Information Required by Section 25.114(d) for MSAT-1 and MSAT-2

Both the U.S.-licensed MSAT-2 satellite (also known as AMSC-1) and the Canadian-licensed MSAT-1 satellite (licensed by Industry Canada to Mobile Satellite Ventures (Canada) Inc.)) have already been authorized to operate in the L band and the Appendix 30B Ku band for service in the United States pursuant to the Commission's rules applicable at the time of licensing.[1] The information below along with the

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[1] MSV hereby incorporates by reference the following applications and approvals relating to MSAT-2: *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); *AMSC Subsidiary Corporation, Order and Authorization*, DA 95-721 (April 5, 1995) (authorizing modification of TT&C frequencies); *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 space station license for MSAT-2 to MSV); *Upper and Lower L-band, Report and Order*, 17 FCC Rcd 2704 (2002) (authorizing operations in the lower L band); AMSC Subsidiary Corporation, Application for Modification, File No. SAT-MOD-19960919-00116 (granted December 31, 2002) (authorizing repointing of L band antenna); Mobile Satellite Ventures Subsidiary LLC, Application for Modification, File No. SAT-MOD-20020107-00013 (granted August 28, 2002) (authorizing relocation of TT&C operations to Canada); Mobile Satellite Ventures Subsidiary LLC, Application for Modification, File No. SAT-MOD-20040623-00120 (granted August 23, 2004) (authorizing MSAT-2 to operate at 100.95° W.L.); Letter from Mobile Satellite Ventures Subsidiary LLC to Ms. Marlene H. Dortch, FCC (September 9, 2004) (notifying FCC of inclined orbit operations); Mobile Satellite Ventures Subsidiary LLC, Application for Modification, File No. SAT-MOD-20041124-00213 (granted December 6, 2006) (authorizing provision of space segment capacity on MSAT-2 on a non-common-carrier basis).

MSV hereby incorporates by reference the following applications and approvals relating to MSAT-1: *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 use of MSAT-1 in the Appendix 30B Ku band in the United States);

accompanying Schedule S are being resubmitted in response to a request from Commission staff to facilitate processing of an application to modify an earth station license. This application does not request authorization for new frequencies, a change in orbital location, or any other change in the technical parameters of MSAT-1 and MSAT-2.

I. GENERAL DESCRIPTION OF OVERALL SYSTEM FACILITIES, OPERATIONS, AND SERVICE (47 C.F.R. § 25.114(D)(1))

The MSAT-1 and MSAT-2 satellites serve North America with a network consisting of two satellites, ground segment, and associated tracking, telemetry, command, and control ("TT&C") facilities.

A. Space Segment

MSAT-1 operates at the 106.5° W.L. orbital location with ± 0.05° East-West station keeping volume.[2] MSAT-2 operates at the 100.95° W.L. orbital location in inclined orbit with ± 0.05° East-West station keeping volume.[3] Each satellite is licensed to use L band frequencies for service links: 1530-1544 MHz & 1545-1559 MHz (Space-to-Earth) and 1631.5-1645.5 MHz & 1646.5-1660.5 MHz (Earth-to-Space).

B. Ground Segment

The primary TT&C and feeder link earth stations that communicate with the MSAT-1 and MSAT-2 satellites are located in Ottawa, Ontario, Canada. Feederlink

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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).

[2] MSV Canada intends to operate MSAT-1 in inclined orbit in the near future.

[3] Letter from Mobile Satellite Ventures Subsidiary LLC to Ms. Marlene H. Dortch, FCC (September 9, 2004) (notifying FCC of inclined orbit operations of MSAT-2).

earth station facilities for MSAT-2 are also located in Reston, Virginia with a back-up station located in Alexandria, Virginia.

C. TT&C

Both satellites use 12/14 GHz frequencies for TT&C.[4] TT&C operations for both satellites are conducted from earth stations located in Ottawa, Ontario, Canada. The satellite antenna pattern characteristics for the on-station mode of operation of the TT&C are identical to the feeder link antenna patterns. In addition to the on-station antenna beams, the TT&C subsystem also employs an omnidirectional antenna configuration that was used during orbit-raising and will not be used in any future operation except in the event of certain operational contingencies.

D. System Control

1. Network Operational Control

Network operational control is staffed 7 days per week, 24 hours per day, to ensure continuity of service. Personnel provide in-house maintenance and monitoring of the transmission facilities, network facilities, and the facilities that connect with the PSTN, PDN, and private networks. To ensure reliable service, system monitoring includes:

- Monitoring of all active components with switchover to redundant active units upon alarm.

[4] MSV has reached a coordination agreement with the licensee of these frequencies at the nominal 101° W.L. orbital location. *See AMSC Subsidiary Corporation, Order and Authorization*, DA 95-271 (April 5, 1995) (authorizing modification of TT&C frequencies). TT&C operations for MSAT-2 are conducted in accordance with conditions adopted by the International Bureau. *See* Mobile Satellite Ventures Subsidiary LLC, Application for Modification, File No. SAT-MOD-20020107-00013 (granted August 28, 2002) (authorizing relocation of TT&C operations for MSAT-2 to Canada).

- Monitoring of system power levels at critical junctions to insure that the transmission levels remain within tolerances.
- Line monitoring, to insure the continuity of the transmission lines that interconnect the network components. Upon alarm, the facility switches to diversely routed redundant path(s) where available.
- Each of the carriers present in the satellite transponders are continuously monitored and maintained within frequency assignment and power allocation tolerances.
- MSV has contracted with a firm to monitor satellite health and safety.

E. System Capacity

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.

II. FEEDER LINK FREQUENCIES (47 C.F.R. § 25.114(D)(2))

Each satellite is licensed to use the following Appendix 30B Ku band frequencies for feeder link operations: 10.75-10.95 GHz band (space-to-Earth) and 13.0-13.15 & 13.20-13.25 GHz (Earth-to-space).

III. PREDICATED SPACECRAFT ANTENNA GAIN CONTOURS (47 C.F.R. § 25.114(D)(3))

1. Service Link Antenna Gain Contours

The antenna gain contours for MSAT-1 and MSAT-2 as designed are depicted below and included in the Schedule S package.[5]

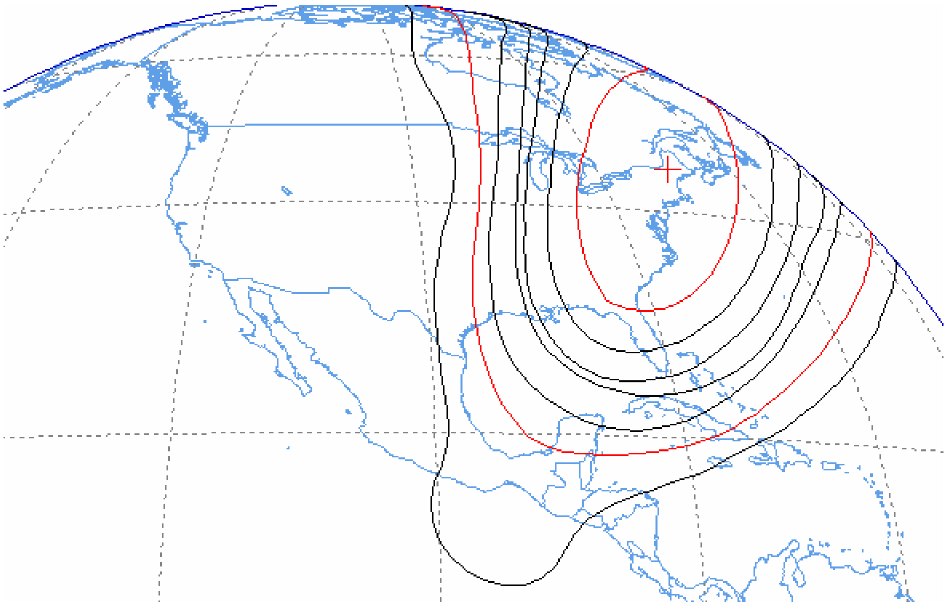
[5] *See also* File No. SAT-MOD-19960919-00116.

MSAT-1 Beam Contours

MSAT-1 Beam LE1

Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours

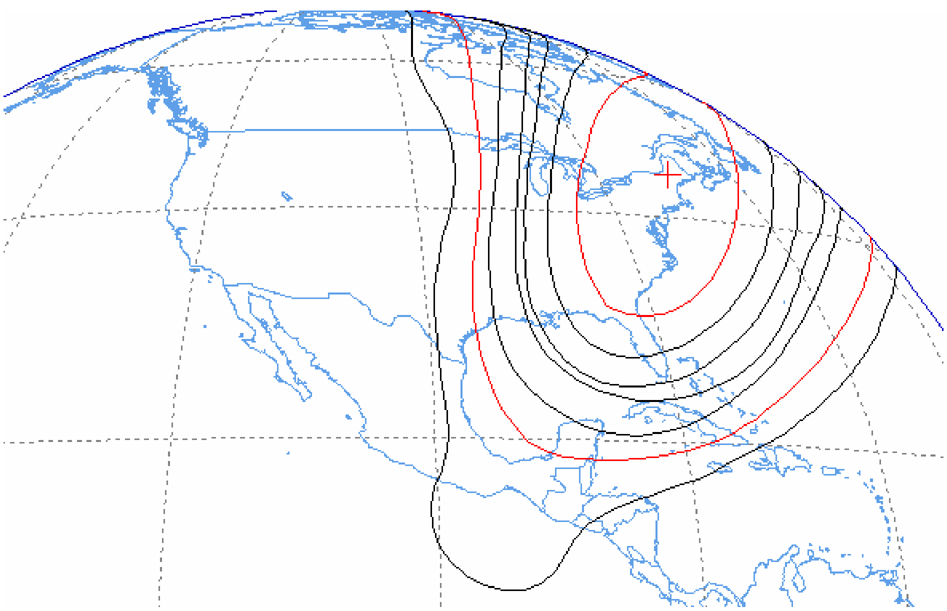
Peak Gain = 34 dBi   RHCP



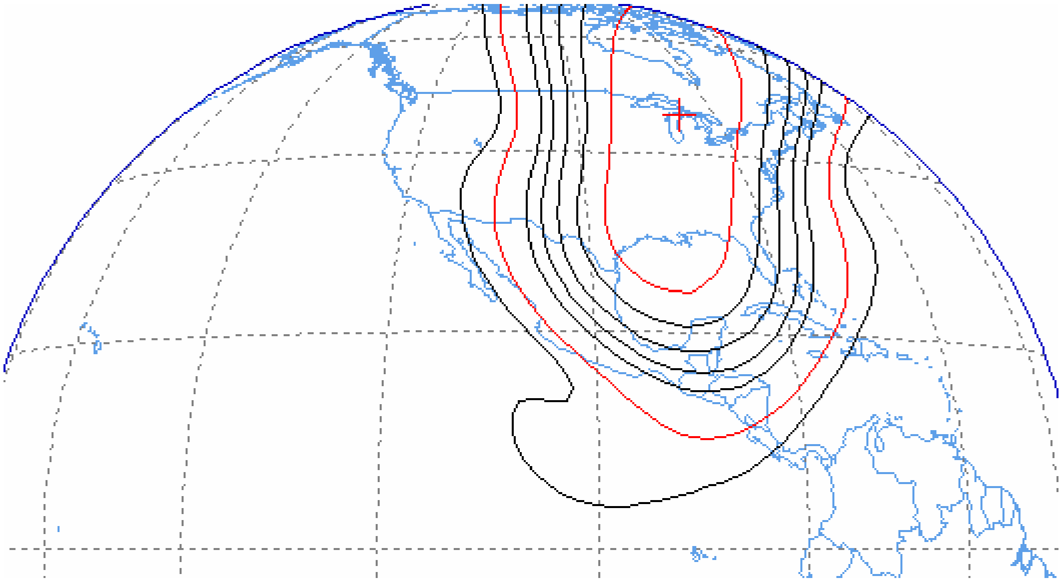
MSAT-1 Beam LR1

Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours

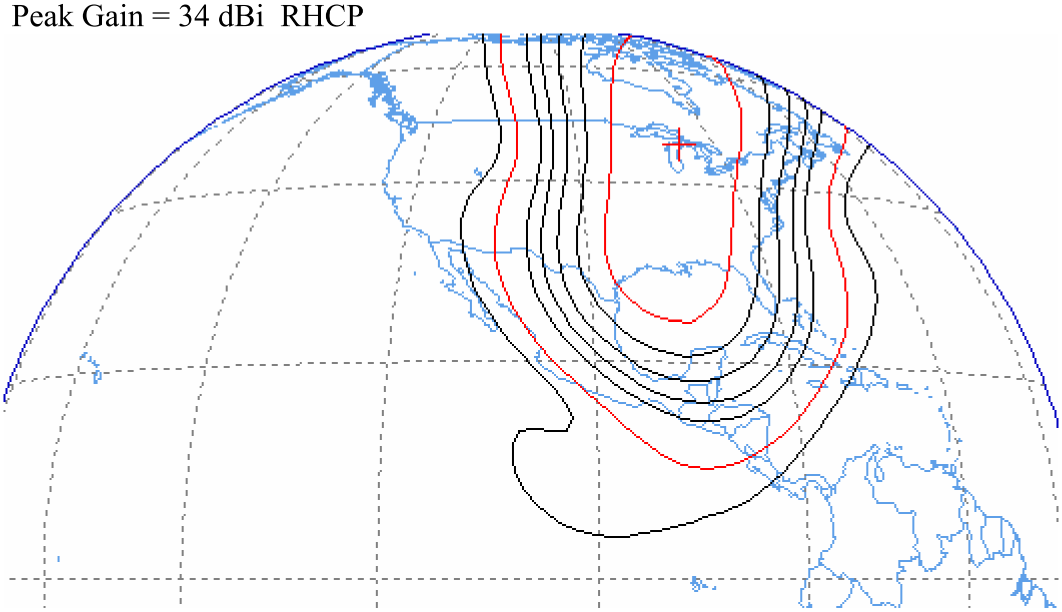
Peak Gain = 34 dBi RHCP



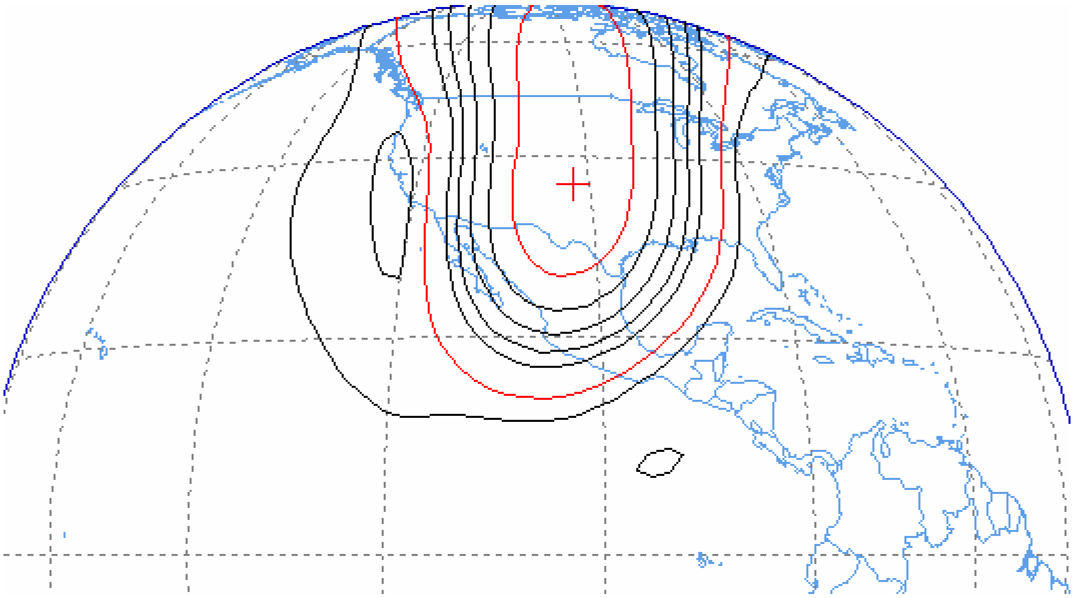
MSAT-1 Beam LE2
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi   RHCP



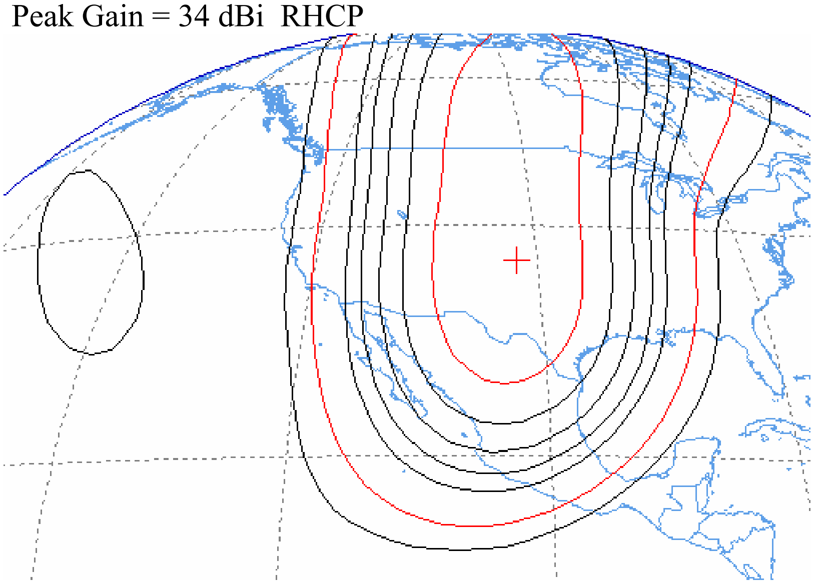
MSAT-1 Beam LR2
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, -20, and -20 dB contours
Peak Gain = 34 dBi RHCP



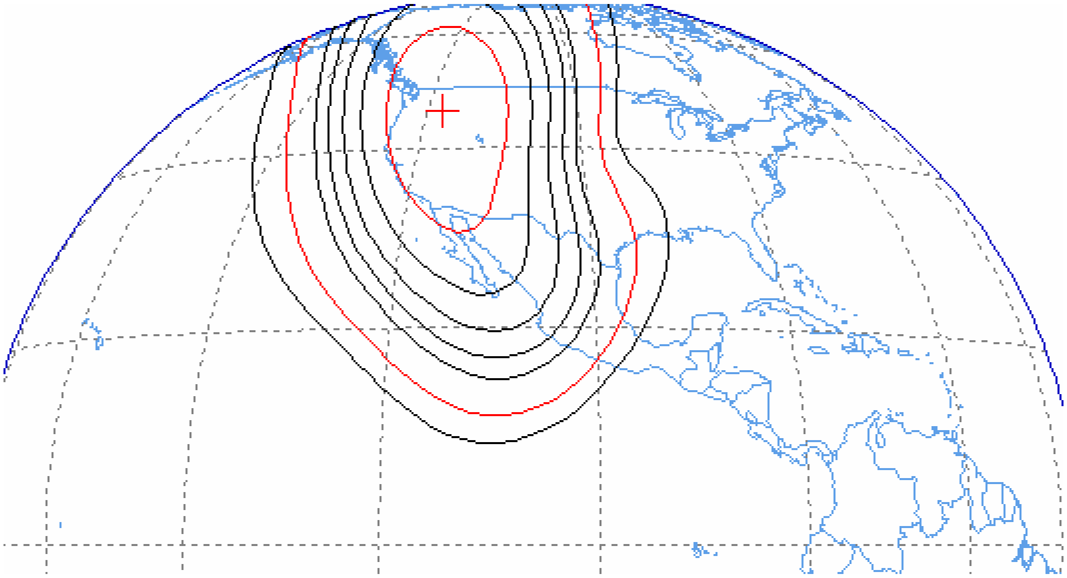
MSAT-1 Beam LE3
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi RHCP



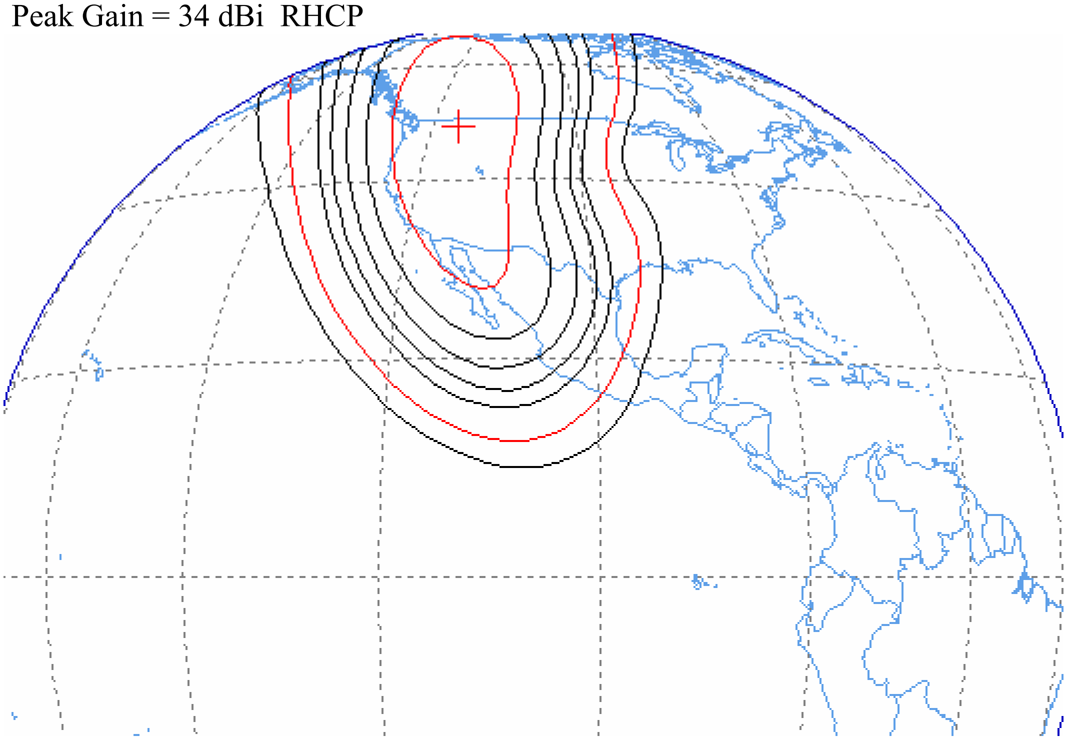
MSAT-1 Beam LR3
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi RHCP



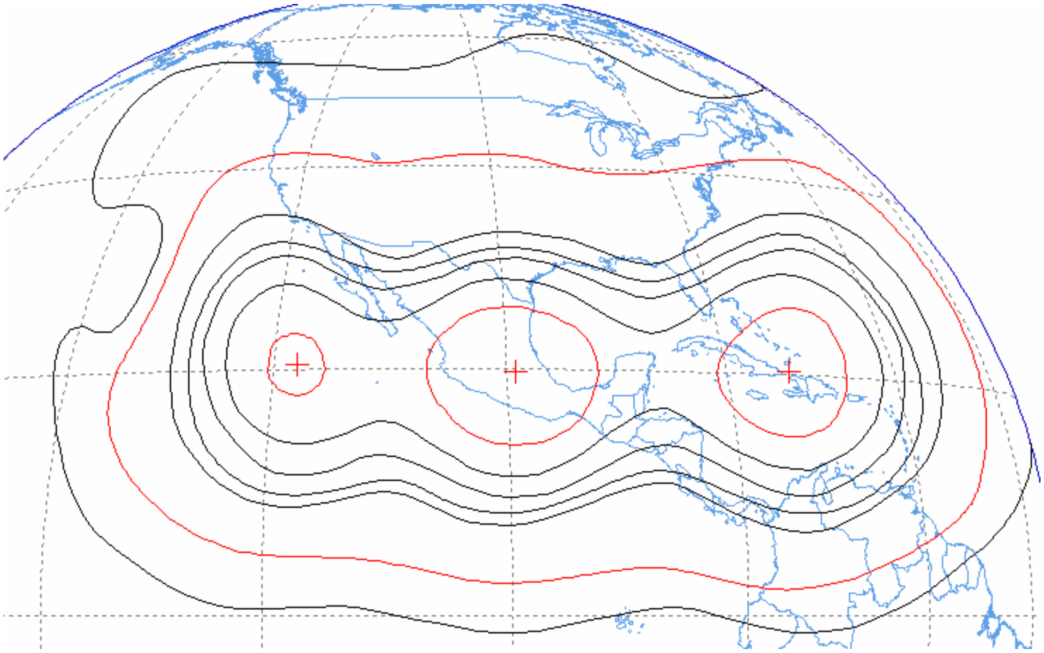
MSAT-1 Beam LE4
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi RHCP



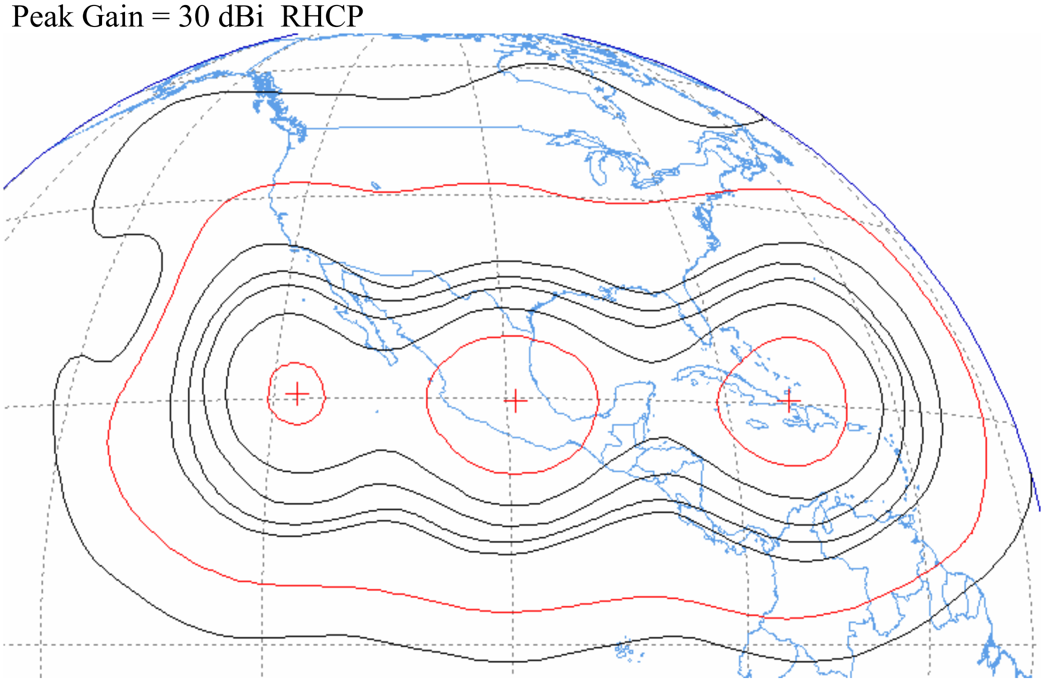
MSAT-1 Beam LR4
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi RHCP



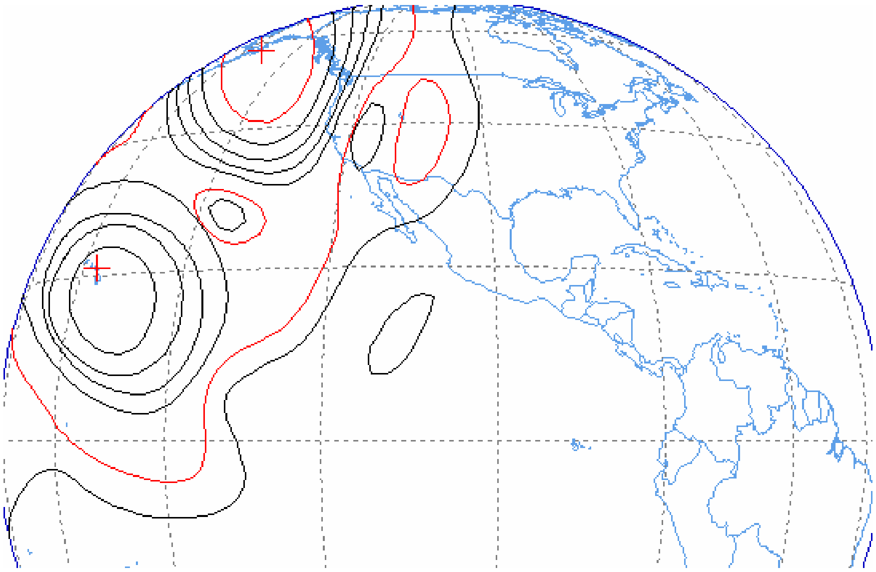
MSAT-1 Beam LE5
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 30 dBi   RHCP



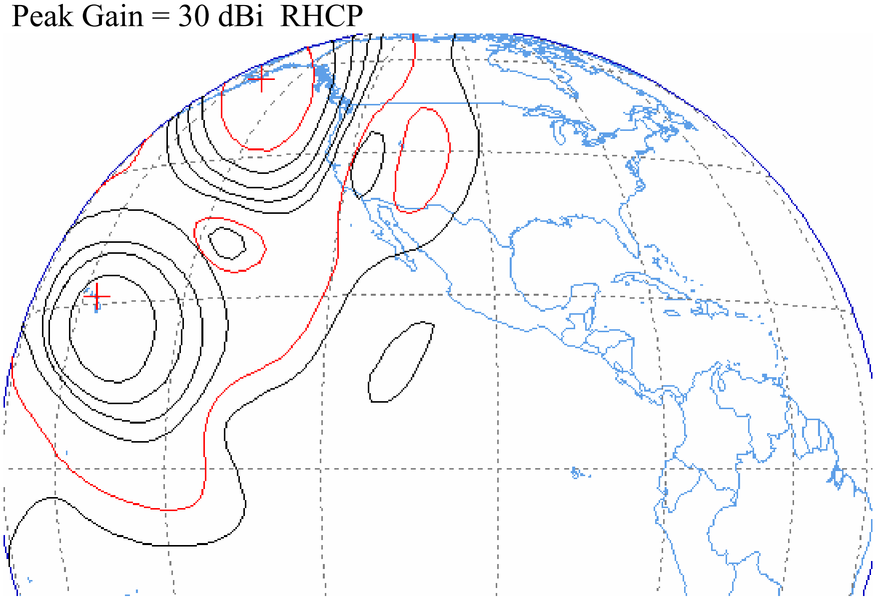
MSAT-1 Beam LR5
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 30 dBi RHCP



MSAT-1 Beam LE6
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 30 dBi   RHCP

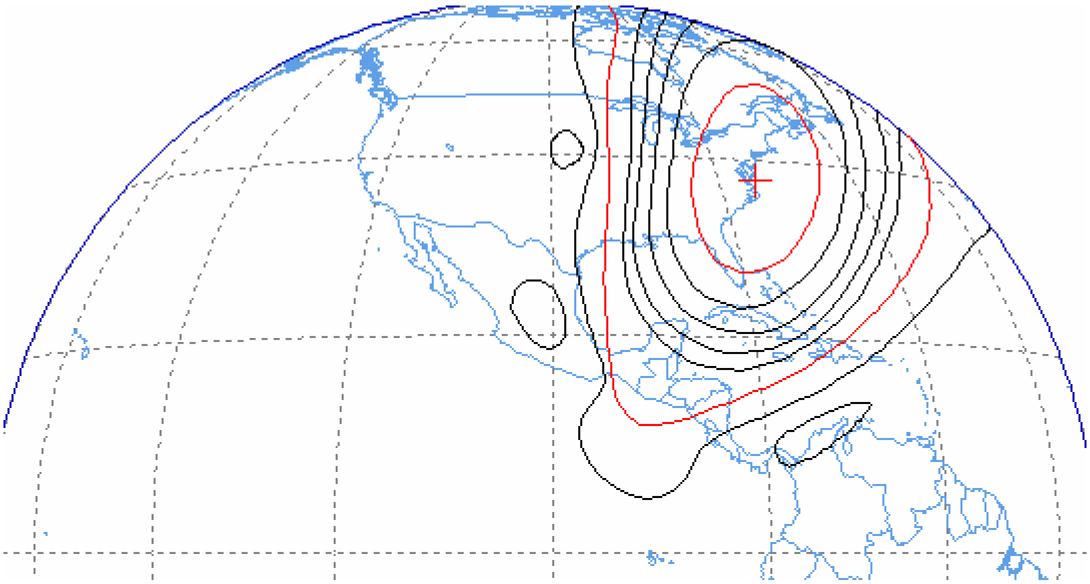


MSAT-1 Beam LR6
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 30 dBi RHCP

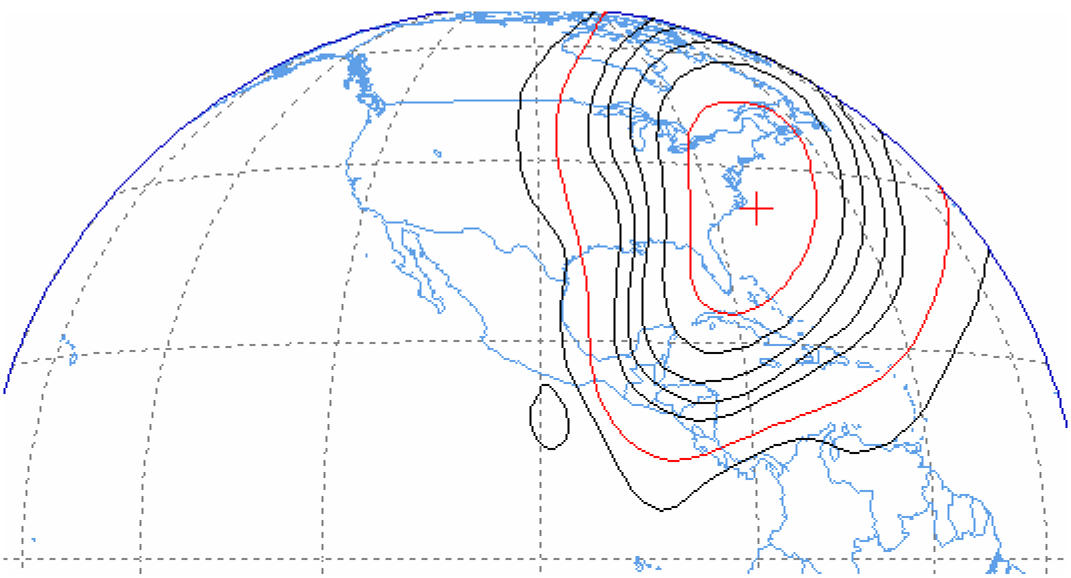


MSAT-2 L-Band Beam Contours

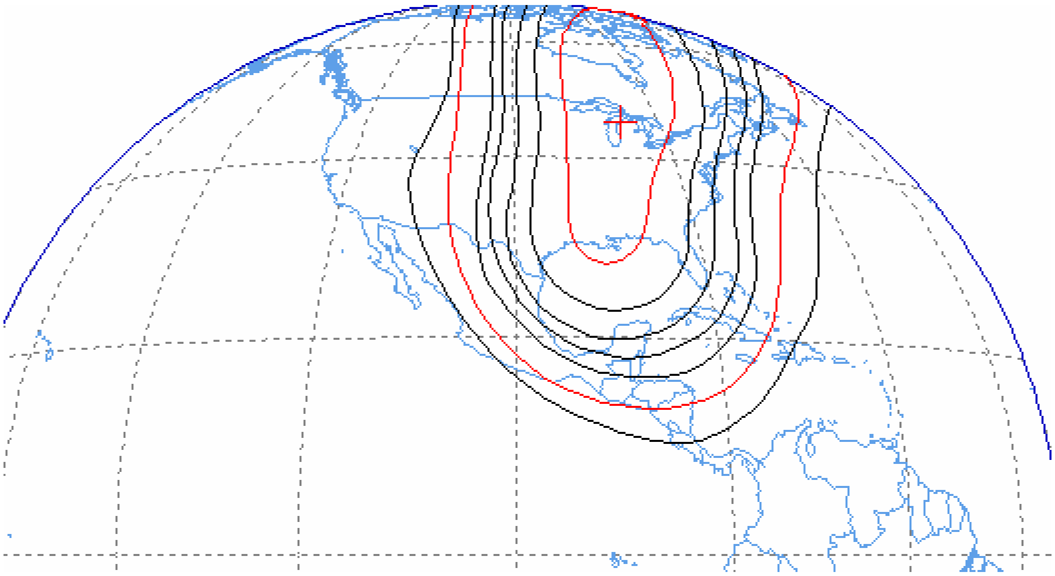
MSAT-2 Beam LE1
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20dB contours
Peak Gain = 34 dBi   RHCP



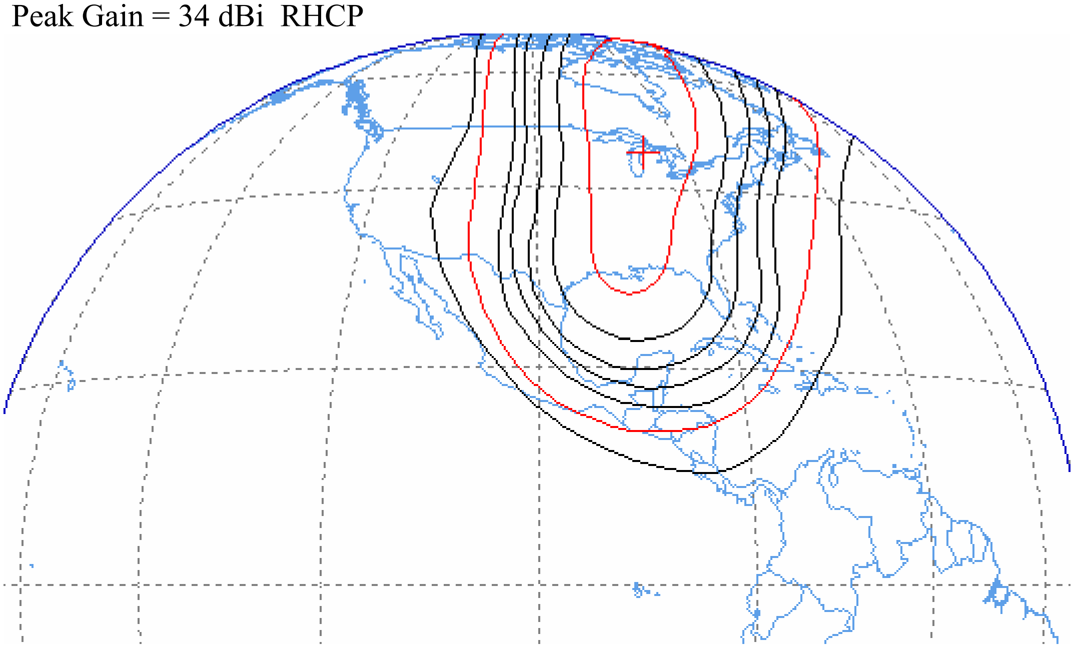
MSAT-2 Beam LR1
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20dB contours
Peak Gain = 34 dBi RHCP



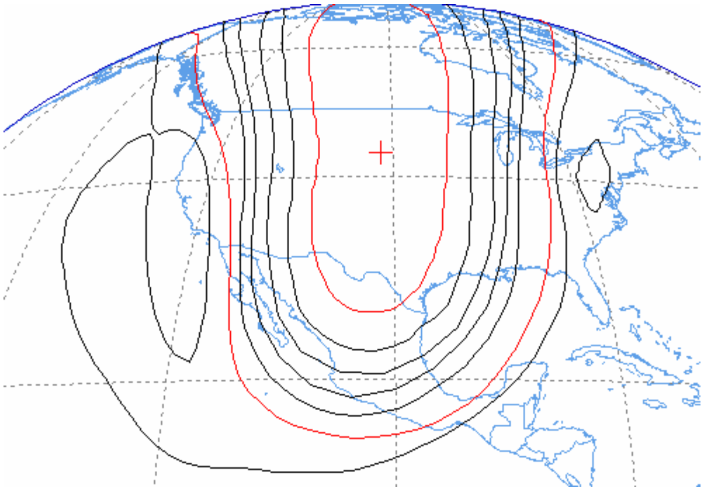
MSAT-2 MSAT-2 Beam LE2
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi   RHCP



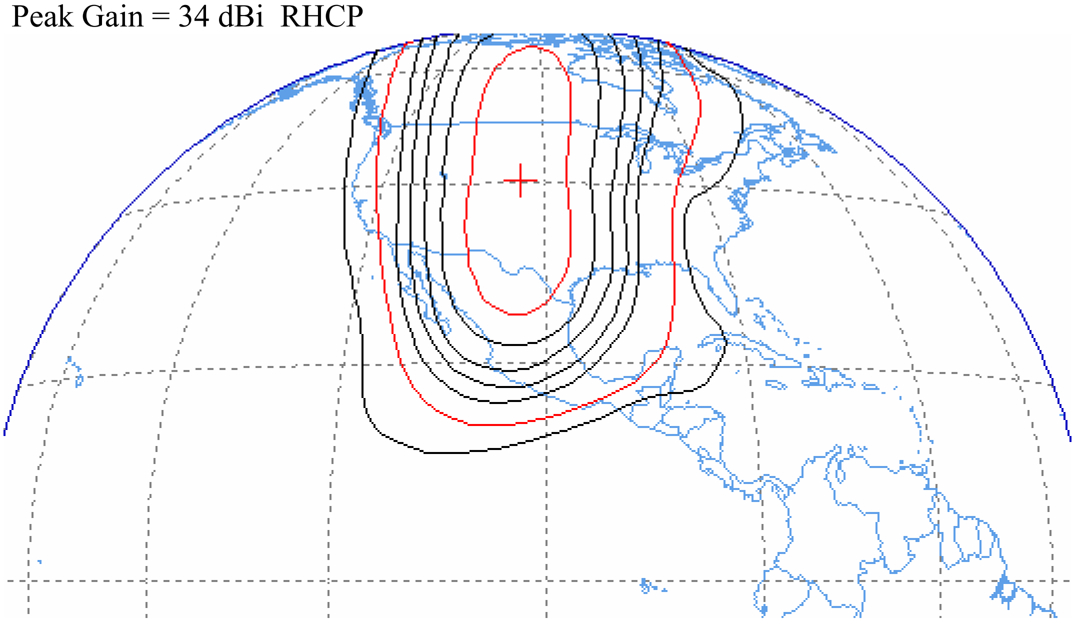
MSAT-2 Beam LR2
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi RHCP



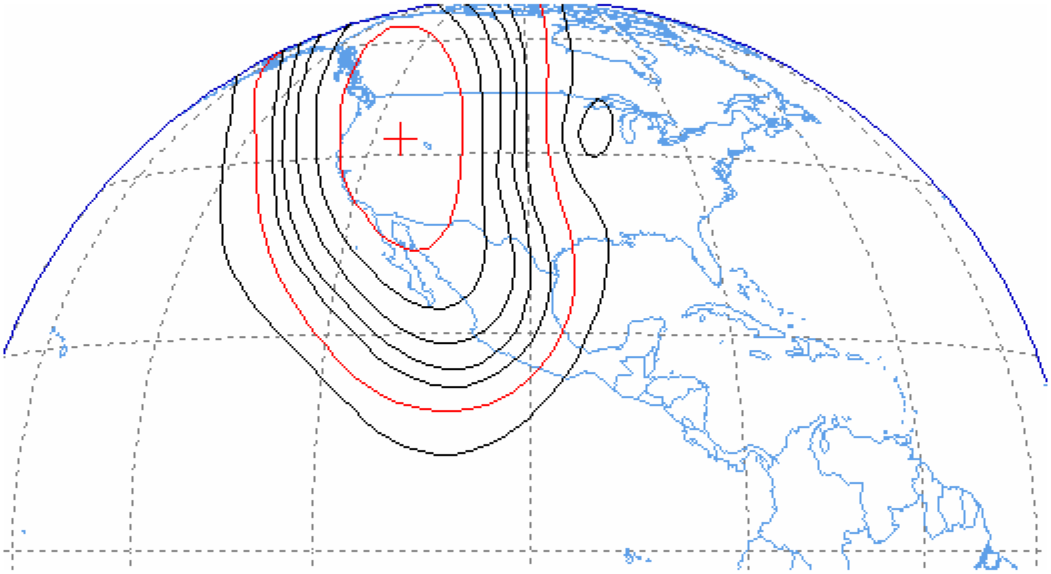
MSAT-2 MSAT-2 Beam LE3
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi   RHCP



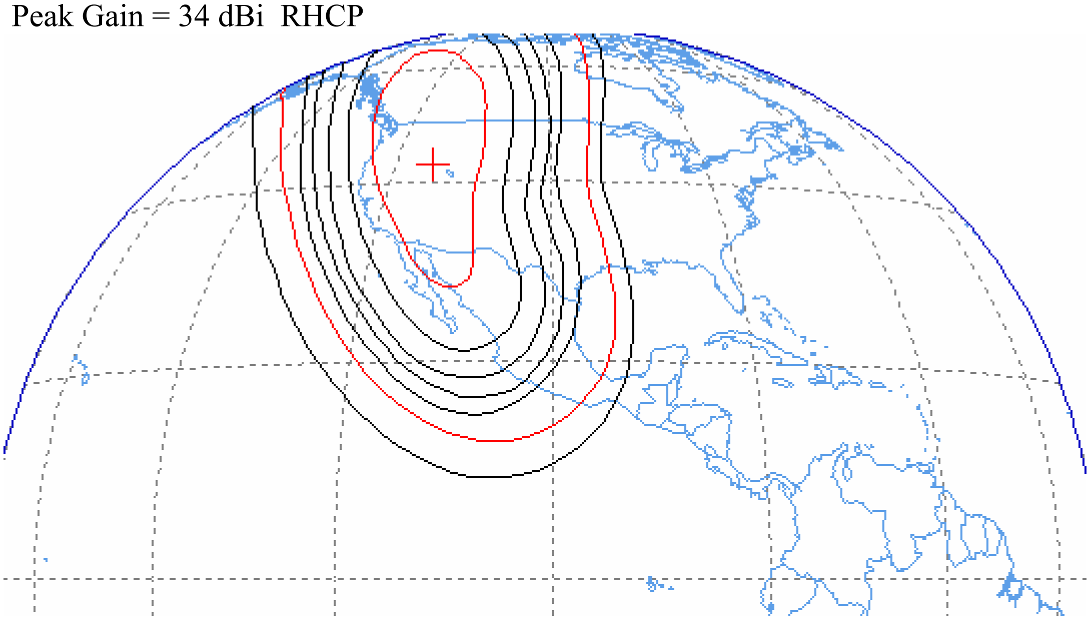
MSAT-2 Beam LR3
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi RHCP



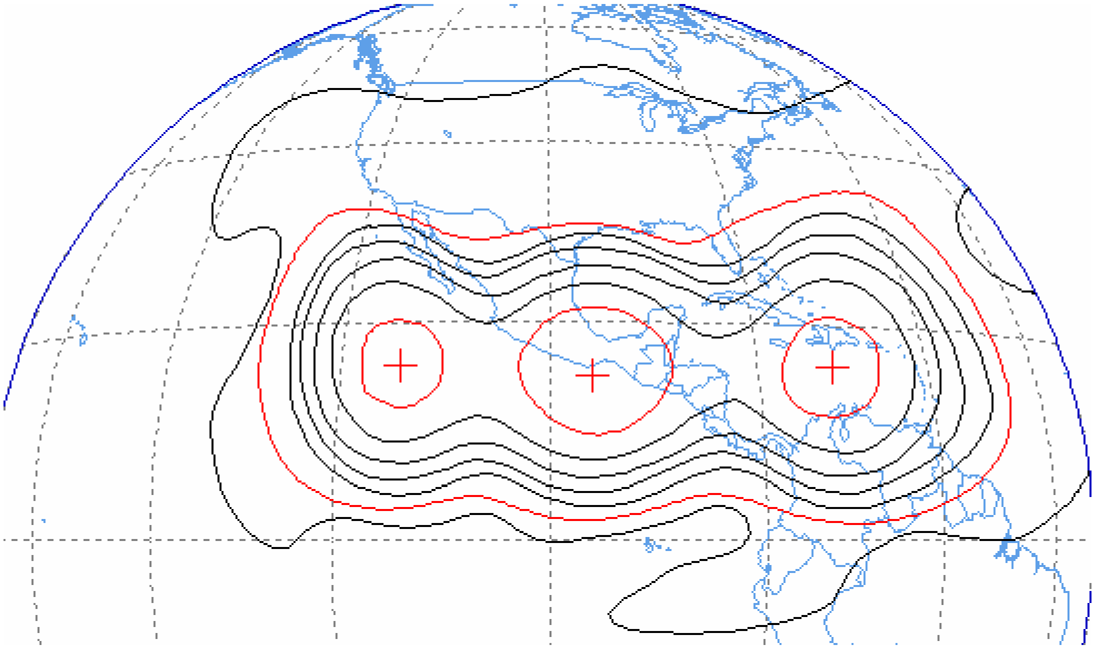
MSAT-2 MSAT-2 Beam LE4
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi   RHCP



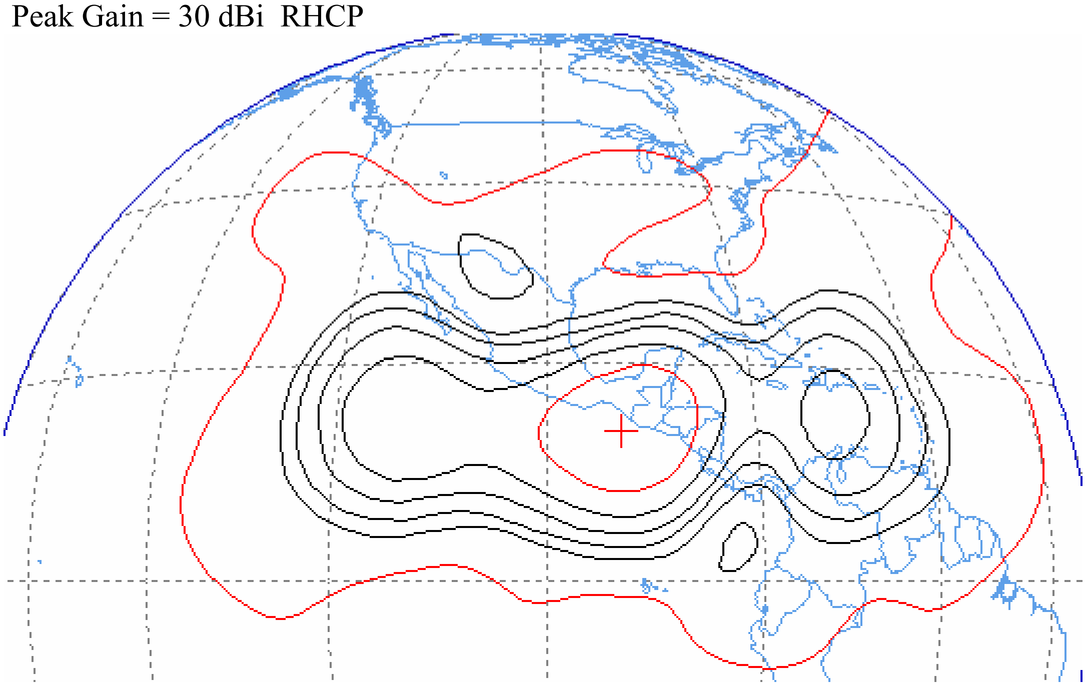
MSAT-2 Beam LR4
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 34 dBi RHCP



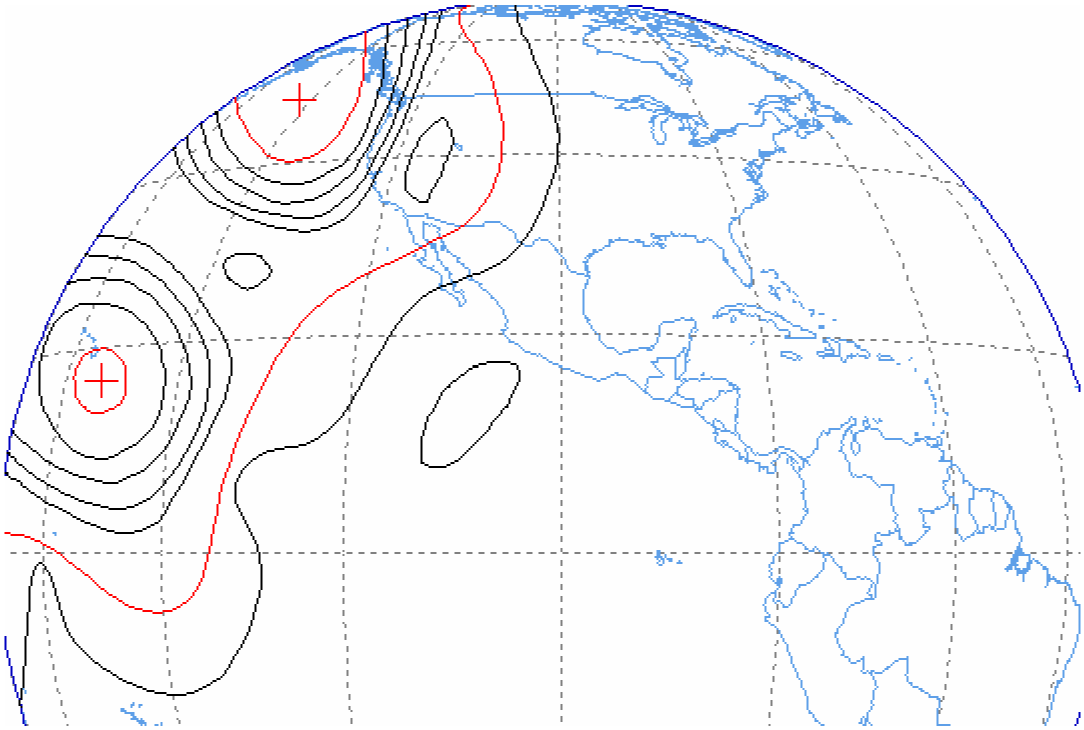
MSAT-2 MSAT-2 Beam LE5
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 30 dBi   RHCP



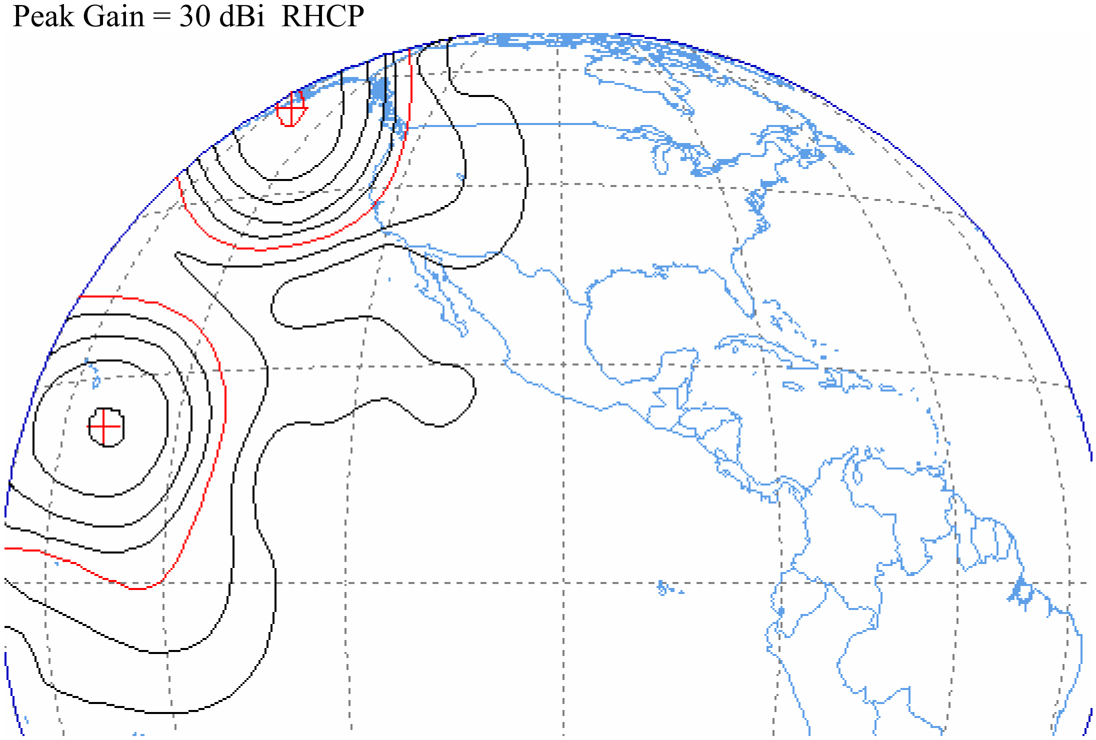
MSAT-2 Beam LR5
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 30 dBi RHCP



MSAT-2 MSAT-2 Beam LE6
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 30 dBi RHCP



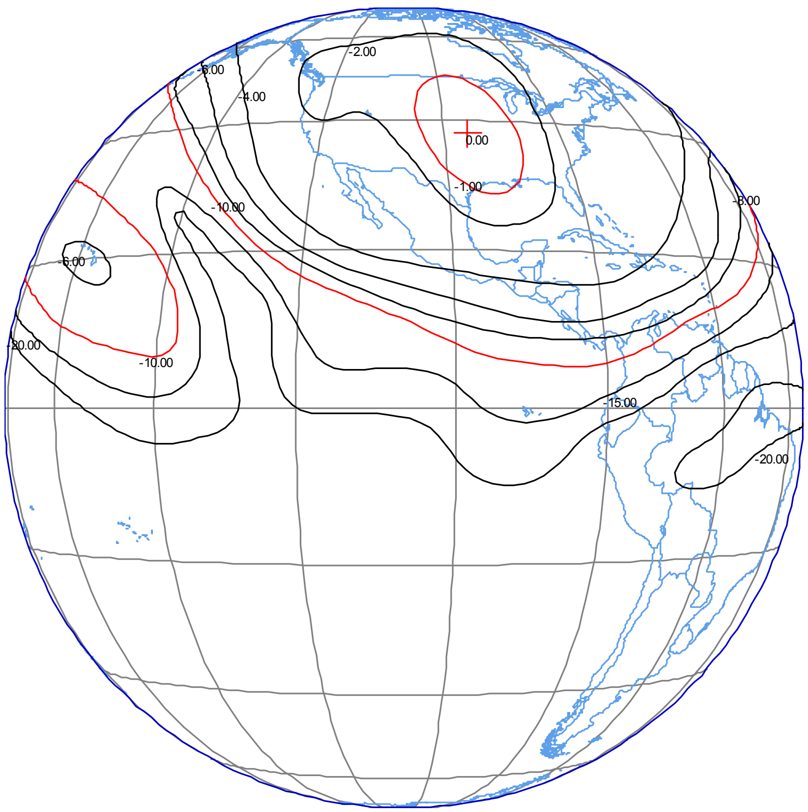
MSAT-2 Beam LR6
Showing beam peak (0 dB) and -2, -4, -6, -8, -10, -15, and -20 dB contours
Peak Gain = 30 dBi RHCP



2. Feeder Link Antenna Gain Contours

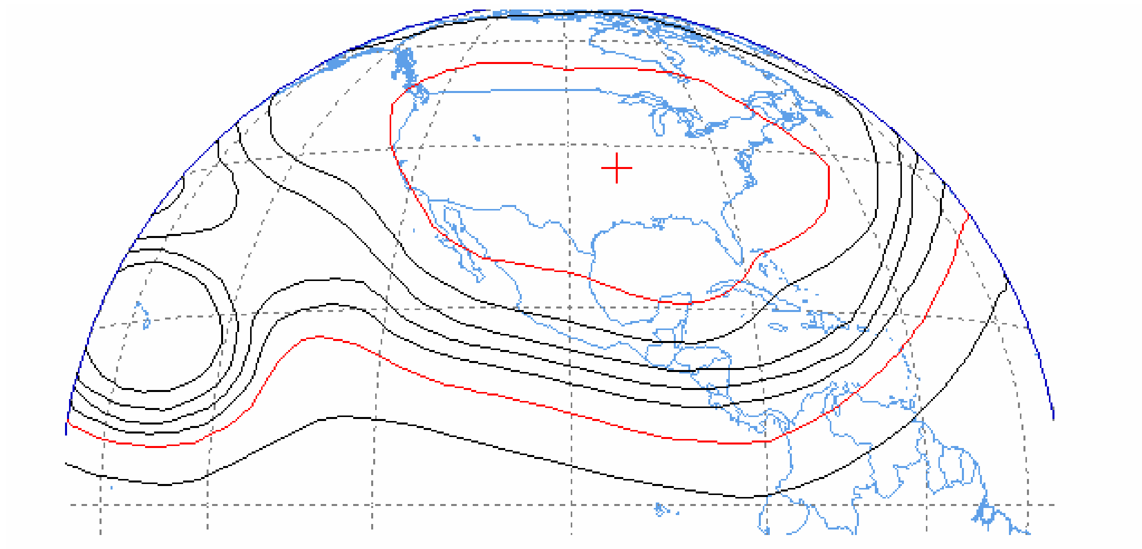
The feeder link antenna gain contours for MSAT-1 and MSAT-2 as designed are depicted below and included in the Schedule S package.[6]

MSAT-1 Ku-Band Feederlink Beam Peak Gain = 29.2 dBi
-2, -4, -6, -8, -10, -15, and -20 dB Contours



[6] *See also* File No. SAT-MOD-19920203-00003.

MSAT-2 Ku-Band Feederlink Beam   Peak Gain = 29.2 dBi
-2, -4, -6, -8, -10, -15, and -20 dB Contours



IV. SERVICE DESCRIPTION, LINK DESCRIPTIONS, AND TYPICAL USER AND GATEWAY TERMINALS (47 C.F.R. § 24.114(D)(4))

1. Service Description

The MSAT-1 and MSAT-2 satellites provide a full range of mobile satellite services, including voice and data, to customers in North America.

2. Communications and Feeder Link Performance

The following link budgets apply to both the MSAT-1 and MSAT-2 satellites.

MSAT CW Carrier Edge of Coverage Link Budget

MSAT CW Carrier EOC Link Budget			
PARAMETER	**UNITS**	**FORWARD (Hub to User)**	**RETURN (User to Hub)**
Noise Bandwidth	kHz	1	1
Boltzmann's constant	dBW/Hz·K	-228.6	-228.6
UPLINK		**Clear**	**Clear**
Frequency	GHz	13	1.64
Earth Station EIRP	dBW	52.5	12
Body Shielding Loss	dB	x	0
Polarization Loss	dB	x	-0.5
Free Space Loss	dB	-206.7	-188.8
Uplink Fade	dB	0	0
Satellite Antenna Gain, EOC	dBi	29	29
Received Carrier Power	dBW	-125.2	-148.3
Satellite G/T	dB/K	-1	5
Intersystem Interference Allowance	dB	0.5	1
C/No	dB·Hz	72.9	55.3
C/Imo	dB·Hz	52.0	54.0
Satellite C/(No+Io)	dB·Hz	52.0	51.6
DOWNLINK			
Frequency	GHz	1.55	11
Satellite Active Gain	dB	123.3	122
Satellite Antenna Gain, EOC	dBi	29	29
Satellite EOC EIRP	dBW	27.1	2.7
Free Space Loss	dB	-188.5	-205.2
Downlink Fade	dB	x	0
Earth Station G/T	dB/K	-16	36.5
Interference Allowance	dB	1	0.5
C/No	dB·Hz	50.2	62.1
LINK			
Link C/(No+Io)	dB·Hz	48.0	51.2
Required C/No	dB-Hz	45.0	45.0
Margin	dB	3.0	6.2

MSAT GC-S Carrier Edge of Coverage Link Budget

MSAT GC-S Carrier EOC Link Budget			
PARAMETER	**UNITS**	**FORWARD (Hub to User)**	**RETURN (User to Hub)**
Noise Bandwidth	kHz	4	4
Boltzmann's constant	dBW/Hz·K	-228.6	-228.6
UPLINK		**Clear**	**Clear**
Frequency	GHz	13	1.64
Earth Station EIRP	dBW	54.5	12
Body Shielding Loss	dB	x	0
Polarization Loss	dB	x	-0.5
Free Space Loss	dB	-206.7	-188.8
Uplink Fade	dB	0	0
Satellite Antenna Gain, EOC	dBi	29	29
Received Carrier Power	dBW	-123.2	-148.3
Satellite G/T	dB/K	-1	5
Intersystem Interference Allowance	dB	0.5	1
C/No	dB·Hz	74.9	55.3
C/Imo	dB·Hz	58.0	60.0
Satellite C/(No+Io)	dB·Hz	57.9	54.0
DOWNLINK			
Frequency	GHz	1.55	11
Satellite Active Gain	dB	123.3	122
Satellite Antenna Gain, EOC	dBi	29	29
Satellite EOC EIRP	dBW	29.1	2.7
Free Space Loss	dB	-188.5	-205.2
Downlink Fade	dB	x	0
Earth Station G/T	dB/K	-16	36.5
Interference Allowance	dB	1	0.5
C/No	dB·Hz	52.2	62.1
LINK			
Link C/(No+Io)	dB·Hz	51.2	53.4
Required C/No	dB-Hz	45.0	45.0
Margin	dB	6.2	8.4

MSAT MMS Carrier Edge of Coverage Link Budget

MSAT MMS Carrier EOC Link Budget			
PARAMETER	**UNITS**	**FORWARD (Hub to User)**	**RETURN (User to Hub)**
Noise Bandwidth	kHz	1	1
Boltzmann's constant	dBW/Hz·K	-228.6	-228.6
UPLINK		**Clear**	**Clear**
Frequency	GHz	13	1.64
Earth Station EIRP	dBW	44.5	4.0
Body Shielding Loss	dB	x	0
Polarization Loss	dB	x	-0.5
Free Space Loss	dB	-206.7	-188.8
Uplink Fade	dB	0	0
Satellite Antenna Gain, EOC	dBi	29	29
Received Carrier Power	dBW	-133.2	-156.3
Satellite G/T	dB/K	-1	5
Intersystem Interference Allowance	dB	0.5	1
C/No	dB·Hz	64.9	47.3
C/Imo	dB·Hz	52.0	54.0
Satellite C/(No+Io)	dB·Hz	51.8	46.5
DOWNLINK			
Frequency	GHz	1.55	11
Satellite Active Gain	dB	123.3	122
Satellite Antenna Gain, EOC	dBi	29	29
Satellite EOC EIRP	dBW	19.1	-5.3
Free Space Loss	dB	-188.5	-205.2
Downlink Fade	dB	x	0
Earth Station G/T	dB/K	-20	36.5
Interference Allowance	dB	1	0.5
C/No	dB·Hz	38.2	54.1
LINK			
Link C/(No+Io)	dB·Hz	38.0	45.8
Required C/No	dB-Hz	34.2	34.2
Margin	dB	3.8	11.6

MSAT DATAF Carrier Edge of Coverage Link Budget

MSAT DATAF Carrier EOC Link Budget			
PARAMETER	**UNITS**	**FORWARD (Hub to User)**	**RETURN (User to Hub)**
Noise Bandwidth	kHz	300	300
Boltzmann's constant	dBW/Hz·K	-228.6	-228.6
UPLINK		**Clear**	**Clear**
Frequency	GHz	13	1.64
Earth Station EIRP	dBW	65.5	23.9
Body Shielding Loss	dB	x	0
Polarization Loss	dB	x	-0.5
Free Space Loss	dB	-206.7	-188.8
Uplink Fade	dB	0	0
Satellite Antenna Gain, EOC	dBi	29	29
Received Carrier Power	dBW	-112.2	-136.4
Satellite G/T	dB/K	-1	5
Intersystem Interference Allowance	dB	0.5	1
C/No	dB·Hz	85.9	67.2
C/Imo	dB·Hz	76.8	78.8
Satellite C/(No+Io)	dB·Hz	76.3	66.9
DOWNLINK			
Frequency	GHz	1.55	11
Satellite Active Gain	dB	123.3	122
Satellite Antenna Gain, EOC	dBi	29	29
Satellite EOC EIRP	dBW	40.1	14.6
Free Space Loss	dB	-188.5	-205.2
Downlink Fade	dB	x	0
Earth Station G/T	dB/K	-10	36.5
Interference Allowance	dB	1	0.5
C/No	dB·Hz	69.2	74
LINK			
Link C/(No+Io)	dB·Hz	68.4	66.1
Required C/No	dB-Hz	58.8	58.8
Margin	dB	9.6	7.3

MSAT DATA1 Carrier Edge of Coverage Link Budget

MSAT DATA1 Carrier EOC Link Budget			
PARAMETER	**UNITS**	**FORWARD (Hub to User)**	**RETURN (User to Hub)**
Noise Bandwidth	kHz	**168**	**168**
Boltzmann's constant	dBW/Hz·K	-228.6	-228.6
UPLINK		**Clear**	**Clear**
Frequency	GHz	13	1.64
Earth Station EIRP	dBW	55.4	**6.5**
Body Shielding Loss	dB	x	0
Polarization Loss	dB	x	-0.5
Free Space Loss	dB	-206.7	-188.8
Uplink Fade	dB	0	0
Satellite Antenna Gain, EOC	dBi	29	29
Received Carrier Power	dBW	-122.3	-153.78
Satellite G/T	dB/K	-1	5
Intersystem Interference Allowance	dB	0.5	1
C/No	dB·Hz	75.8	49.82
C/Imo	dB·Hz	74.3	76.3
Satellite C/(No+Io)	dB·Hz	71.9	49.8
DOWNLINK			
Frequency	GHz	1.55	11
Satellite Active Gain	dB	123.3	122
Satellite Antenna Gain, EOC	dBi	29	29
Satellite EOC EIRP	dBW	30	-2.78
Free Space Loss	dB	-188.5	-205.2
Downlink Fade	dB	x	0
Earth Station G/T	dB/K	**-25.3**	36.5
Interference Allowance	dB	1	0.5
C/No	dB·Hz	43.8	56.62
LINK			
Link C/(No+Io)	dB·Hz	43.8	49.0
Required C/No	dB-Hz	**41.2**	**41.2**
Margin	dB	2.6	7.8

MSAT DATA2 Carrier Edge of Coverage Link Budget

MSAT DATA2 Carrier EOC Link Budget			
PARAMETER	**UNITS**	**FORWARD (Hub to User)**	**RETURN (User to Hub)**
Noise Bandwidth	kHz	**42**	**42**
Boltzmann's constant	dBW/Hz·K	-228.6	-228.6
UPLINK		**Clear**	**Clear**
Frequency	GHz	13	1.64
Earth Station EIRP	dBW	53.4	**6.5**
Body Shielding Loss	dB	x	0
Polarization Loss	dB	x	-0.5
Free Space Loss	dB	-206.7	-188.8
Uplink Fade	dB	0	0
Satellite Antenna Gain, EOC	dBi	29	29
Received Carrier Power	dBW	-124.3	-153.78
Satellite G/T	dB/K	-1	5
Intersystem Interference Allowance	dB	0.5	1
C/No	dB·Hz	73.8	49.82
C/Imo	dB·Hz	68.2	70.2
Satellite C/(No+Io)	dB·Hz	67.2	49.8
DOWNLINK			
Frequency	GHz	1.55	11
Satellite Active Gain	dB	123.3	122
Satellite Antenna Gain, EOC	dBi	29	29
Satellite EOC EIRP	dBW	28	-2.78
Free Space Loss	dB	-188.5	-205.2
Downlink Fade	dB	x	0
Earth Station G/T	dB/K	**-25.3**	36.5
Interference Allowance	dB	1	0.5
C/No	dB·Hz	41.8	56.62
LINK			
Link C/(No+Io)	dB·Hz	41.8	49.0
Required C/No	dB-Hz	**41.2**	**41.2**
Margin	dB	0.6	7.8

3. Typical Subscriber Terminals

A number of different subscriber terminals with varying technical parameters have been authorized to operate in the United States with the MSAT-1 and MSAT-2 satellites. *See, e.g.*, Call Signs E930367, E980179, E990133.

4. Baseline Gateway Facilities

Feeder link earth station facilities for MSAT-1 and MSAT-2 are located in Ottawa, Ontario, Canada. Feeder link earth station facilities for MSAT-2 are also located in Reston, Virginia with a back-up station located in Alexandria, Virginia.

Similar radio frequency equipment is used at each feeder link earth station. On the uplink transmission path, the modulated output from the uplink channel equipment is connected to a redundant up-converter system that translates the modulated signals to the Appendix 30B Ku band. The output of the converters is amplified by redundant high-power amplifiers and fed to the antenna for transmission to the satellite. On the downlink transmission path, the received signal is first amplified by a redundant pair of low-noise amplifiers. The output is fed to a redundant down-converter system that translates the feeder link frequencies to the appropriate frequency for the downlink channel equipment.

V. CALCULATION OF PFD LEVELS (47 C.F.R. § 25.114(D)(5))

The ITU maintains GSO satellite downlink power flux density ("PFD") limits across the entire 10.7 - 11.7 GHz frequency band.[7] 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, 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 1-6 provides the power density for the feeder downlinks for each carrier type. Table 1-7 calculates power flux density on the ground based on the maximum density calculated in Table 1-6 and compares it with the limits, showing positive margin in each case.

[7] Article 21, Table S21-4, ITU Radio Regulation (2001).

Table 1-6: Feeder Link (Return) PFD Compliance (10.7 – 11.7 GHz)

Elevation Angle	Slant Range (km)	PSL (dB-m^2)	MSV's GSO MSS Maximum PFD (dBW/m^2/4 kHz)	Maximum PFD Limit (dBW/m^2/4 kHz)	Margin (dB)
0°	41,680	-163.4	-154.7	-150	4.7
5°	41,128	-163.3	-154.6	-150	4.6
25°	39,072	-162.8	-154.1	-140	14.1
90°	35,787	-162.1	-153.3	-140	13.3

Table 1-7: Satellite Telemetry PFD Compliance (10.7 – 11.7 GHz)

Elevation Angle	Slant Range (km)	PSL (dB-m^2)	MSV's GSO MSS Maximum PFD (dBW/m^2/4 kHz)	Maximum PFD Limit (dBW/m^2/4 kHz)	Margin (dB)
0°	41,680	-163.4	-159.9	-150	9.9
5°	41,128	-163.3	-159.8	-150	9.8
25°	39,072	-162.8	-159.3	-140	19.3
90°	35,787	-162.1	-158.5	-140	18.5

VI. PUBLIC INTEREST CONSIDERATIONS (47 C.F.R. § 25.114(D)(6))

As stated in response to Question 43 of the Form 312, grant of the application to modify the CMDC earth station license will serve the public interest.

VII. REQUIREMENTS FOR DOMESTIC FSS APPLICANTS (47 C.F.R. § 25.114(D)(7))

The MSAT feederlinks operate in the Ku band frequencies defined in Appendix 30B of the ITU Radio Regulations, and the MSAT TT&C operations operate on standard Fixed Satellite Service ("FSS") Ku band frequencies (11.7-12.2 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space)).

In the Appendix 30B plan, the nearest allocated satellite longitudes to 101°W and 106.5°W are: 98.2°W (Aruba), 104°W (Ecuador), 107.3 (Canada) and 104°W, Jamaica. The only satellites within 10° with ITU filings in the Appendix 30B Ku band are MSAT-

1 (Canada) at 106.5°W, MSAT-2 (US) at 101°W, and MSV-1 at 101°W. Both MSAT satellites have been brought into use. When MSV-1 is launched, MSV will resolve potential interference issues between MSV-1 and MSAT-2 operationally. Similarly, upon the launch of MSV-2, MSV Canada will resolve potential interference issues between MSV-2 and MSAT-1 operationally.

Thus, no satellites using the Appendix 30B Ku band operate 2° away from 101°W or 106.5°W. Therefore, the interference analysis has been performed assuming that a satellite with Appendix 30B Ku band carriers and antenna parameters identical to those of MSV-1 operates at 99°W. To broaden the applicability of the analysis, parameters from the withdrawn applications of two other entities that proposed to operate satellites in the Appendix 30B Ku band (at 120°W and 87.5°W) have been included in the analysis.[8] Both satellite filings were widely separated from the MSATs, but for the purpose of the analysis they will be considered to be located 2° away from 101°W. These filings are sufficiently similar that they are combined into one "Other Operator" category for the analysis. All MSAT and MSV feederlink signals and other operator carriers are digital.

In the standard FSS Ku band, satellites operate within 2° of the MSAT slots at 99.0°, 101°, 103°, 105°, and 107.3° west longitude. MSV previously reached a coordination agreement, referenced above, with the operator of a standard Ku band satellite at 101°W. In the standard Ku band, the MSAT TT&C signals are analog, and for the analysis, the potential interference cases are assumed to be analog as well.

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[8] Iridium, Application for Modification, File No. SAT-MOD-20030828-00286 (August 28, 2003); Boeing, Amendment, File No. SAT-AMD-20030827-00241 (August 27, 2003).

Carriers and Feederlink Earth Station Characteristics

The carrier types and power densities for the MSATs, MSV-1 and MSV-2, and the other operator filings are provided in tables [1a], [1b], and [1c] respectively.

Table [1a] MSAT-1 and MSAT-2 Carriers

	MSAT Ku Band - Uplink				**MSAT Ku Band - 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
Command	69.0	1000	9.0		---	---	---
Telemetry	---	---	---		17.5	100	-32.5
	Max Uplink Density =		**16.7**		**Max Downlink Density =**		**-32.5**
	Min Uplink Density =		**3.1**		**Min Downlink Density =**		**-55.0**

Table [1b] MSV-1 and MSV-2 Carriers

MSV Ku Band - Uplink					**MSV Ku Band - 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
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 =**		**-41.1**

Table [1c] Other Operator Carriers

Other Ku Band Uplinks					**Other Ku Band Downlinks**		
Carrier	**EIRP (dBW)**	**BW (kHz)**	**Density dBW/Hz**		**EIRP (dBW)**	**BW (kHz)**	**Density dBW/Hz**
cdma2000*	47.4	1250	-13.5		28.1	1250	-32.9
Command	69.0	1000	9.0		---	---	---
Telemetry	---	---	---		17.5	100	-32.5

* Assume maximum CDMA carrier loading with 29.3 dBW uplink EIRP/user and 10 dBW downlink EIRP/user.

Relevant feederlink earth station characteristics are shown in Table 2. Side lobe antenna gain is calculated using an angle of 2.2° because that is the Topocentric angle corresponding to 2° orbital separation.

Table 2 – Feederlink Earth Station Antenna Characteristics.

	MSAT-1 or 2	MSV-1 or 2	Other Operator
Antenna Transmit Gain (dBi)	61.1	61.1	57.9
Sidelobe Pattern	29-25Log()	29-25log()	29-25log()
Sidelobe Gain @ 2.2	20.4	20.4	18.4
Delta Gain Main -Side Lobe (dB)	**40.7**	**40.7**	**39.5**
Antenna Receive Gain (dBi)	60.1	60.1	56.6
Sidelobe Pattern	29-25Log()	29-25log()	29-25log()
Sidelobe Gain @ 2.2	20.4	20.4	18.4
Delta Gain Main - Side Lobe (dB)	**39.7**	**39.7**	**38.2**

Uplink Analysis

Table 3 shows the results of the uplink C/I calculations for all pair-wise combinations of networks. The assumption of two interfering satellites, each 2° separated from the victim, is included. 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:

$$C/I_{up} = C_{oVup} - C_{oIup} + \Delta G_{tI} + 3\ \text{dB}$$

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 3 – Uplink Interference Calculation Results (C/I)

		Victim Density (dBW/Hz)			
		MSAT-1 or 2 Min Density	**MSV-1 or 2 Min Density**	**Other cdma2000**	**Other Command**
Interferer Density	**dBW/Hz**	3.1	2.1	-13.5	9.0
MSAT-1 or 2 Max Density	19.7	**24.1**	**23.0**	**7.4**	**29.9**
MSV-1 or 2 Max Density	12.9	**30.9**	**29.9**	**14.2**	**36.8**
Other Operator Max Density	-10.5	**53.1**	**52.1**	**36.5**	**59.0**
Minimum Uplink C/I =		**10.4 dB**		**Maximum ΔT/T=**	**9.1%**

From the Table 3, all carrier combinations except for one result in very low interference. Except for the case of MSAT interference into the other operator network, the worst case C/I is 14.2 dB, which corresponds to a ΔT/T value of 3.8%, well below the coordination threshold value of 6%. The worst case, ΔT/T = 9.1%, could be resolved in operator to operator coordination, for example by adjusting the uplink power density or detailed frequency assignments of the network links..

Downlink Analysis

Table 4 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. The assumption of two interfering satellites, each 2° separated from the victim, is included. 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:

$$C/I_{down} = C_{oVdown} - C_{oIdown} + \Delta G_{rI} + 3\ \text{dB}$$

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 4 – Downlink Interference Calculation Results (C/I)

		Victim Density (dBW/Hz)			
		MSAT-1 or 2 Min Density	**MSV-1 or 2 Min Density**	**Other cdma2000**	**Other Telemetry**
Interferer Density	**dBW/Hz**	-55.0	-41.1	-32.9	-32.5
MSAT-1 or 2 Max Density	-32.5	-29.5	**14.1**	**28.1**	**34.8**
MSV-1 or 2 Max Density	-26.3	-23.3	**7.9**	**21.8**	**28.6**
Other Operator Max Density	-32.9	-29.9	**14.5**	**28.4**	**35.2**
Minimum Uplink C/I =		**7.9 dB**	**Maximum ΔT/T=**	**16.2%**	

From the Table 4, all carrier combinations except one result in very low downlink interference. Except for the case of MSV-1 or MSV-2 interference into the MSAT-1 or MSAT-2 networks, the worst case C/I is 14.1 dB, which corresponds to a ΔT/T value of 3.8%, well below the coordination threshold value of 6%. Interference between MSAT and MSV satellites can be prevented by operational measures.

VIII. REQUIREMENTS FOR L BAND MSS APPLICANTS (47 C.F.R. § 25.114(D)(8))

Both MSAT-2 and MSAT-1 have already been authorized to provide service in the United States. *See supra* note 1.

IX. REQUIREMENTS FOR NVNG MSS APPLICANTS (47 C.F.R. § 25.114(D)(9))

Not applicable.

X. REQUIREMENTS FOR BIG LEO AND 2 GHZ MSS APPLICANTS (47 C.F.R. § 25.114(D)(10))

Not applicable.

XI. REQUIREMENTS FOR DBS APPLICANTS (47 C.F.R. §§ 25.114(D)(11) AND (D)(13))

Not applicable.

XII. REQUIREMENTS FOR NGSO FSS APPLICANTS 47 C.F.R. § 25.114(D)(12))

Not applicable.

XIII. ORBITAL DEBRIS MITIGATION (47 C.F.R. §§ 25.114(D)(14))

1. Spacecraft Hardware Design (47 C.F.R. § 25.114(d)(14)(i))

MSV has assessed and limited the amount of debris released in a planned manner during normal operations. MSAT-1 and MSAT-2 have been launched and are operating at their authorized positions. MSV does not intend to release debris during the planned course of operations of MSAT-1 and MSAT-2. MSV has considered the possibility of MSAT-1 and MSAT-2 becoming sources of debris by collisions with small debris or meteoroids that could cause loss of control of the spacecraft and prevent post-mission disposal. MSV has addressed the possibility of collision by ensuring that critical spacecraft components are located inside the protective body of 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.

2. Minimizing Accidental Explosions (47 C.F.R. § 25.114(d)(14)(ii))

MSV 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 though 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 and MSAT-2 reach their final disposal orbits, 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.

3. Safe Flight Profiles (47 C.F.R. § 25.114(d)(14)(iii))

MSV has assessed and limited the probability of MSAT-1 and MSAT-2 becoming a source of debris by collisions with large debris or other operational space stations.

MSAT-1. At the 106.5° W.L. orbital location, MSV is unaware of other satellites operating at that location. There is an ITU filing for MSAT-30B that is for the feederlinks of MSAT-1 and is physically on the same platform. There is a request for coordination for another satellite at 106.5°W; however this request was filed in 1996 and is therefore believed to have expired. Further, MSV is not aware of any construction contract that has been awarded for that network. Moreover, that satellite does not appear in the FAA's Commercial Space Launch Schedule. Accordingly, operation of MSAT-1 at the 106.5° W.L. orbital location with ± 0.05° East-West station keeping volume will not overlap with the station keeping volume of other operators.

MSAT-2. At the nominal 101° W.L. orbital location, MSV is aware that DIRECTV Enterprises, LLC ("DIRECTV") is authorized by the Commission to operate multiple satellites and has applied to the Commission to operate additional satellites at that location. MSV is also aware that SES Americom Inc. ("SES") is licensed by the Commission to operate a satellite at the nominal 101° W.L. orbital location. Moreover, Pegasus DBS Development Corp. has an application pending with the Commission to launch and operate a satellite at the 101° W.L. orbital location. With respect to non-U.S.-licensed systems, the United Kingdom, France, and Luxembourg have filed coordination requests with the ITU for satellites at the 101° W.L. orbital location. MSV is not aware of any construction contracts that have been awarded for these networks. Moreover, none of these satellites appear in the FAA's Commercial Space Launch Schedule. Operation of MSAT-2 at the 100.95° W.L. orbital location with ± 0.05° East-West station keeping volume avoids overlapping with the station keeping volume of other operators at the nominal 101° W.L. orbital location.

4. Post-Mission Disposal (47 C.F.R. § 25.114(d)(14)(iv))

MSAT-1. MSAT-1 was launched in 1996 and, therefore, is not subject to the Commission's disposal altitude requirements that are based on the Inter-Agency Space Debris Coordination Committee (IADC) formula. 47 C.F.R. § 25.283(a). However, MSV Canada will 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. MSV will allocate and reserve approximately 10 kg of propellant for final orbit raising maneuvers to this altitude. 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. MSV has assessed fuel gauging uncertainty and has provided an adequate margin of fuel reserve to address the assessed uncertainty in remaining propellant.

MSAT-2. MSAT-2 was launched in 1995 and, therefore, is not subject to the Commission's disposal altitude requirements that are based on the Inter-Agency Space Debris Coordination Committee (IADC) formula. 47 C.F.R. § 25.283(a). However, MSV will dispose of MSAT-2 by moving it to a minimum altitude of 300 km above the GSO orbit at the end of its operational life. MSV will allocate and reserve approximately 10 kg of propellant for final orbit raising maneuvers to this altitude. 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. MSV has assessed fuel gauging uncertainty and has provided an adequate margin of fuel reserve to address the assessed uncertainty in remaining propellant.

XIV. WAIVERS (TO THE EXTENT NECESSARY)

As discussed above, both the U.S.-licensed MSAT-2 satellite and the Canadian-licensed MSAT-1 satellite (licensed by Industry Canada to Mobile Satellite Ventures (Canada) Inc.)) have already been authorized to operate in the L band and the Appendix 30B Ku band for service in the United States pursuant to the Commission's rules applicable at that time. *See supra* note 1. This application does not request authorization for new frequencies, a change in orbital location, or any other change in the technical parameters of MSAT-1 and MSAT-2. Only to the extent necessary, MSV requests the following waivers.

A. Section 25.210(i) – Cross-Polarization Isolation

The cross-polarization isolation of the MSAT-1 and MSAT-2 satellites in the TT&C and the Appendix 30B band feeder link beams is less than 30 dB. While the Commission's rules require antennas in the FSS to provide at least 30 dB of cross-polarization isolation (47 C.F.R. § 25.210(i)), it does not appear that this rule applies to MSAT-1 and MSAT-2. First, the rule took effect in May 1993, after construction of MSAT-1 and MSAT-2 commenced.[9] Second, Section 25.273(d) of the Commission's rules provides that only satellites "authorized" after May 10, 1993 which do not satisfy the requirements of Section 25.210 may be required to accept greater constraints in resolving interference problems than complying ones. 47 C.F.R. § 25.273(d). Both

[9] *See Amendment of Part 25 of the Commission's Rules, Second Report and Order and Further Notice of Proposed Rulemaking*, 8 FCC Rcd 1316 (rel. March 4, 1993).

MSAT-1[10] and MSAT-2[11] were initially authorized by their licensing Administrations prior to this date.

Nonetheless, and only to the extent necessary, a waiver of this rule is requested to enable MSAT-1 and MSAT-2 to operate with 20 dB of cross-polarization isolation in the TT&C and the Appendix 30B Ku band within the primary coverage area of the antenna for feeder link, command, telemetry, and power control beacon operations. The Bureau has explained that the cross-polarization isolation requirement of Section 25.210(i) is necessary in order to facilitate two-degree orbital spacing between geostationary satellites.[12] In the case of MSAT-1 and MSAT-2, there are no other satellites that currently use Appendix 30B Ku band frequencies within more than five degrees of the 101° W.L. orbital location. Accordingly, the operation of MSAT-1 and MSAT-2 with less than 30B of cross-polarization isolation will not result in harmful interference to any U.S. or foreign-licensed satellite. Moreover, consistent with the Bureau's recent decision granting DIRECTV a waiver of Section 25.210(i), if the Commission authorizes access to the U.S. market to a satellite that is compliant with the two-degree spacing requirement, and is located as close as two degrees from MSAT-1 and MSAT-2, MSV will coordinate in good faith with the licensee. If a coordination agreement is not reached, MSV will operate MSAT-1 and MSAT-2 on a non-harmful interference basis relative to U.S. services provided in the Appendix 30B Ku band and the standard FSS Ku band by any

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[10] Letter from R.G. Amero, Manager (DOSS), Space Services, Frequency/Orbit Management, Department of Communications, Government of Canada, to Mr. Orest Roscoe, General Manager, Network Development, Telesat Mobile Inc., DOSS D 6215-17-1 (August 2, 1991).

[11] *Order and Authorization*, 4 FCC Rcd 6041 (1989).

[12] *See DIRECTV Enterprises, LLC, Order and Authorization*, DA 06-1493 (July 21, 2006) ("*DIRECTV Order*").

authorized system that is two-degree spacing compliant. Accordingly, the operation of MSAT-1 and MSAT-2 will not cause more interference than would be caused if MSAT-1 and MSAT-2 complied with Section 25.210(i) of the Commission's rules, and MSV will not claim protection against interference to its operations caused by U.S. services provided in the Appendix 30B Ku band and the standard FSS Ku band by a two-degree compliant satellites if such interference results from failure of MSAT-1 and MSAT-2 to comply with Section 25.210(i).

B. Section 25.202(g) – TT&C at Edge of Allocated Bands

Both MSAT-1 and MSAT-2 use TT&C frequencies in the standard Ku band, outside of the L band and Appendix 30B Ku band frequency bands. Accordingly, and only to the extent necessary, a waiver is requested of Section 25.202(g) of the FCC's rules, which requires TT&C "for U.S. domestic satellites [to] be conducted at either or both edges of the allocated band(s)." 47 C.F.R. § 25.202(g). The Commission previously authorized MSAT-2 to use TT&C frequencies in the standard Ku band because, at the time the satellite was being constructed, there were no worldwide TT&C facilities operating in the Appendix 30B Ku band.[13] The same rationale justifies a waiver for the MSAT-1 satellite. Further, MSV coordinated with adjacent satellite operators at the time of launch of MSAT-1. Moreover, MSV will coordinate with other satellite operators to the extent they are proposed to be located within 2 degrees of the 106.5° W.L. orbital location at some point in the future. For example, MSAT-2 is co-located

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[13] *AMSC Subsidiary Corporation, Memorandum Opinion and Order*, 8 FCC Rcd 4040 (1993); *AMSC Subsidiary Corporation, Order and Authorization*, DA 95-721 (April 5, 1995).

with a satellite operating in the standard FSS Ku band at 101°W and has operated since launch under the terms of an agreement reached with the operator.[14]

C. Section 25.114(c) -- Schedule S

A partial waiver of the following subsections of Section 25.114(c) of the Commission's rules is requested to allow flexibility in completing the information required by the Schedule S submitted with this application. As discussed below, the good cause for a waiver is that the Schedule S does not account for the following unique aspects of MSV's GSO MSS satellite.

1. MSAT-1

Schedule S, Question S1:

(a) The MSAT-1 satellite has been in operation at 106.5°W longitude for over 10 years. Therefore, data for the following items is not provided.

S1.b Construction Start Date

S1.c Construction Completion Date

S1.d1 Estimated Launch date (Begin)

(b) MSAT-1 is a Mobile Satellite Service (MSS) satellite and does not have transponders in the sense of a Fixed Satellite Service (FSS) satellite. On MSAT-1, the 200 MHz of up and downlink feederlink spectrum in Ku-band is mapped to 29 MHz of L-band 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.

[14] *See id.*

(c) Transmit Maximum EIRP (dBW) for the LD1 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.

(d) Minimum SFD – The forward communications paths on the satellite will be operated only in a linear mode, well backed-off from saturation. Therefore, Linear gain through the satellite is more meaningful than SFD and is provided in S10.

Schedule S, Question S13:

(e) Carriers per transponder – Since the satellite does not have transponders in the conventional fixed satellite service sense, carriers per transponder is not a definable quantity. System capacity is a more appropriate measure. Therefore, the quantity "1" has been entered in Schedule S.

2. MSAT-2

Schedule S, Question S1:

(a) The MSAT-2 satellite has been in operation at 100.95°W longitude for over 10 years. Therefore, data for the following items is not provided.

S1.b Construction Start Date

S1.c Construction Completion Date

S1.d1 Estimated Launch date (Begin)

(b) MSAT-2 is a Mobile Satellite Service (MSS) satellite and does not have transponders in the sense of a Fixed Satellite Service (FSS) satellite. On MSAT-2, the 200 MHz of up and downlink feederlink spectrum in Ku-band is mapped to 29 MHz of L-band 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, and total transponder bandwidth.

(c) Transmit Maximum EIRP (dBW) for the LD1 beams – The value entered is the maximum aggregate EIRP for MSAT-2, even though that power would operationally be spread over all the downlink beams.

(d) Minimum SFD – The forward communications paths on the satellite will be operated only in a linear mode, well backed-off from saturation. Therefore, linear gain through the satellite is more meaningful than SFD and is provided in S10.

Schedule S, Table S11

(g) CDMA Processing Gain – Schedule S will not accept values in column (g). The processing gain is 18 dB for DATA1 and 12 dB for DATA2. The other carriers types have no processing gain.

Schedule S, Question S13:

(e) Carriers per transponder – Since the satellite does not have transponders in the conventional fixed satellite service sense, carriers per transponder is not a definable quantity. System capacity is a more appropriate measure. Therefore, the quantity "1" has been entered in Schedule S.