Before the
Federal Communications Commission
Washington, D.C. 20554

Application of	)	
	)	
SkyTerra Subsidiary LLC	)	File No. SAT-MOD-_____________
	)	
For Modification of License to Operate	)	
MSAT-2 at 103.3ºW	)	

Application for Modification

SkyTerra Subsidiary LLC ("SkyTerra") is licensed to operate a Mobile Satellite Service ("MSS") satellite, MSAT-2 (a.k.a. AMSC-1), at the 101.3ºW orbital location.[1] SkyTerra's next-generation satellite, SkyTerra 1, which will replace MSAT-2, is also authorized to operate at that location, and its launch and operate milestone is May 26, 2010.[2] To make room for the replacement satellite and maintain continuity of service to customers pending the transition of service from MSAT-2 to SkyTerra 1, SkyTerra hereby requests that the Commission modify the license for MSAT-2 to permit continued operations at and during the drift from the satellite's current position to the 103.3ºW orbital location +/- 0.05 degrees.[3] MSAT-2 will operate at the new location for an estimated eight months until SkyTerra 1 has been fully tested

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[1] *Memorandum Opinion, Order and Authorization*, 4 FCC Rcd 6041 (1989); *remanded by Aeronautical Radio, Inc. v. FCC*, 928 F.2d 428 (D.C. Cir. 1991); *Final Decision on Remand*, 7 FCC Rcd 266 (1992); *aff'd, Aeronautical Radio, Inc. v. FCC*, 983 F.2d 275 (D.C. Cir. 1993); *see also AMSC Subsidiary Corporation, Memorandum Opinion and Order*, 8 FCC Rcd 4040 (1993); *see also* Stamp Grant, File No. SAT-MOD-20080303-0005 (granted May 19, 2008).

[2] SkyTerra has requested an extension of this milestone requirement until October 31, 2010. *See* SAT-MOD-20100405-00064 (April 5, 2010).

[3] Subject to Commission approval, SkyTerra intends to begin drift of MSAT-2 15-30 days prior to the launch of SkyTerra 1.

and customers are transitioned to the new satellite.[4] As discussed in the attached Technical Exhibit, SkyTerra has coordinated the relocation of MSAT-2 with affected satellite operators, the relocation of the satellite will not cause harmful interference to other satellite operators, and the proposed license modification complies with the Commission's technical rules.[5] An updated, comprehensive Schedule S attachment, reflecting the relocation of the satellite and associated technical changes, is provided with this application.

With respect to physical coordination of MSAT-2 at 103.3ºW +/- 0.05 degrees, SkyTerra has reviewed the lists of FCC-licensed satellite networks, as well as those that are currently under consideration by the FCC, and networks for which a request for coordination has been published by the ITU within +/- 0.15 degrees of the relevant orbital location. SkyTerra concludes that the station-keeping volume of MSAT-2 at the proposed new location will not overlap the station-keeping volume of any other satellite, and accordingly, no physical coordination will be required. For all of these reasons, SkyTerra submits that the Commission should grant this application for the relocation of MSAT-2.[6]

By this application, SkyTerra also modifies, in part, its orbital debris mitigation statement for MSAT-2 and requests, to the extent necessary, waiver of that portion of Section 25.283(c) of the Commission's rules, 47 C.F.R. § 25.283(c), requiring the relief of pressure vessels at satellite

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[4] After this period, SkyTerra intends to transfer MSAT-2 to a graveyard orbit or alternatively relocate the satellite to another orbital location to provide international services.

[5] The Technical Exhibit provides a Power Flux Density compliance demonstration (Tables A-1 and A-2) and a two-degree spacing analyses for the applicable frequency bands (Tables B through I).

[6] As required by the Commission's rules, SkyTerra hereby certifies that all other information related to MSAT-2's licensed operations and not addressed in this application has not changed materially. *See* 47 C.F.R. § 25.117(d)(1).

end-of-life.[7] MSAT-2 is a Boeing Model 601 satellite, which is not designed to allow for the discharge of all pressurant upon satellite end-of-life. Rather, consistent with Boeing's practice with respect to a number of its spacecraft buses, the helium tanks are isolated at the end of transfer orbit and the amount of the remaining gas and the low pressurization in the tanks result in minimal potential for accidental explosions during and after completion of mission. Accordingly, SkyTerra modifies its orbital debris mitigation statement and, to the extent necessary, requests waiver of the Commission's rule.

The statement regarding minimizing accidental explosions is revised as follows:[8]

> ~~MSV~~SkyTerra has assessed and will limit the probability of accidental explosions during and after completion of mission operations. The MSAT-1 and MSAT-2 satellites are designed to minimize the potential for accidental explosions resulting from propellant leakage and fuel and oxidizer mixing or other means. Propellant tanks and thrusters are isolated using redundant values, 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 and MSAT-2 reach their final disposal orbits, all on-board sources of stored energy will be removed, with the exception of the pressurized vessels discussed below, by depleting all propellant tanks, venting all pressurized systems, discharging batteries, and turning off all active units. MSAT-1 and MSAT-2 each use a Boeing 601 spacecraft bus that has a liquid propulsion system design that includes two helium (pressurant) tanks plus two pairs of fuel and oxidizer tanks. Venting of the excess propellant in the fuel and oxidizer tanks is performed as part of the end-of-life shutdown operations. The helium tanks provide proper propellant tank pressurization for apogee engine firings during transfer orbit. Both helium tanks are isolated at the end of transfer orbit by firing pyrotechnic valves, and there is no venting provision for these helium tanks at the satellite end-of-life. SkyTerra has estimated that approximately 129 grams of helium will be sealed in each tank when they are isolated resulting in a final pressure of 262 psi, which is extremely low relative to the design burst pressure of 5,250 psi. Due to the low pressure in the helium tanks at the satellite end-of-life, an explosive event is unlikely, even in the event of a tank rupture (e.g. a meteorite

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[7] SkyTerra intends shortly to file a similar waiver request of the orbital debris mitigation requirement with respect to MSAT-1.

[8] *See* Application, File No. SES-MFS-20070530-00731, at Technical Appendix p. 33 (filed May 30, 2007).

strike). Accordingly, the satellite design results in minimal potential for the release of orbital debris.

Under Section 1.3 of the Commission's rules, 47 C.F.R. § 1.3, the Commission has authority to waive its rules for good cause. Good cause exists if "special circumstances warrant a deviation from the general rule and such deviation will serve the public interest."[9] In determining whether a waiver is appropriate, the Commission should "take into account considerations of hardship, equity, or more effective implementation of overall policy."[10]

MSAT-2 is an in-orbit spacecraft and was launched nearly a decade before the FCC's orbital debris mitigation rules became effective.[11] Accordingly, any satellite design change now is not possible. Moreover, any such requirement would be retroactive rulemaking that would impermissibly "increase a party's liability for past conduct."[12] Under similar circumstances, the Bureau has granted such a waiver request and it should do so here, as well.[13]

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9 *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

10 *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969), *cert. denied*, 409 U.S. 1027 (1972).

11 MSAT-2 was launched in 1995 and the relevant rules became effective October 12, 2004. *Mitigation of Orbital Debris*, 69 Fed. Reg. 54581-54589 (September 9, 2004).

12 *See Mitigation of Orbital Debris*, 19 FCC Rcd 11567, at ¶ 78 (2004) (citing *Celtronix Telemetry, Inc.. v. FCC*, 272 F.3d 585, 588 (D.C. Cir. 2001)).

13 *See* Stamp Grant, File No. SAT-MOD-20080630-00133, at Condition 3 (September 02, 2008) (granting waiver of venting requirement and noting that "Galaxy 12 was launched before Section 25.283(c) became effective."); *see also* Stamp Grant, File No. SAT-LOA-20090807-00085 (granted December 15, 2009) (granting waiver of venting requirement for DIRECTV 12/RB2-A, a Boeing 702 satellite, given its imminent launch); *see also* Stamp Grant, File No. SAT-LOA-20071221-00183 (granted March 12, 2008) (granting a waiver of venting requirement for AMC-14, a Lockheed A2100 satellite, in light of late stage of satellite construction); Stamp Grant, File Nos. SAT-MOD-20070628-00090, SAT-AMD-20070731-00108 (granted November 30, 2007) (granting waiver of venting requirement for Horizons 2, an Orbital Sciences Star satellite, in light of late stage of satellite construction); Stamp Grant, File Nos. SAT-MOD-20070207-00027, SAT-AMD-20070716-00102 (granted October 4, 2007) (granting waiver of venting requirement for INTELSAT-11, an Orbital Sciences Star-2 satellite, in light of late stage of satellite construction).

Waiver is also appropriate in this case because grant would not undermine the purpose of the rule, to reduce the risk of accidental explosion. The amount of the remaining gas in the helium tanks and the low blanket pressure in those tanks at the satellite end-of-life result in minimal potential for accidental explosions during and after completion of mission, consistent with the FCC's rules. Indeed, the Boeing 601 spacecraft bus (and other spacecraft buses with similar designs)[14] has been in commercial service for more than 15 years without incidents involving accidental explosions.[15]

[14] *See id.*

[15] For a list of Boeing model 601 spacecraft, see http://www.boeing.com/defense-space/space/bss/factsheets/601/601fleet.html (last visited April 6, 2010).

Technical Exhibit

Feeder Link PFD Compliance Demonstration

The ITU maintains GSO satellite downlink PFD limits across the entire 10.7-11.7 GHz frequency band. *See* Article 21, Table S21-4, ITU Radio Regulation (2001). The Commission's rules specify identical PFD limits for GSO satellites operating in the 10.95-11.2 GHz and 11.45-11.7 GHz bands (47 C.F.R. § 25.114(c)(8)), but do not specify any PFD limits for GSO satellites operating in the 10.7-10.95 GHz or 11.2-11.45 GHz bands.

Table A-1 provides the power density for the feeder downlinks for the MSAT-2 carriers. Table A-2 calculates PFD on the ground based on the maximum density calculated in Table A-1 and compares it with the limits, showing positive margin in each case.

Table A-1: Feeder Link (Return) EIRP Density (10.7 – 11.7 GHz)

Carrier	**EIRP (dBW)**	**BW (kHz)**	**EIRP Density (dBW/4 kHz)**
CW	2.7	6	0.9
GC-S	2.7	6	0.9
QPSK-V	3.7	6	1.9
MMS	-5.3	5	-6.3
DATA-F	14.6	300	-4.2
Data1	-2.8	168	-19.0
Data2	-2.8	42	-13.0
	Maximum EIRP Density =		1.9

Table A-2: Feeder Link (Return) PFD Compliance (10.7 – 11.7 GHz)

Elevation Angle (degrees)	Slant (km)	Path Spreading Loss (dB-m^2)	MSAT-2 Maximum Power Flux Density (dB(W/m^2/4 kHz))	Maximum PFD Limit (dB(W/m^2/4 kHz))	Margin (dB)
0	41,680	-163.4	-161.5	-150	11.5
5	41,128	-163.3	-161.4	-150	11.4
25	39,072	-162.8	-160.9	-140	20.9
90	35,787	-162.1	-160.1	-140	20.1

Two-Degree Interference Analysis

The MSAT-2 feeder links operate in the Ku-band frequencies defined in Appendix 30B of the ITU Radio Regulations, and the MSAT-2 Telemetry, Tracking, and Command ("TT&C") operations are in the standard Fixed Satellite Service ("FSS") Ku-band frequencies (12/14 GHz). The respective interference analyses are provided below. The MSAT-2 service links operate in the L-band frequencies for which a two-degree analysis is not required.[1] Additionally, SkyTerra has coordinated the L-band operations of MSAT-2 at 103.3°W with Inmarsat and SkyTerra (Canada) Inc., the only potentially affected North American L-band satellite operators.

Interference Analysis for the Appendix 30B Ku-Band Carriers

In the Appendix 30B plan,[2] the only satellite allotment within two degrees of the nominal 103°W orbital location, other than those of SkyTerra, is that of Ecuador, at 104.0°W.[3] However, the ITU database shows that allotment has not been converted to an assignment or brought into use. Therefore, the interference analysis has been performed assuming that a hypothetical

1 *See* 47 C.F.R.§ 25.150(b); *see also* Letter to Lon Levin from Bob Nelson, File No. SAT-AMD-20031118-00335 (April 23, 2004).

2 International Telecommunications Union Radio Regulations 2007, Appendix 30B, Article 10.

3 MSAT-1 may be relocated to 105.3°W.

satellite with Appendix 30B Ku-band carriers and antenna parameters identical to those of MSAT-2 will be operating at 105.3°W and SkyTerra 1 will be operating at 101.3°W.[4]

The carrier types and power densities for MSAT-2 and SkyTerra 1 are provided in Tables B-1 and B-2, respectively.

Table B-1 MSAT-2 Feeder Link Carriers

	Uplink				Downlink		
Carrier	**EIRP (dBW)**	**BW (kHz)**	**Density dBW/Hz**		**EIRP (dBW)**	**BW (kHz)**	**Density dBW/Hz**
CW	52.5	6	14.7		2.7	6	-35.1
GC-S	54.5	6	16.7		2.7	6	-35.1
QPSK-V	52.5	6	14.7		3.7	6	-34.1
MMS	47.0	5	10.0		-5.3	5	-42.3
DATA-F	65.5	300	10.7		14.6	300	-40.2
Data1	55.4	168	3.1		-2.8	168	-55.0
Data2	53.4	42	7.2		-2.8	42	-49.0
		Max Uplink Density =	**16.7**			**Max Downlink Density =**	**-35.1**
		Min Uplink Density =	**3.1**			**Min Downlink Density =**	**-55.0**

4 *See* Public Notice, Report No. SPB-207, DA 04-1708 (June 16, 2004); *see also supra* note 3 (discussing potential relocation of MSAT-1 to 105.3°W).

Table B-2 SkyTerra 1 Feeder Link Carriers

Uplink					Downlink		
Carrier	**EIRP (dBW)**	**BW (kHz)**	**Density dBW/Hz**		**EIRP (dBW)**	**BW (kHz)**	**Density dBW/Hz**
WCDMA	71.7	5000	4.7		34.5	5000	-32.5
cdma2000	66.7	1250	5.7		34.7	1250	-26.3
GMR	61	200	8.0		20.5	200	-32.5
WiMax	62.1	1000	2.1		33.5	1000	-26.5
GMSA-1	65	1250	4.0		-2.7	6.4	-40.8
GMSA-2	---	---	---		0.6	6.4	-37.5
GMSA-3	---	---	---		11.6	12.8	-29.5
GMSA-4	---	---	---		14.1	1250	-46.9
GMR-3G-1	49	31.25	4.1		-0.03	31.25	-45.0
GMR-3G-2	52	62.5	4.0		4.85	31.25	-40.1
GMR-3G-3	52	62.5	4.0		7.16	62.5	-40.8
GMR-3G-4	56	156.25	4.1		19.4	156.25	-32.5
MSAT-Voice	46.7	4.8	9.9		1.7	4.8	-35.1
MSAT-Data	40.0	1.2	9.2		-10.3	1.2	-41.1
Command	68.0	1000	8.0		---	---	---
Telemetry	---	---	---		20.0	100	-30.0
		Max Uplink Density =	**9.9**			**Max Downlink Density =**	**-26.3**
		Min Uplink Density =	**2.1**			**Min Downlink Density =**	**-46.9**

Relevant feeder link earth station characteristics are shown in Table B-3. Side lobe antenna gain toward an adjacent satellite is calculated using an angle of 2.2°, an estimate of the topocentric angle corresponding to 2.0° orbital separation.

Table B-3 – Feeder Link Earth Station Antenna Characteristics

Antenna Transmit Gain (dBi)	61.1
Sidelobe Pattern	29-25Log(θ)
Topocentric Separation	2.2°
Sidelobe Gain @ 2.2° (dBi)	20.4
Delta Gain Main -Side Lobe (dB)	**40.7**

Uplink Analysis

Table B-4a shows the results of the uplink C/I calculations for all pair-wise combinations of networks. For the interfering network in each case, only the highest density (most interfering) carrier is considered. For the victim network in each case, only the lowest density (most sensitive) carrier is considered. Thus, the C/I values calculated represent the worst cases. The C/I values are calculated using the equation:

$$C/I_{up} = C_{oVup} - C_{oIup} + \Delta G_{tI}$$

Where:

C/I_{up} = Uplink carrier to interference ratio of the victim carrier caused by the interfering carrier

C_{oVup} = EIRP density of the victim carrier toward the victim satellite

C_{oIup} = EIRP density of the interfering carrier in the main lobe of its transmitting antenna

ΔG_{tI} = Difference in gain between the main lobe interfering antenna gain and the gain toward the victim satellite.

Table B-4a – Uplink Interference Calculation Results (C/I)

Uplink Single-Entry Co/Io & ΔT/T						
Topocentric Separation = 2.2°						
Interferer			**Victim**			
Interferer	**Maximum Density dBW/Hz**	**Sidelobe Rejection**	**Victim**	**Minimum Density dBW/Hz**	**C/I**	**ΔT/T**
SkyTerra 1	9.9	40.7 dB	MSAT-2	3.1	33.9 dB	0.04%
MSAT @105.3°W	16.7	40.7 dB	MSAT-2	3.1	27.1 dB	0.20%
MSAT-2	16.7	40.7 dB	MSAT@105.3°W	3.1	27.1 dB	0.25%
MSAT-2	16.7	40.7 dB	SkyTerra 1	2.1	26.0 dB	0.25%

As demonstrated in Table B-4a, all carrier combinations result in very low interference. The worst case single-entry C/I is 26.0 dB, which corresponds to a ΔT/T value of 0.25%, well below the coordination threshold value of 6%.

MSAT-2 would receive interference from both SkyTerra 1 and the hypothetical MSAT satellite at 105.3°W for a total ΔT/T of: 0.04% + 0.2% = 0.24%, which is below the coordination threshold value of 6%.

Downlink Analysis

Table B-4b shows the results of the downlink C/I calculations for all pair-wise combinations of carriers and networks. For the interfering network in each case, only the highest density (most interfering) carrier is considered. For the victim network in each case, only the lowest density (most sensitive) carrier is considered. Thus, the C/I values calculated represent the worst cases. Thus, the C/I values calculated represent the worst cases. The C/I values are calculated using the equation:

$C/I_{down} = C_{oVdown} – C_{oIdown} + \Delta G_{rI}$

Where:

C/I_{down} = Downlink carrier to interference ratio of the victim carrier caused by the interfering carrier

C_{oVdown} = EIRP density of the victim satellite carrier toward its earth station

C_{oIdown} = EIRP density of the interfering satellite carrier toward the victim earth station

ΔG_{tI} = Difference in gain between the main lobe victim antenna gain and the gain toward the interfering satellite.

Table B-4b – Downlink Interference Calculation Results (C/I)

Downlink Single-Entry Co/Io & ΔT/T						
Topocentric Separation = 2.2°						
Interferer			**Victim**			
Interferer	**Maximum Density dBW/Hz**	**Sidelobe Rejection**	**Victim**	**Minimum Density dBW/Hz**	**C/I**	**ΔT/T**
SkyTerra 1	-26.3	40.7 dB	MSAT-2	-55	11.9 dB	8.13%
MSAT @105.3°W	-34.1	40.7 dB	MSAT-2	-55	19.7 dB	1.35%
MSAT-2	-34.1	40.7 dB	MSAT@105.3°W	-55	19.7 dB	1.35%
MSAT-2	-34.1	40.7 dB	SkyTerra 1	-46.9	27.9 dB	0.21%

The worst case single-entry C/I is 11.9 dB (ΔT/T = 8.13%) for the case of SkyTerra 1 interference to MSAT-2. The total interference to MSAT-2 would include interference from both SkyTerra 1 and the hypothetical MSAT satellite at 105.3°W, for a total ΔT/T of: 8.13% + 1.35% = 9.48%. This exceeds the coordination threshold value of 6%. However, the interference is primarily caused by SkyTerra 1, which is also operated by SkyTerra. Accordingly, the potential interference cases between MSAT-2 and SkyTerra 1 will be resolved operationally.

All other carrier combinations result in very low interference. The worst case single-entry C/I is 19.7 dB, which corresponds to a ΔT/T value of 1.35%, well below the coordination threshold value of 6%.

Interference Analysis for the FSS Ku-Band carriers

In the standard FSS Ku band (12/14 GHz), other satellites operate within two degrees of MSAT-2, i.e. at the nominal 101°W, 103°W, and 105°W orbital locations. Pursuant to an agreement with SES Americom, Inc., SkyTerra has coordinated the TT&C Ku-band operations of MSAT-2 at 103.3°W with AMC-1 at 103.0°W and AMC-15 at 105.05°W. SkyTerra demonstrates below that the TT&C Ku-band operations of MSAT-2 meet the FCC's two-degree spacing requirement with respect to AMC-2 at 101.0°W and AMC-15 at 105.05°W.

The carrier types and power densities for the TT&C Ku-band operations of MSAT-2 are provided in Table C.

Table C – MSAT-2 12/14 GHz Carrier Parameters

MSAT-2 at 103.3°W Ku-Band Uplink			
Carrier	**EIRP (dBW)**	**BW (kHz)**	**EIRP Density dBW/Hz**
Command	69	1000	**9.0**
		Max Uplink Density =	**9.0**
		Min Uplink Density =	**9.0**

MSAT-2 at 103.3°W Ku-Band Downlink			
Carrier	**EIRP (dBW)**	**BW (kHz)**	**EIRP Density dBW/Hz**
Telemetry	17.5	100	**-35.1**
		Max Uplink Density =	**-35.1**
		Min Uplink Density =	**-35.1**

The carrier types and power densities for AMC-2 at 101.0°W and AMC-15 at 105.05°W are provided in Tables D and E, respectively.

Table D AMC-2 Carrier Summary

AMC-2 at 101.0°W Ku-Band Uplinks			
Earth Station	**Max EIRP Density (dBW/Hz)**	**Min EIRP Density (dBW/Hz)**	**Ant Gain (dBi)**
Antenna Type 1	2	-3	60
Antenna Type 2	5	0	58
Antenna Type 3	3	-2	55

AMC-2 at 101.0°W Ku-Band Downlink			
Earth Station	**Max EIRP Density (dBW/Hz)**	**Min EIRP Density (dBW/Hz)**	**Ant Gain (dBi)**
Antenna Type 1	-28.9	-28.9	59

Table E – AMC-15 Carrier Summary

AMC-15 at 105.05°W Ku-Band Uplinks			
Earth Station	Max EIRP Density (dBW/Hz)	Min EIRP Density (dBW/Hz)	Ant Gain (dBi)
Antenna Type A	18	-11.7	60.3
Antenna Type B	18	-11.7	56.6
Antenna Type C	18	-11.7	54.1
Antenna Type D	15.6	-11.7	50.6
Antenna Type E	11.7	-11.7	46.1
Antenna Type F	-1.2	-11.7	42.5
Antenna Type G	-3.6	-11.7	40.1

AMC-15 at 105.05°W Ku-Band Downlinks			
Earth Station	Max EIRP Density (dBW/Hz)	Min EIRP Density (dBW/Hz)	Ant Gain (dBi)
Antenna Type A	-22	-41.5	59
Antenna Type B	-19	-38.9	55.4
Antenna Type C	-19	-36.2	52.7
Antenna Type D	-19	-32.8	49.3
Antenna Type E	-19	-32.1	44.6
Antenna Type F	-19	-31.8	41.3
Antenna Type G	-19	-31.2	38.7
Antenna Type TT&C	-30.1	-33.1	59

Table F presents the results of uplink C/I calculations between the MSAT-2 command carriers and the AMC-2 uplink carriers. In all cases, the calculated delta T/T is lower than the coordination threshold value of 6%. Therefore, there are no apparent interference concerns.

Table F – Uplink Co/Io Calculations for MSAT-2 at 103.3°W and AMC-2 at 101.0°W

Uplink Co/Io Calculations for MSAT-2 at 103.3°W and AMC-2 at 101.0°W						
			Topocentric Angle =	2.5 deg		
Interferer				Victim		
Interferer	Max EIRP Density dBW/Hz	Earth Station Antenna Gain	Sidelobe Rejection	Victim	Min EIRP Density dBW/Hz	Co/Io
AMC-2	2.0	60	40.9 dB	MSAT-2	9.0	47.9
AMC-2	5.0	58	38.9 dB	MSAT-2	9.0	42.9
AMC-2	3.0	55	35.9 dB	MSAT-2	9.0	41.9
MSAT-2	9.0	61.1	42.0 dB	AMC-2	60.0	93.0
MSAT-2	9.0	61.1	42.0 dB	AMC-2	58.0	91.0
MSAT-2	9.0	61.1	42.0 dB	AMC-2	55.0	88.0
					Min Co/Io =	40.6
					Max Delta T/T =	0.01%

Table G presents the results of downlink C/I calculations between the MSAT-2 telemetry carriers and the AMC-2 downlink carriers. In all cases, the calculated delta T/T is lower than the coordination threshold value of 6%. Therefore, there are no apparent interference concerns.

Table G – Downlink Co/Io Calculations for MSAT-2 at 103.3°W and AMC-2 at 101.0°W

Downlink Co/Io Calculations for MSAT-2 at 103.3°W and AMC-2 at 101.0°W						
			Topocentric Angle =	2.5 deg		
Interferer		Victim				
Interferer	Max EIRP Density dBW/Hz	Victim	Earth Station Antenna Gain	Sidelobe Rejection	Min EIRP Density dBW/Hz	C/I
AMC-2	-28.9	MSAT-2	60.1	38.1 dB	-35.1	31.9
MSAT-2	-35.1	AMC-2	59	37.0 dB	-28.9	43.2
					Min Co/Io =	34.9
					Max Delta T/T =	0.03%

Table H presents the results of uplink C/I calculations between the MSAT-2 command carriers and the AMC-15 uplink carriers. In all cases, the calculated delta T/T is lower than the coordination threshold value of 6%. Therefore, there are no apparent interference concerns.

Table H - Uplink Co/Io Calculations for MSAT-2 at 103.3°W and AMC-15 at 105.05°W

Uplink Co/Io Calculations for MSAT-2 at 103.3°W and AMC-15 at 105.05°W						
			Topocentric Angle =	2.2 deg		
Interferer				Victim		
Interferer	Max EIRP Density dBW/Hz	Earth Station Antenna Gain	Sidelobe Rejection	Victim	Min EIRP Density dBW/Hz	C/I
AMC-15	18.0	60.3	38.3 dB	MSAT-2	9.0	29.3
AMC-15	18.0	56.6	34.6 dB	MSAT-2	9.0	25.6
AMC-15	18.0	54.1	32.1 dB	MSAT-2	9.0	23.1
AMC-15	15.6	50.6	28.6 dB	MSAT-2	9.0	22.0
AMC-15	11.7	46.1	24.1 dB	MSAT-2	9.0	21.4
AMC-15	-1.2	42.5	20.5 dB	MSAT-2	9.0	30.7
AMC-15	-3.6	40.1	18.1 dB	MSAT-2	9.0	30.7
MSAT-2	9.0	61.1	39.1 dB	AMC-15	-11.7	18.4
MSAT-2	9.0	61.1	39.1 dB	AMC-15	-11.7	18.4
MSAT-2	9.0	61.1	39.1 dB	AMC-15	-11.7	18.4
MSAT-2	9.0	61.1	39.1 dB	AMC-15	-11.7	18.4
MSAT-2	9.0	61.1	39.1 dB	AMC-15	-11.7	18.4
MSAT-2	9.0	61.1	39.1 dB	AMC-15	-11.7	18.4
MSAT-2	9.0	61.1	39.1 dB	AMC-15	-11.7	18.4
					Min Co/Io =	18.4
					Max Delta T/T =	1.46%

Table I presents the results of downlink C/I calculations between the MSAT-2 telemetry carriers and the AMC-15 downlink carriers. In all cases, the calculated delta T/T is lower than the coordination threshold value of 6%. Therefore, there are no apparent interference concerns.

Table I – Downlink Co/Io Calculations for MSAT-2 at 103.3°W and AMC-15 at 105.05°W

Downlink Co/Io Calculations for MSAT-2 at 103.3°W and AMC-15 at 105.05°W						
			Topocentric Angle =	2.2 deg		
Interferer		Victim				
Interferer	Max EIRP Density dBW/Hz	Victim	Earth Station Antenna Gain	Sidelobe Rejection	Min EIRP Density dBW/Hz	C/I
AMC-15	-22.0	MSAT-2	60.1	38.1 dB	-35.1	25.0
AMC-15	-19.0	MSAT-2	60.1	38.1 dB	-35.1	22.0
AMC-15	-19.0	MSAT-2	60.1	38.1 dB	-35.1	22.0
AMC-15	-19.0	MSAT-2	60.1	38.1 dB	-35.1	22.0
AMC-15	-19.0	MSAT-2	60.1	38.1 dB	-35.1	22.0
AMC-15	-19.0	MSAT-2	60.1	38.1 dB	-35.1	22.0
AMC-15	-19.0	MSAT-2	60.1	38.1 dB	-35.1	22.0
AMC-15	-30.1	MSAT-2	60.1	38.1 dB	-35.1	33.1
MSAT-2	-35.1	AMC-15	59	37.0 dB	-41.5	30.6
MSAT-2	-35.1	AMC-15	55.4	33.4 dB	-38.9	29.6
MSAT-2	-35.1	AMC-15	52.7	30.7 dB	-36.2	29.6
MSAT-2	-35.1	AMC-15	49.3	27.3 dB	-32.8	29.6
MSAT-2	-35.1	AMC-15	44.6	22.6 dB	-32.1	25.6
MSAT-2	-35.1	AMC-15	41.3	19.3 dB	-31.8	22.6
MSAT-2	-35.1	AMC-15	38.7	16.7 dB	-31.2	20.6
MSAT-2	-35.1	AMC-15	59	37.0 dB	-33.1	39.0
					Min Co/Io =	**20.6**
					Max Delta T/T =	**0.88%**

Conclusion

Accordingly, based on the analysis provided above, operation of MSAT-2 at 103.3°W complies with the Commission's technical rules.

Technical Certification

I, Richard Evans, Principal Engineer, SkyTerra Subsidiary LLC, certify under penalty of perjury that:

I am the technically qualified person with overall responsibility for preparation of the technical information contained in this application. 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/
Richard Evans

Dated: April 12, 2010