

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554**

In the Matter of )  
 )  
LightSquared Subsidiary LLC ) File No. \_\_\_\_\_  
 )  
Application for Special Temporary Authority )

**APPLICATION**

By this Application, LightSquared Subsidiary LLC (“LightSquared”) seeks Special Temporary Authority (“STA”) beginning November 28, 2010 and continuing for 30 days (i.e. until December 28, 2010) to conduct certain in-orbit testing (“IOT”) of the SkyTerra 1 satellite, as explained below. Given the imminent launch of the satellite in less than one month, LightSquared requests that the Commission act expeditiously in granting this application.<sup>1</sup>

**I. BACKGROUND**

LightSquared is authorized to launch and operate the SkyTerra 1 satellite at the 101.3°W.L. location.<sup>2</sup> The satellite is authorized to operate its service links on the L-band frequencies (i.e. 1525-1544/1545-1559 MHz (space-to-Earth) and 1626.5-1645.5/1646.5-1660.5 MHz (Earth-to-space)) coordinated internationally by the United States and its feeder links on the Appendix 30B Ku-band frequencies (i.e. 10.70-10.95 & 11.20-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-Space)). On November 14, 2010, SkyTerra 1 is scheduled to be

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<sup>1</sup> Because LightSquared seeks to conduct the tests specified in this application for no more than 30 days, no public notice of this application is necessary. *See* 47 C.F.R. § 25.120(b)(4).

<sup>2</sup> *In the Matter of Mobile Satellite Ventures Subsidiary LLC*, 20 FCC Rcd 9752 (Int’l Bur. 2005); *see also* File Nos. SAT-MOD-20100405-00064 (filed April 5, 2010) and SAT-AMD-20100908-00191 (filed September 8, 2010) (seeking an extension of the launch and operate milestone for SkyTerra 1). The MSAT-2 satellite presently operates at 101.3°W.L., and LightSquared has a pending application to relocate that satellite to 103.3°W.L. *See* File Nos. SAT-MOD-20100412-00075, SAT-AMD-20100514-00101, and SAT-AMD-20100527-00112.

launched from Kazakhstan by ILS International Launch Services, Inc. Beginning November 28, 2010, LightSquared plans to perform certain testing of its communications payload, including associated telemetry, tracking, and command systems, as discussed below.<sup>3</sup> The IOT will be performed by employees of LightSquared's satellite contractor, Boeing Satellite Systems Inc. ("Boeing"), under LightSquared's direction and supervision.<sup>4</sup>

The IOT will be performed using LightSquared's FCC authorized gateway earth stations at Napa, CA (E080030) and Cedar Hill, TX (E080031), as well as gateway earth stations in Saskatoon, Saskatchewan and Ottawa, Ontario, which are authorized by Industry Canada to communicate with SkyTerra 1. The IOT will consist of a number of sequentially performed tests. Initially, the satellite's bus systems and communication payload will be tested, and basic functionality will be confirmed. Subsequently, the performance of the components related to beam-forming will be tested as will the combined payload and Ground-Based Beam Forming ("GBBF") network to confirm that various L-band beams are being formed as specified.

A portion of the IOT will be performed using signals within the limits permitted under LightSquared's satellite and earth station authorizations. However, for the tests specified below, LightSquared will exceed its authorized limits and, accordingly, seeks STA to conduct such tests. The proposed testing of SkyTerra 1 is not expected to cause harmful interference to any other satellite operator, and as discussed below, LightSquared either has coordinated or expects to

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<sup>3</sup> The communications payload of the SkyTerra 1 satellite consists of two repeater subsystems: one associated with the forward channel and another one associated with the return channel. The forward channel refers to the Ku-to-L band signal path that originates from any of LightSquared's Ku-band gateway facility to the satellite, and is transmitted to an L-band terminal. The return channel refers to the link from an L-band terminal to the satellite and then to the Ku-band gateway.

<sup>4</sup> Boeing is also responsible for obtaining any necessary authorizations for launch and early orbit phase ("LEOP") operations.

complete coordination with all potentially affected satellite operators prior to the launch of SkyTerra 1.

## **II. TEST DESCRIPTIONS**

### **A. L-Band Power Ramp-up**

The power output of the L-band forward payload will be gradually increased to the Nominal Operating Point which corresponds to the maximum L-band power that will be used in operation. The objective of the test is to gradually increase the temperature of coaxial cables to vent out air and organic gases trapped inside. Table 1 shows the characteristics of the downlink L-band carrier used during power ramp-up. STA is required for this carrier because its power and power flux spectral density (“PFSD”) exceeds that of any carrier type authorized for SkyTerra 1. For this test, as well as those discussed below involving the L-band frequencies, LightSquared has coordinated use of the IOT frequencies and power levels with Inmarsat, the only potentially affected L-band operator.<sup>5</sup> LightSquared will be in continuous contact with Inmarsat prior to and during IOT; Inmarsat will be aware of the test schedule and will be able to alert LightSquared if any harmful interference is detected during testing.

### **B. L-Band Forward Payload Health Check**

The objective of this test is to characterize the health of the L-band forward and return element paths. Signal paths through each solid-state power amplifier will be checked sequentially, and the total test duration will be 120 minutes. Table 1 shows the characteristics of

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<sup>5</sup> Some of the IOT involve L-band frequencies assigned internationally to Solidaridad-1, which is no longer in operations. Accordingly, there can be no harmful interference to that satellite from any of the proposed testing. SkyTerra 1 is also authorized to use the Solidaridad-1 frequencies. *See also In the Matter of SkyTerra Subsidiary LLC*, DA 10-356 (Int’l Bur. March 1, 2010). With respect to all tests, LightSquared will coordinate internally and with its joint venture partner, SkyTerra (Canada) Inc., to prevent harmful interference to MSAT-2 at 103.3°W.L. and MSAT-1 at 106.5°W.L., respectively.

the downlink L-band carrier used during the forward payload health check. STA is required for this carrier because its PFSD exceeds that of any carrier type authorized for SkyTerra 1.

### **C. L-Band Forward and Return Antenna Mapping**

Antenna mapping will be performed to confirm the gain and gain roll-off of the forward L-band beams. Table 1 shows the characteristics of the downlink L-band carriers used during forward L-Band antenna mapping. These carriers will be received and measured at the gateway earth stations while the satellite attitude is slewed in elevation and azimuth. STA is required for this carrier because its PFSD exceeds that of any carrier type authorized for SkyTerra 1. Further, during portions of the slews, the SkyTerra-1 beams will be aimed beyond authorized boundaries.

For return L-band antenna mapping, LightSquared will uplink CW carriers from its gateway earth stations. These carriers will be received at the satellite as its attitude is slewed in elevation and azimuth. STA is required because the carrier will have an EIRP of 15 dBW while the gateway earth stations are authorized for a maximum carrier EIRP of 9 dBW.

### **D. L-Band G/T Check**

A 24-hour G/T check will be conducted over a range of the L-band frequencies by transmitting test carriers from a beam originating from the Napa, CA gateway earth station. All test carriers will be within bandwidth limits authorized for use by LightSquared. STA is required because the carriers will have an EIRP of 15 dBW, which exceeds the maximum carrier EIRP of 9 dBW authorized to the Napa gateway earth station.

### **E. Ku-Band Forward and Return Antenna Mapping and Forward EIRP Test**

Antenna mapping will be performed to confirm the gain and gain roll-off of the four forward and return Ku-band beams. For the forward mapping, a CW carrier within the authorized frequency parameters will be transmitted from the satellite Ku-band beam under test. The carriers will be received and measured at the Napa, CA gateway earth station while the

satellite attitude is slewed in elevation and azimuth. The forward EIRP test is similar, except that the satellite attitude will be fixed for each beam measurement with the beam under test centered on the Napa, CA gateway and four different frequencies will be used. For the return beam mapping, a CW carrier within authorized power and frequency parameters will be transmitted from the Napa, CA gateway earth station, and the level measured at the satellite will be transmitted back to the Napa, CA station via the telemetry channel. For the forward beam mapping, four CW carriers within the authorized frequency parameters will be transmitted from the satellite and will be measured at Napa, CA gateway earth station. STA is required for this carrier because during portions of the slews, the SkyTerra 1 beams will be aimed beyond authorized boundaries toward the north and west, and the downlink PFSD will exceed the limits of 47 C.F.R. § 25.208, as shown in Table 4 below.

This test is not expected to cause harmful interference. The nearest co-frequency satellite is TerreStar-1 at 111.0 °W,<sup>6</sup> and at this minimum 9.8° of minimum separation, the lowest amount of sidelobe discrimination (for a 2.7m antenna, which is the minimum size for an ITU compliant AP-30B antenna) is 45 dB. *See* ITU RR AP-30B Annex 1, paragraph 1.6. Additionally, the test carriers are widely spaced, and therefore, the average density over the band is low. LightSquared expects to complete coordination with Terrestrial prior to the launch of SkyTerra 1. There are no other Appendix 30B networks operating within the affected region.

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<sup>6</sup> *See supra* note 5 (discussing coordination with MSAT-1 and MSAT-2).

Table 1- Forward L-Band Payload Tests

	L-band EIRP (dBW)	Bandwidth	L-band PFSD (dBW/m <sup>2</sup> -Hz)	Expected Duration
L-Band Power Ramp-up	67.9	312.5 kHz	-114	6 hours
Payload Health Check - CW	52	CW	-111	2 hours
L-Band Antenna Mapping	53	CW	-110	15 minutes/cut x 60 cuts

Note: Corresponding Ku-band carriers will be spread across the authorized band and will be within authorized levels.

Table 2- Return L-Band Payload Tests

	L-band EIRP (dBW)	Bandwidth	Expected Duration
Feed Element Gain Check	15	CW	90 minutes
Payload Health Check - CW	15	CW	2 hours
L-Band Antenna Mapping	15	CW	15 minutes/cut x 60 cuts
L-Band G/T Check	15	CW	24 hours

Note: Corresponding Ku-band carriers will be spread across the authorized band and will be within authorized levels.

Table 3- Forward Ku-Band Antenna Mapping and EIRP Test

	Satellite Ku-band EIRP (dBW)	Bandwidth	EIRP Density (dBW/4 kHz)	Expected Duration
Ku-Band Antenna Mapping	32.2	CW	-3.8	40 hours

Note: The test will comprise a number of cuts over 40 hours, but the carriers will not be active continuously throughout that period.

Table 4 – Downlink PFSD

Maximum PFD Limit (dB(W/m <sup>2</sup> /4 kHz))	Elevation Angle (degrees)	SkyTerra 1 Maximum Power Flux Density (dB(W/m <sup>2</sup> /4 kHz))	Margin (dB)
-150	0	-131.2	-18.8
-150	5	-131.1	-18.9
-140	25	-130.6	-9.4
-140	90	-129.9	-10.1

For the foregoing reasons, LightSquared requests that the FCC grant this application expeditiously.

Respectfully submitted,

**LightSquared Subsidiary LLC**

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/s/

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October 25, 2010



## Technical Certification

I, Richard Evans, hereby certify under penalty of perjury that:

I am the technically qualified person responsible for preparation of the engineering information contained in this application, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this application, and that it is complete and accurate to the best of my knowledge.

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/s/

Richard Evans  
Principal Engineer  
LightSquared Subsidiary LLC

October 25, 2010

