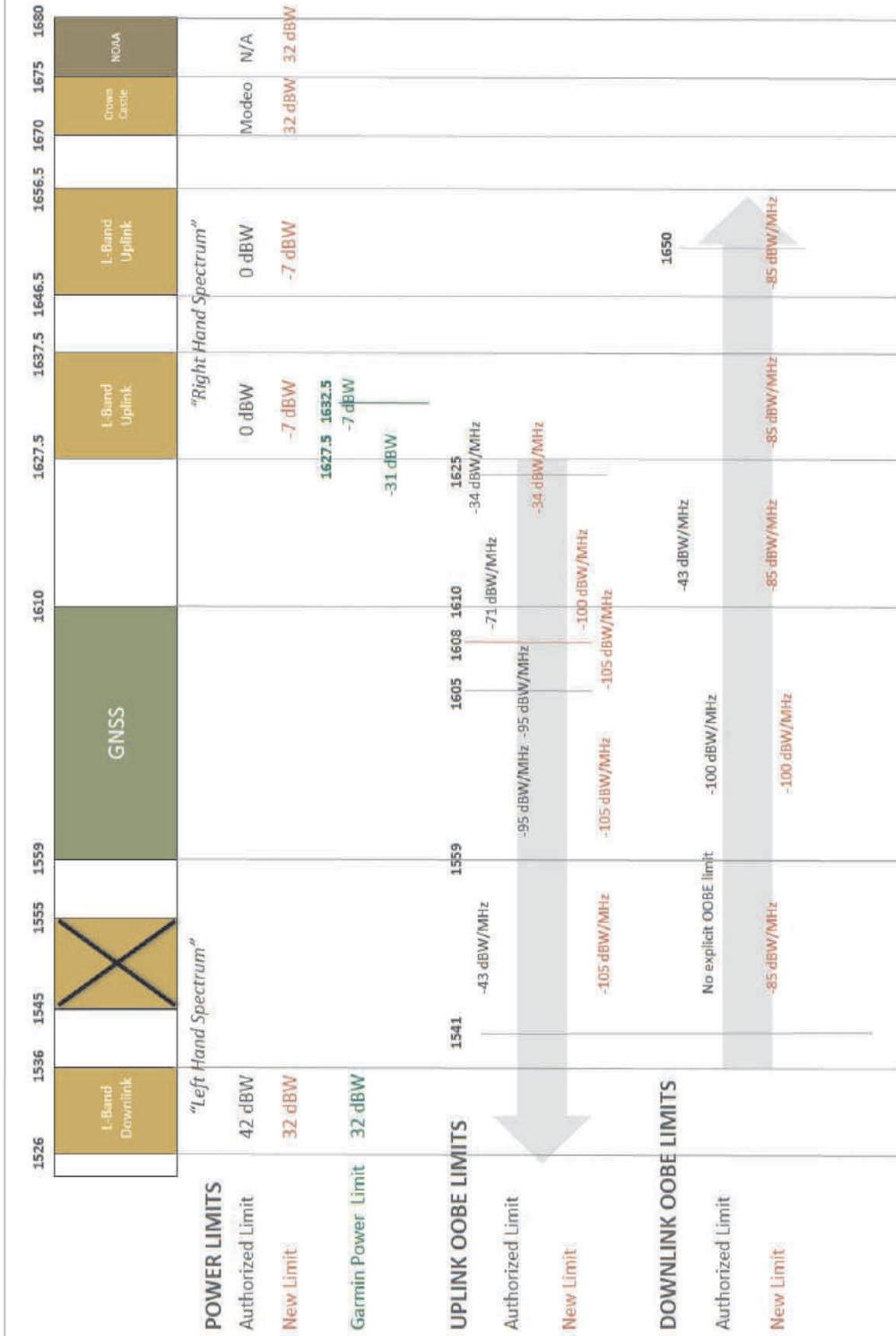
- **Power limits** –
 - modify the EIRP limit for the 1526-1536 MHz band from 42 dBW to 32 dBW.
- **Out-of-band emissions (OOBE) limits** –
 - implement a -85 dBW/MHz limit from 1541-1559 MHz;
 - retain the -100 dBW/MHz limit from 1559-1610 MHz (RNSS band); and
 - implement a -85 dBW/MHz limit for 1610-1650 MHz.
- **Narrowband OOBE limits** –
 - modify the limit for narrowband from 1541-1559 MHz to -112 dBW/2 kHz.
 - retain the limit for narrowband from 1559-1610 MHz to -110 dBW/700 Hz; and
 - modify the limit for narrowband from 1610-1650 MHz to -95 dBW/700 Hz.

User Equipment Operations (Uplinks) in the 1627.5-1637.5 MHz and 1646.5-1656.5 MHz Bands

- **Power limits** –
 - modify the EIRP limit for the 1627.5-1637.5 MHz band from 0 to -7 dBW, provided that the 1627.5-1632.5 MHz segment of this band will have an EIRP limit that ramps from -31 dBW to -7 dBW for a period of five years – until January 1, 2021 – and then that segment will revert to -7 dBW; and
 - modify the EIRP limit for the 1646.5-1656.5 band from 0 dBW to -7 dBW.
- **OOBE limits** –
 - retain a -34 dBW/MHz limit at 1625 MHz;
 - modify the limit at 1610 from -71 dBW/MHz to -100 dBW/MHz, ramping up between the values at 1625 MHz and 1610 MHz;
 - implement a -105 dBW/MHz limit at 1608 MHz, ramping up between the values at 1610 MHz and 1608 MHz;
 - modify the limit at 1559-1608 from -95 dBW/MHz to -105 dBW/MHz; and
 - modify the limit from 1541-1559 MHz from -43 dBW/MHz to -105 dBW/MHz.
- **Narrowband OOBE limits** –
 - modify the limit for narrowband from 1610-1625 MHz to ramp from -110 dBW/700 Hz to -44 dBW/700 Hz;
 - modify the limit for narrowband from 1608-1610 MHz to ramp from -115 dBW/700 Hz to -110 dBW/700 Hz;
 - modify the limit for narrowband from 1559-1608 MHz to -115 dBW/700Hz; and
 - modify the limit for narrowband from 1541-1549 MHz to -132 dBW/2 kHz.

⁵⁰ See Applications, Description of Proposed Modification at 4-7.

Technical Operating Parameters Specified in Coexistence Plans



Note: The Coexistence Plans also include narrowband limits not depicted here.