

## Exhibit C Application Narrative and Waiver Request

Pursuant to Section 25.117(c) of the Commission's rules, LightSquared Subsidiary LLC, Debtor-in-Possession ("LightSquared") hereby requests authority to modify the L-Band earth station license that is the subject of this application (the "License") in connection with the planned change in orbital location of MSAT-1 at a new location just one degree away. The License authorizes LightSquared to provide L-Band mobile satellite service ("MSS") over MSAT-1, a Canadian-licensed spacecraft that currently is located at 106.5° W.L. The Commission granted market access for L-Band operations over MSAT-1 in 1999.<sup>1</sup> MSAT-1 is expected to be relocated from its current orbital position to 107.5° W.L. in September 2015, pursuant to Industry Canada authority that currently is being sought. LightSquared plans to continue to make available L-Band service over MSAT-1 at its new location. Grant of the application would facilitate the planned relocation, enable the continued availability of service over MSAT-1, and otherwise serve the public interest.

Under Commission precedent, this request is properly processed outside the modified processing round often used for NGSO-like MSS applications, as the L-Band MSS service link frequencies to be used by MSAT-1 at its new orbital location are the same frequencies already authorized for use by the satellite just one degree away.<sup>2</sup>

As discussed in the attached Technical Annex, continued operations of this L-Band earth station over the relocated MSAT-1 would comply with the Commission's technical rules governing L-Band MSS operations. An updated Schedule S reflecting the relocation of the satellite and associated technical changes related to the L-Band operations of the satellite is being provided with this application.<sup>3</sup> No other change to the authorized parameters of the facilities covered by the License is contemplated.

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<sup>1</sup> See *Applications of SatCOM Systems, Inc., et al.*, Order and Authorization, 14 FCC Rcd 20798 (1998).

<sup>2</sup> See, e.g., *Mobile Satellite Ventures Subsidiary LLC*, Order and Authorization, DA 05-1492 ¶ 14 (rel. May 23, 2005); see also *Mobile Satellite Ventures Subsidiary LLC*, Order and Authorization, DA 05-50 ¶ 8 (rel. Jan. 10, 2005) (processing a new L-Band MSS satellite application to operate at a different location and serve a different geographic area without instituting a modified processing round as long as the same frequencies are used).

<sup>3</sup> This application pertains only to L-Band operations of MSAT-1. Information regarding the primary TT&C and feeder-link operations of MSAT-1, which involve facilities located outside of the United States and operate pursuant to authority from and oversight by Industry Canada, are provided for informational purposes only. See *Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, Report and Order, 15 FCC Rcd 16127 ¶¶ 86-87 (2000) (market access requests for foreign-licensed satellite need not cover operations outside the United States); IBFS File No. SAT-PPL-20060516-00061, at 1 n.2 (granted Jan. 18, 2007) (disclosing existence of Ka-band payload on Anik F3 but not seeking market access for the Ka-band payload and providing

LightSquared requests, to the extent necessary, waiver of that portion of Section 25.283(c) of the Commission's rules that requires the relief of pressure vessels at a satellite's end-of-life.<sup>4</sup> MSAT-1 was launched in 1996, nearly a decade before the Commission's orbital debris mitigation rules became effective on October 12, 2004.<sup>5</sup> Accordingly, it is no longer possible to change the design of the satellite. MSAT-1 is a Boeing Model 601 satellite, which is not designed to discharge fully every pressure vessel upon end-of-life. Rather, the standard de-orbiting procedure for the Boeing Model 601, which would be employed in the case of MSAT-1, calls for helium tanks to be isolated and vented to a very low level of pressurization (*i.e.*, a few hundred kPa). This design element related to a vessel that holds an inert gas does not appreciably increase the potential for accidental explosions during or after a spacecraft's mission.

Notably, the Commission previously has waived Section 25.283(c) in the case of *unlaunched* satellites with similar design elements where it was impractical to effect a redesign of such satellites.<sup>6</sup> In the case of MSAT-1, which already was in-orbit at the time Section 25.283(c) went into effect, the case for waiver is even more compelling. Waiver also is appropriate in this case because it would not undermine the purpose of the rule; as explained above, MSAT-1's satellite design appropriately minimizes the risk of accidental explosion during and after completion of mission, consistent with the Commission's rules. Indeed, the Boeing 601 spacecraft bus (and other spacecraft buses with similar helium tank designs) has been in commercial service for about 20 years without incidents involving accidental explosions.

Finally, as discussed in the accompanying Technical Annex, LightSquared is requesting a partial waiver of Section 25.114(c) of the Commission's rules to allow flexibility to provide certain information that is not readily captured by the form Schedule S submitted with this application, and which represent unique aspects of MSAT-1.<sup>7</sup>

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complete technical information only regarding the C- and Ku-Band operations of the spacecraft).

<sup>4</sup> 47 C.F.R. § 25.283(c). Under Section 1.3 of the Commission's rules, the Commission has authority to waive its rules for good cause. 47 C.F.R. § 1.3. Good cause exists if "special circumstances warrant a deviation from the general rule and such deviation will serve the public interest." *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990). In determining whether a waiver is appropriate, the Commission should "take into account considerations of hardship, equity, or more effective implementation of overall policy." *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969), *cert. denied*, 409 U.S. 1027 (1972).

<sup>5</sup> *See Mitigation of Orbital Debris*, 69 Fed. Reg. 54581-89 (Sept. 9, 2004).

<sup>6</sup> *See, e.g.*, Stamp Grant, IBFS File No. SAT-MOD-20080630-00133, at Condition 3 (granted Sept. 2, 2008) (granting waiver of venting requirement and noting that "Galaxy 12 was launched before Section 25.283(c) became effective"); *see also* Stamp Grant, IBFS File No. SAT-LOA-20090807-00085 (granted Dec. 15, 2009) (granting waiver of venting requirement for DIRECTV 12/RB2-A).

<sup>7</sup> 47 C.F.R. § 25.114(c).

## TECHNICAL ANNEX

The Canadian-licensed MSAT-1 satellite (licensed by Industry Canada to SkyTerra (Canada) Inc.) currently is authorized to provide service to the United States in the L Band from 106.5° W.L.<sup>1</sup> This application seeks authority to provide L-Band service over MSAT-1 from a location just one degree away, at 107.5° W.L. This application does not request authorization for new frequencies, any other change in the technical parameters of MSAT-1, or any other change in the currently authorized earth station parameters defined in the License. This technical annex provides information not contained in the Schedule S associated with this application, or otherwise not provided in connection with the prior applications for authority referenced above, which have included all of the information required of L-Band MSS applicants under Section 25.114(d)(8) of the Commission's rules.

The MSAT-1 satellite provides MSS to North America in conjunction with a variety of ground segment facilities. While the system-wide capacity depends on the mix of traffic types, the beam configurations used, and the geographic distribution of traffic, the design capacity is 1820 channels in the L Band.

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<sup>1</sup> See, e.g., *TMI Communications and Company, L.P.*, 14 FCC Rcd 20798 (1999) (granting TMI MET license to access MSAT-1, Call Sign E980179), *aff'd sub nom.*, *AMSC Subsidiary Corp. v. FCC*, 216 F.3d 1154 (D.C. Cir. 2000), *modified*, 15 FCC Rcd 24467 (2000); *TMI Communications and Company, L.P.*, 15 FCC Rcd 18117 (2000) (granting TMI MET license to access MSAT-1, Call Sign E990133); *Motient Services Inc., et al., Order and Authorization*, DA 01-2732, File No. SAT-ASG-20010302-00017 *et al.* (November 21, 2001) (granting assignment of TMI MET licenses to MSV); *Mobile Satellite Ventures Subsidiary LLC, Order and Authorization*, DA 01-2745 (November 23, 2001) (authorizing earth stations assigned to MSV to communicate with MSAT-1); *Mobile Satellite Ventures Subsidiary LLC, Application for Modification*, File No. SES-MOD-20020906-01531 (granted February 3, 2003) (authorizing use of MSAT-1 in the lower L Band).

MSAT-1 currently operates at 106.5° W.L. and would relocate to 107.5° W.L. pursuant to authority that is being sought from Industry Canada. The satellite has been operating in inclined orbit mode since July 2007; as of May 1, 2015, the inclination has been 6.5°. The satellite has  $\pm$  0.05° East-West station keeping volume. U.S. market access has been granted for the following L-Band frequencies: 1530-1544 MHz & 1545-1559 MHz (Space-to-Earth) and 1631.5-1645.5 MHz & 1646.5-1660.5 MHz (Earth-to-Space).

The primary TT&C and feeder link earth stations that communicate with the MSAT-1 satellite are located in Allan Park, Ontario, Canada.<sup>2</sup> Limited technical specifications related to those ground segment operations are provided in the Schedule S attached to this application for informational purposes.

LightSquared provides the following orbital debris mitigation assessment out of an abundance of caution as market access was granted for MSAT-1 at 106.5° W.L. before the Commission's orbital debris rules came into effect. LightSquared has assessed and limited the amount of debris released in a planned manner during normal operations. MSAT-1 has been launched and is operating at its currently authorized position. LightSquared does not intend to release debris during the planned relocation of MSAT-1 or in the course of its operations at 107.5° W.L. LightSquared has considered the possibility of MSAT-1 becoming a source of debris by collisions with small debris or meteoroids that could cause loss of control of the spacecraft and prevent post-mission disposal. LightSquared has addressed the possibility of collision by ensuring that critical spacecraft components are located inside the protective body of

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<sup>2</sup> TT&C and feeder-link operations utilize Ku-Band spectrum. As the primary ground segment facilities for those operations are located outside of the United States and are subject to licensing and/or oversight by Industry Canada, they are outside the scope of this application. LightSquared does not seek authority to conduct TT&C or feeder-link operations with MSAT-1 from the United States during or after its relocation to 107.5° W.L.

the spacecraft and are properly shielded and by ensuring that satellite subsystems have redundant components. For example, omnidirectional antennas are mounted on opposite sides of the satellite, and either antenna will be sufficient to support orbit raising. The command receivers and decoders, telemetry encoders and transmitters, bus control electronics, and power subsystem components are fully redundant, physically separated, and located within a shielded area to minimize the probability of the spacecraft becoming a source of debris due to a collision.

LightSquared has assessed and will limit the probability of accidental explosions during and after completion of mission operations. The MSAT-1 satellite is designed to minimize the potential for accidental explosions through propellant leakage and fuel and oxidizer mixing or other means. Propellant tanks and thrusters are isolated using redundant valves, and electrical power systems are shielded in accordance with standard industry practices. During the mission, batteries and various critical areas of the propulsion subsystem will be monitored to avoid conditions that could result in explosion. After MSAT-1 reaches its final disposal orbit, and except to the limited extent described in the narrative and waiver request associated with this application, all on-board sources of stored energy will be removed by depleting all propellant tanks, venting all pressurized systems, discharging batteries, and turning off all active units.

LightSquared has assessed and limited the probability of MSAT-1 becoming a source of debris by collisions with large debris or other operational space stations. LightSquared is unaware of other satellites operating at 107.5° W.L. Accordingly, operation of MSAT-1 at that location with  $\pm 0.05^\circ$  East-West station keeping volume is not expected to overlap with the station keeping volume of other operators.

MSAT-1 was launched in 1996 and, therefore, is not subject to the Commission's disposal altitude requirements.<sup>3</sup> Nevertheless, SkyTerra (Canada) Inc. (the Canadian licensee of MSAT-1) intends to dispose of MSAT-1 by moving it to a minimum altitude of 300 km above the GSO orbit at the end of its operational life. Approximately 10 kg of propellant will be allocated and reserved for final orbit raising maneuvers to this altitude, even accounting for the relocation of the spacecraft to 107.5° W.L. The reserved fuel figure was determined by the spacecraft manufacturer and provided for in the propellant budget. To calculate this figure, the manufacturer used an equation in which the expected mass of the satellite at end of life and the required delta-velocity to achieve the desired orbit were inputted. This calculation includes an assessment of fuel gauging uncertainty and has includes margin for uncertainty in remaining propellant.

To the extent necessary, a partial waiver of the following subsections of Section 25.114(c) of the Commission's rules is requested to allow flexibility to provide the following information, which is not readily captured by the Schedule S form, in this annex instead:

*Schedule S, Question S1:*

(a) MSAT-1 is a Mobile Satellite Service (MSS) satellite and does not have traditional transponders in the sense of a Fixed Satellite Service (FSS) satellite. On MSAT-1, the 200 MHz of up and downlink feeder-link spectrum is mapped to 29 MHz of MSS spectrum in each of 6 beams covering North America. Therefore, "1" is entered in item g, the number of transponders, and "29 MHz" is entered in item h, total transponder bandwidth.

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<sup>3</sup> See 47 C.F.R. § 25.283(d).

(b) Transmit Maximum EIRP (dBW) for the LA1 and LA2 beams – The value entered is the maximum aggregate EIRP for MSAT-1, even though that power would operationally be spread over all the downlink beams.

(c) Minimum SFD – The forward communications paths on the satellite will be operated only in a linear mode, well backed-off from saturation.

### **Technical Certification**

I, James Thorpe, Senior Engineer at LightSquared, certify under penalty of perjury that:

(i) I am the technically qualified person with overall responsibility for preparation of the technical information contained in this application and (ii) I am familiar with the requirements of Part 25 of the Commission's rules, and the information contained in the application is true and correct to the best of my knowledge and belief.

/s/ James Thorpe

Dated: June 5, 2015