BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
LightSquared Subsidiary LLC	)	RM-11683
	)	
Petition for Rulemaking for Development of Operating Parameters for Terrestrial Use of the 1526-1536 MHz Portion of the L-Band	)	

To: The Commission

OPPOSITION OF LOCKHEED MARTIN CORPORATION

Lockheed Martin Corporation ("Lockheed Martin") hereby provides its Comments in opposition to the above-captioned petition for rule making from LightSquared Subsidiary, LLC ("LightSquared").[1] In its Petition, LightSquared requests that the Commission initiate a rulemaking proceeding to amend the Commission's rules in unspecified ways to reflect "operating parameters for terrestrial use of the 1526-1536 MHz portion of the L-Band . . . ." It seeks rules that would, "for a transition period, allow terrestrial use of the lower 10 MHz of LightSquared's L-Band downlink spectrum at 1526-36 MHz in a manner to ensure further compatibility with GPS receivers[,]" and "establish a timetable that, based explicitly on the record in this proceeding, would ultimately permit LightSquared robust commercial terrestrial use of this band."[2] For the reasons provided below, Lockheed Martin calls upon the Commission to dismiss the LightSquared Petition without prejudice as premature.

---

[1] *See* Public Notice, Report No. 2968 (released November 16, 2012), inviting statements opposing or supporting the above-captioned petition for rule making.

[2] LightSquared Subsidiary LLC Petition for Rulemaking to Revise the Commission's Technical Rules, RM-11683, filed September 28, 2012 ("LightSquared Petition").

I. Introduction

Lockheed Martin is engaged in the research, design, development, manufacture and integration of advanced technology systems, products and services across a broad range of areas for both commercial and government customers. Lockheed Martin is the only Commission licensee of space stations operating in the 1559-1610 MHz (or "L1") RNSS band.[3] The two Lockheed Martin RPS satellites and their associated earth stations provide a service integral to the Federal Aviation Administration's ("FAA") overall Wide Area Augmentation System ("WAAS"). The WAAS provides augmentation of GPS signals throughout the entire National Airspace System ("NAS") to improve the accuracy, availability, and integrity of the GPS space-based positioning, navigation, and timing ("PNT") service.

The LM RPS System is an integral part of the WAAS developed by the FAA to augment the GPS, in order to improve the accuracy, integrity, and availability of space-based radio-navigation for enhanced safety of flight throughout the NAS. WAAS uses a network of ground-based reference stations to measure small variations in the GPS satellites' signals. Measurements from the reference stations are then routed to master stations, which generate and send the WAAS signal to the RPS satellites that broadcast messages to WAAS-enabled GPS receivers on end-user aircraft that improves the GPS service performance, which is required for the use of GPS throughout in the NAS providing increased data accuracy.

As the service Lockheed Martin provides over the RPS satellites incorporates the GPS signals in the 1559-1610 MHz band, disruption of the GPS L1 signal has the potential to cause harmful interference to the RPS system – and beyond. The RPS satellites broadcast a WAAS signal in the 1559-1610 MHz band that is used by GPS aviation receivers and specially-

[3] The RPS satellites also operate in the "L5" RNSS band at 1164-1215 MHz.

enabled WAAS receivers on aircraft for use in air navigation and air traffic control. The earth stations that uplink the signals to the RPS satellites include a very sensitive GPS/WAAS receiver with a much higher gain antenna than is found in the typical GPS receiver. As such, these receivers are very sensitive to interference. If signal reception is disrupted, these antennas are unable to perform a safety critical function to uplink the proper signal for broadcast from the WAAS RPS satellites on the L1 signals. Interference to this L1 signal on Lockheed Martin's RPS satellites would cause the feedback control loop – utilized in the ground station, which very closely controls the uplink signal – to produce erroneous data. This erroneous data would then be operated upon by the feedback control loop and result in an incorrect uplink signal that would be broadcast from the Lockheed Martin RPS satellite.

The main issue arises from the fact that an RPS broadcast of erroneous data would not be immediately detected by Lockheed Martin, by the FAA's WAAS monitor, or by the end-user aircraft, and would thus likely result in the introduction of a substantial safety hazard to a significant portion of the, and potentially the entire, National Airspace System. Once the interference situation is detected, the uplink transmission to the satellite would be terminated immediately, and unless a backup ground station is available, the broadcast transmissions that are required to enable use of GPS in the National Airspace System would also cease.

This means that any interference to the reception and use by aircraft in flight of the signals broadcast by the Lockheed Martin RPS satellites, without question, significantly reduces the efficiency of the National Airspace System and quite possibly endangers safety of life and property.

Lockheed Martin also manufactures military aircraft that are tested using the aeronautical mobile telemetry ("AMT") spectrum in the 1435-1525 MHz band at several test

ranges around the country. Interference to or disruption of AMT signals during testing presents a risk of grievous damage to life and property – both on and off the test range.

For more than two years, the Commission has been considering LightSquared proposals to provide high-powered terrestrial mobile service using base stations that would operate in the 1525-1559 MHz band. Earlier this year, following an unprecedented course of thorough testing that was carried out in 2011 by the Commission-established Technical Working Group, the Commission proposed to vacate a controversial 2011 decision that conditionally granted LightSquared access to the 1525-1559 MHz band.[4] The Commission cited the inability to resolve satisfactorily the interference to GPS operations that would be caused by LightSquared's planned terrestrial operations, and the absence of any realistic prospect that such interference concerns could be resolved in a reasonable period of time.[5] Although a Commission ruling on its proposal to relieve LightSquared of authority to operate its proposed terrestrial mobile service in the 1525-1559 MHz band remains forthcoming, LightSquared has now returned to the Commission with a new set of rulemaking and application proposals to use spectrum in the 1525-1559 MHz band for terrestrial mobile base station operations.[6]

---

[4] *See* FCC Public Notice, "International Bureau Invited Comment on NTIA Letter Regarding LightSquared Conditional Waiver," DA 12-214, IB Docket No. 11-109, released February 15, 2012 ("*February 15 Public Notice*"), at 3. GPS is the Global Positioning System, which operates in the radionavigation-satellite service band at 1559-1610 MHz – immediately adjacent to the MSS band licensed to LightSquared.

[5] *Id.*

[6] In addition to this LightSquared Petition, LightSquared has petitioned the Commission to allocate spectrum for terrestrial mobile service in the 1675-1680 MHz band for LightSquared's use as "an alternative" to the provision of mobile service in the upper part of the 1525-1559 MHz band (RM-11681); it has also applied the Commission for a modification of its satellite system license to both vacate the authority the Commission has already proposed to vacate (and which LightSquared has previously opposed) and "gain access to 5 MHz of alternative spectrum" for mobile service at 1675-1680 MHz (File No. SAT-MOD-20120928-00160, *et. seq.*, at Narrative, p. 4). Lockheed Martin filed a statement in opposition to the petition for rulemaking in RM-11681 on December 10, 2012, and is filing comments on the LightSquared modification applications contemporaneously with this statement in opposition.

II. Discussion

Lockheed Martin urges the Commission to conclude that LightSquared's "comprehensive approach" is not actionable at this time. In particular, the LightSquared Petition is speculative, reliant on contingencies, and lacking in technical support. The absence of a technical showing is a surprising deficiency given that the Commission's pending proposal to deny LightSquared all authority to operate a terrestrial service in the 1525-1559 MHz band stems from Commission-directed studies that showed no reasonable prospect for terrestrial use of the 1525-1559 MHz band for the foreseeable future.

While Lockheed Martin appreciates LightSquared's reference to transparent and inclusive government-industry cooperation, and compatibility with GPS,[7] use of the 1526-1536 MHz sement of the MSS downlink band for terrestrial service has been specifically been deemed untenable by government studies that conducted actual tests of LightSquared's effects on GPS. An engineering showing or some other technical demonstration of the feasibility of what LightSquared proposes – including an effort to meaningfully distinguish the results already reached – are the bare minimum requirements here. The LightSquared Petition does not include any articulation of a rationale for concluding that the TWG conclusion that extends to the 1526-1536 MHz band should be overturned or even revisited.[8]

Similarly absent from the LightSquared Petition is any recognition at all that provision of a high-power terrestrial mobile service in the lower portion of the 1525-1559 MHz band may have an impact on AMT operations in the band immediately below 1525 MHz. Lockheed

---

[7] LightSquared Petition at 4.

[8] A petitioner for rulemaking must not only propose a general manner of operation, it must demonstrate how modified operations can successfully be implemented without increasing the potential for harmful interference to existing spectrum users. *See, e.g., Starkey Laboratories, Inc.*, 27 FCC Rcd 5805 (OET, 2012) (Petition for rulemaking is dismissed without further action when petitioner was found not to have "provided any analysis to demonstrate that its proposal will not increase the potential for interference to licensed users").

Martin and others have raised this concern before. In comments Lockheed Martin filed last year into the docket containing the TWG study results, Lockheed Martin noted that it shared a concern with the National Space-Based Positioning, Navigation, and Timing Systems Engineering Forum ("NPEF") on the potential increase in interference to AMT flight test operations in the band directly below 1525 MHz that would result from LightSquared terrestrial mobile broadband operations in the 1525-1559 MHz band – particularly in the lower 10 MHz of that band (i.e., adjacent to the AMT band).[9]

Adding to these shortcomings is the fact that LightSquared's comprehensive plan is subject to an array of contingencies. For example, the plan assumes at the outset that LightSquared will "obtain[] access to 1670-1680 MHz for use as downlink spectrum," even though that proposal is the subject of a separately initiated rulemaking proceeding.[10] At the same time, LightSquared notes that it "has also requested the Commission to confirm that all of the milestones in the Commission's Order approving the transfer of control of SkyTerra to Harbinger are now mooted and . . . establish new milestones at a future date."[11] And as LightSquared notes at the outset of its Petition, there is already an ongoing proceeding in which the Commission has concluded, based on interference concerns impacting hundreds of thousands of deployed GPS devices, to suspend indefinitely the extant LightSquared ATC

---

[9] *See* Comments of Lockheed Martin Corporation in IB Docket No. 11-09, at 9 (filed July 29, 2011) (citing the public version of the June 1, 2011 NPEF Report, "Assessment of LightSquared Terrestrial Broadband System Effects on GPS Receivers and GPS-Dependent Applications" ("NPEF Report")). Lockheed Martin noted that the NPEF Report (at 9-2) observed that an earlier coordination agreement between the Aerospace and Flight Test Coordinating Council "and MSV, predecessor to LightSquared, did not contemplate the extensive terrestrial deployment now reflected in LightSquared's current plan. Any consideration of moving LightSquared farther down in the MSS allocated band should also consider the potential impacts to AMT operation, both in terms of increased potential interference and the additional coordination burden that would be placed on military and other Federal agency frequency managers and Federal test facilities").

[10] LightSquared Petition at 5.

[11] *Id.* at 1 n.1.

authority for limited terrestrial mobile operations.[12] These obstacles combine to shroud LightSquared's Petition in uncertainty – uncertainty that LightSquared itself offers nothing to help resolve when its Petition provides no concrete answers to difficult technical questions that are currently before the Commission in several already-pending proceedings.

Finally, Lockheed Martin observes that, as drafted, LightSquared's Petition offers no evidence that its spectrum proposal would advance the public interest, convenience, or necessity by promoting a more advantageous use of the spectrum resource. The identification of new spectrum that would allow multiple providers to offer new terrestrial broadband service is not the only public interest consideration at stake here. Countervailing public and national interest considerations omitted from the Petition are the continued ability of long-established and critical uses of bands both above and below 1525-1559 MHz to continue without disruption or intolerable constraint. These national interests not only have to be taken into account, they have to be fully reconciled with the overall (but not overriding) national policy objective of increasing the amount of spectrum available in this country for the provision of mobile broadband service.

The LightSquared Petition thus has both substantive and procedural obstacles to overcome before it merits any further Commission consideration. The Commission should, at a minimum, defer action on the Petition until LightSquared provides the technical showings and justifications needed. The course of action preferred by Lockheed Martin is for the Commission to dismiss the petition without prejudice to resubmission once the myriad outstanding issues from other pending proceedings are resolved and contingencies are removed

[12] *Id.* at 2.

one way or the other.[13] Once LightSquared makes a credible technical demonstration, and proposes a viable technical mechanism for protecting existing and future GPS receivers and avoiding harmful interference to AMT operations, Lockheed Martin could foresee the Commission proceeding to the next phase of the administrative rulemaking process.

III. Conclusion

For all of the reasons provided above, Lockheed Martin respectfully opposes the advancement of the LightSquared Petition at this time.

Respectfully submitted,

LOCKHEED MARTIN CORPORATION

By: s/ Jennifer Warren

Jennifer Warren
Vice President, Technology Policy
& Regulation
Lockheed Martin Corporation
2121 Crystal Drive, Suite 100
Arlington VA, 22202

December 17, 2012

[13] Under Section 1.401 of the Commission's Rules, 47 C.F.R. § 1.401(e), the Commission has the right, *inter alia*, to deny or dismiss without prejudice petitions for rulemaking which are premature.

CERTIFICATE OF SERVICE

I, Jennifer Warren, hereby certify that on this 17th day of December, 2012, a copy of the foregoing Opposition of Lockheed Martin Corporation is being sent via first class, U.S. Mail, postage prepaid, to the following:

Jeffrey J. Carlisle
Executive Vice President
Regulatory Affairs & Public Policy
LightSquared
10802 Parkridge Boulevard
Reston, VA 20191-4334

s/ Jennifer Warren