Engineering Statement

Intelsat License LLC ("Intelsat") proposes to operate its Galaxy 12 spacecraft from 129° W.L. From this orbital location, Galaxy 12 will utilize the 5925 – 6425 MHz and 3700 – 4200 MHz frequency bands to provide service to the United States.

Galaxy 12 is currently authorized to operate from 133º W.L. (see FCC File Nos.: SAT-MOD-20100120-00013 and SAT-AMD-20100514-00102). Intelsat now proposes to relocate Galaxy 12 from 132.9º W.L. to 129º W.L..[1]

To take the impact of this proposed change in orbital location into account, this engineering statement provides the following technical information 1) frequency plan, 2) gain contours, (3) power flux density levels, (4) Galaxy 12 link budget and interference analysis, (5) adjacent satellite link analysis and (6) orbital debris mitigation plan.

1) Frequency Plan

The Galaxy 12 frequency and beam switching plans are provided in Exhibits 1A and 1B. From the 129° W.L. orbital location, the primary channel configuration (as designated in Exhibit 1A) will be implemented on Galaxy 12.

2) Gain Contours

The coverage patterns for Galaxy 12 operating at the proposed 129° W.L. orbital location are provided in Exhibits 2A through 2J.

3) Power Flux Density ("PFD") Levels

The power flux density limits for space stations are specified in Section 25.208 of the Commission's rules. In the 3700 – 4200 MHz band, the maximum PFD level at the Earth's surface produced by Galaxy 12 was calculated for a 36 MHz digital carrier (having an occupied bandwidth of 30.133 MHz) and a 36 MHz analog TV/FM carrier, which typically generate the highest PFD levels. The power flux density level for the Galaxy 12 telemetry carriers was also calculated. The results are provided in Exhibit 3

[1] Intelsat intends to temporarily move Galaxy 12 from 133° W.L. to 132.9° W.L. before drifting the satellite from 132.9° W.L. to 129° W.L. Request for Special Temporary Authority for Galaxy 12, Call Sign: S2422, File No. SAT-STA-20110915-00183 (filed Sept. 15, 2011).

and show that the downlink power flux density levels of the Galaxy 12 carriers do not exceed limits specified in Section 25.208 of the Commission's rules.

4) Galaxy 12 Link Budget and Interference Analysis

Link analysis for Galaxy 12 was conducted for a number of representative carriers. For the analysis, it was assumed that the nearest co-frequency satellites to Galaxy 12 were Galaxy 13 and AMC-11. Galaxy 13 is licensed to Intelsat and operates at 127º W.L. The technical characteristics of Galaxy 13 are contained in FCC file number SAT-AMD-20030228-00020. AMC-11 is licensed to SES World Skies and operates from 131º W.L. The technical characteristics of the C-band payload of AMC-11 are contained in FCC file number SAT-LOA-20020104-00002.

The uplink power density of the emissions of Galaxy 13 and AMC-11 was assumed to be -38.7 dBW/Hz, the maximum level specified in Section 25.212(d) of the Commission's rules for digital C-band carriers. Other assumptions made for the link budget analysis were as follows:

a) In the plane of the geostationary satellite orbit, all transmitting and receiving earth station antennas have off-axis co-polar gains that are compliant with the limits specified in Section 25.209(a)(1) of the FCC's rules.
b) All transmitting and receiving earth stations have a cross-polarization isolation value of at least 30 dB within their main beam lobe.
c) Degradation due to rain was not considered, given that rain (attenuation) effects are insignificant at C-band.

The impact of the TV/FM carriers from the adjacent satellites at 127° W.L. and 131° W.L on the transmissions of Galaxy 12 was not considered due to the fact that TV/FM carriers are known to be high-density carriers with most of the energy contained within the near vicinity of the carrier center frequency. Operation of sensitive narrow-band carriers is typically precluded within these high power density areas of the TV/FM carrier. Accordingly, placement and operation of TV/FM carriers are normally achieved through internal coordination and/or coordination discussions with the adjacent satellite operator, whichever may be the case, rather than through C/I calculations – since the results of such calculations would show

that narrow-band carriers typically could not operate on a co-frequency basis with TV/FM carriers.

The results of the C-band analyses are shown in Exhibit 4 and demonstrate that operation of the Galaxy 12 satellite from 129º W.L. would permit the intended services to achieve their respective performance objectives while maintaining sufficient link margin. Additionally, the uplink power density levels of the carriers listed in Exhibit 4 comply with the limits contained in Section 25.212(d) of the Commission's rules.

5) Adjacent Satellite Link Analysis

At C- band, the impact of the proposed Galaxy 12 emissions on the transmissions of Galaxy 13 and AMC-11 was analyzed. For Galaxy 13, it was assumed that nearest co-frequency satellites were Galaxy 12 and Galaxy 14. Galaxy 14 is licensed to Intelsat and operates from 125º W.L. The technical characteristics of this spacecraft are contained in FCC file number SAT-AMD-20030827-00283.

For the AMC-11 link analysis, it was assumed that the nearest co-frequency satellites were Galaxy 12 and Galaxy 15. Galaxy 15 is licensed to Intelsat and operates at 133º W.L. The technical characteristics of Galaxy 15 are contained in FCC file numbers SAT-AMD-20031103-00320 and SAT-AMD-20040603-00111).

The impact of Galaxy 12 emissions on the TV/FM carriers of Galaxy 13 and AMC-11 was not considered for the reasons articulated in section 4. Additionally, the assumptions made in section 4 pertaining to Earth station off-axis gain performance, Earth station cross-polarization performance and rain attenuation were also applied in the analysis.

The results of the analysis are listed in Exhibits 5 and 6. The Galaxy 12 transmissions will be limited to those levels contained in Sections 25.212(d) unless higher levels are coordinated with affected adjacent satellite operators. In any case, pursuant to the results in Exhibits 5 and 6, the uplink power density of the Galaxy 12 digital carriers operating in the 5925 – 6425 MHz band will not exceed -38.7 dBW/Hz. Within the 3700 – 4200 MHz band the downlink EIRP density of the Galaxy 12 digital carriers will not exceed -30.6 dBW/Hz.

6) Schedule S Submission

Intelsat is providing a Schedule S with its application. The Schedule S contains only: (1) those Galaxy 12 data items that have changed from those that were shown in the Schedule S for SAT-AMD-20100514-00102; and (2) data items whose inclusion was required in order for the software application to function properly.

7) Orbital Debris Mitigation Plan

Intelsat is proactive in ensuring safe operation and disposal of this and all spacecraft under its control. The four elements of debris mitigation are addressed below.

7.1) Orbital Debris Mitigation Plan: Spacecraft Hardware Design

The spacecraft is designed such that no debris will be released during normal operations. Intelsat has assessed the probability of collision with meteoroids and other small debris (<1 cm diameter) and has taken the following steps to limit the effects of such collisions: (1) critical spacecraft components are located inside the protective body of the spacecraft and properly shielded; and (2) all spacecraft subsystems have redundant components to ensure no single-point failures. The spacecraft does not use any subsystems for end-of-life disposal that are not used for normal operations.

7.2) Orbital Debris Mitigation Plan: Minimizing Accidental Explosions

Intelsat has assessed the probability of accidental explosions during and after completion of mission operations. The spacecraft is designed in a manner to minimize the potential for such explosions. Propellant tanks and thrusters are isolated using redundant valves and electrical power systems are shielded in accordance with standard industry practices. At the completion of the mission, and upon disposal of the spacecraft, Intelsat will, with the exception of the oxidizer tanks, ensure the removal of all stored energy on the spacecraft by depleting all propellant tanks, venting all pressurized systems, and turning off all active units.

As explained in Intelsat's filing SAT-MOD-20080630-00133, upon completion of the Galaxy 12 orbit raising maneuver, the oxidizer tanks are isolated from both the Liquid Apogee Motor ("LAE") and Dual Mode Thrusters ("DMTs"). Typically, some residual oxidizer remains in the tank following the isolation. It is anticipated that less than 11 kilograms of oxidizer is carried throughout the mission (less than 2.5% fill fraction).

Venting both fuel and pressurant through thrusters at the end of the mission minimizes the risk of reaction between fuel and oxidizer. Also, oxidizer remaining in the propellant manifolds between the pyro valves and the LAE/DMT thrusters will be expelled at the end of life by performing an engine pulsing maneuver. The risk of an explosive reaction is further reduced by isolating the oxidizer tanks from the remainder of the propulsion system. In addition, at the worst case end of life temperature, with a 2.5% fill fraction, the pressure in the oxidizer tank will not exceed its burst pressure.

Accordingly, Intelsat requests that the waiver of Section 25.283(c) of the Commission's rules previously granted to the Galaxy 12 spacecraft for operation at 133º W.L. continue to apply at the 129.0º W.L. location.

7.3) Orbital Debris Mitigation Plan: Safe Flight Profiles

Intelsat has assessed and limited the probability of the space station becoming a source of debris as a result of collisions with large debris or other operational space stations.

Galaxy 12 will not be located at the same orbital location as another satellite or at an orbital location that has an overlapping station-keeping volume with another satellite. Intelsat is not aware of any other FCC licensed system, or any other system applied for and under consideration by the FCC, having an overlapping station-keeping volume with Galaxy 12. Intelsat is also not aware of any satellite network with an overlapping station-keeping volume with Galaxy 12 that is the subject of an ITU filing and that is either in orbit or progressing towards launch.

It is noted that Canada has ITU filings for a number of space networks at 129º W.L. There is currently only one Canadian satellite, CIEL-2, which operates at the nominal orbital location of 129º W.L. However, the actual orbital location of CIEL-2 is 128.8º W.L, and as best as can be determined, the position of this spacecraft is maintained to within ±0.05º of this orbital location. Consequently, there would be no overlap of the station-keeping volumes of Galaxy 12 and CIEL-2.

7.4) Orbital Debris Mitigation Plan: Post Mission Disposal

At the end of the mission, Intelsat intends to dispose the spacecraft by moving it to a minimum altitude of 300 kilometers above the geostationary arc. This exceeds the minimum altitude established by the IADC formula.

Intelsat has reserved 6.8 kilograms of fuel for this purpose. The reserved fuel figure will be provided for in the propellant budget. To calculate this figure, the "rocket equation" was used, taking into account the expected mass of the satellite at the end of life and the required delta-velocity to achieve the desired orbit. Intelsat has assessed the fuel gauging uncertainty and has provided an adequate margin of fuel reserve to address the assessed uncertainty in remaining propellant.

In calculating the disposal orbit, Intelsat has used simplifying assumptions as permitted under the Commission's Orbital Debris Report and Order. For reference, the effective area to mass ratios (Cr*A/M) of the Galaxy 12 spacecraft is 0.03 m^2/kg, resulting in a minimum perigee disposal altitude according to the IADC formula of at most 238.2 kilometers above the geostationary arc. This is lower than the 300 kilometer above geostationary disposal altitude specified by Intelsat in this filing. Accordingly, the Galaxy 12 planned disposal orbit complies with the FCC's rules.

Certification Statement

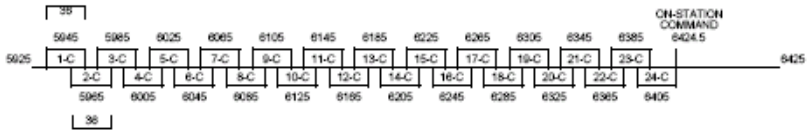
I hereby certify that I am a technically qualified person and am familiar with Part 25 of the Commission's rules. The contents of this engineering statement were prepared by me or under my direct supervision and to the best of my knowledge are complete and accurate.

/s/ Jose Albuquerque	October 7, 2011
Jose Albuquerque Intelsat Senior Director, Spectrum Strategy	Date

Exhibit 1A: Frequency Plan

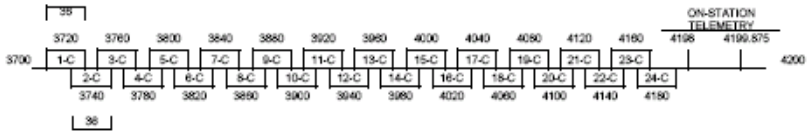
PRIMARY CHANNEL CONFIGURATION

NORTH AMERICA UPLINK BEAM (VERTICAL POLARIZATION)



NORTH AMERICA UPLINK BEAM (HORIZONTAL POLARIZATION)

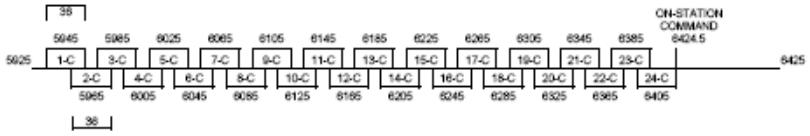
NORTH AMERICA DOWNLINK BEAM (HORIZONTAL POLARIZATION)



NORTH AMERICA DOWNLINK BEAM (VERTICAL POLARIZATION)

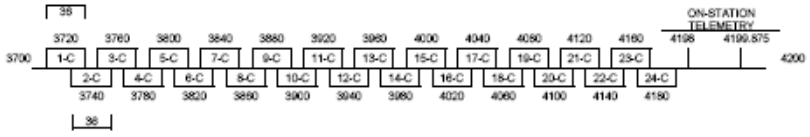
ALTERNATE CHANNEL CONFIGURATION

NORTH AMERICA UPLINK BEAM (HORIZONTAL POLARIZATION)



NORTH AMERICA UPLINK BEAM (VERTICAL POLARIZATION)

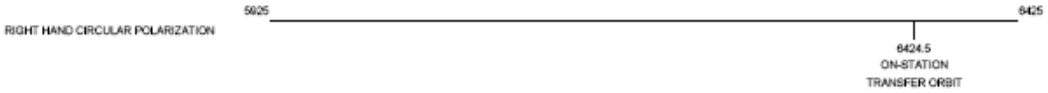
NORTH AMERICA DOWNLINK BEAM (VERTICAL POLARIZATION)



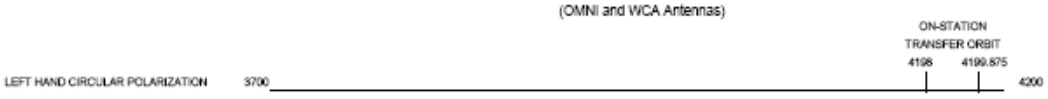
NORTH AMERICA DOWNLINK BEAM (HORIZONTAL POLARIZATION)

TELEMETRY, COMMAND & RANGING

UPLINK COMMAND / RANGING
(OMNI and WCA Antennas)



DOWNLINK TELEMETRY / RANGING
(OMNI and WCA Antennas)



Notes :

1) All frequencies are in megahertz.

2) The above payload channel connection plan is switchable in polarization. Accordingly, the horizontally polarized uplink and downlink channels can be switched to operate with vertical polarization, and the vertically polarized uplink and downlink channels can be switched to operate with horizontal polarization.

Exhibit 1B: Frequency Plan (continued)

Uplink Transponder Designation	Uplink Beam Name	Uplink Polarization	Uplink Center Frequency (MHz)	Downlink Transponder Designation	Downlink Beam Name	Downlink Polarization	Downlink Center Frequency (MHz)	Channel Bandwidth (MHz)	Channel Gain (dB)
1C	CONUS	Vertical	5945	1C	CONUS	Horizontal	3720	36	132.8
3C	CONUS	Vertical	5985	3C	CONUS	Horizontal	3760	36	132.8
5C	CONUS	Vertical	6025	5C	CONUS	Horizontal	3800	36	132.8
7C	CONUS	Vertical	6065	7C	CONUS	Horizontal	3840	36	132.8
9C	CONUS	Vertical	6105	9C	CONUS	Horizontal	3880	36	132.8
11C	CONUS	Vertical	6145	11C	CONUS	Horizontal	3920	36	132.8
13C	CONUS	Vertical	6185	13C	CONUS	Horizontal	3960	36	132.8
15C	CONUS	Vertical	6225	15C	CONUS	Horizontal	4000	36	132.8
17C	CONUS	Vertical	6265	17C	CONUS	Horizontal	4040	36	132.8
19C	CONUS	Vertical	6305	19C	CONUS	Horizontal	4080	36	132.8
21C	CONUS	Vertical	6345	21C	CONUS	Horizontal	4120	36	132.8
23C	CONUS	Vertical	6385	23C	CONUS	Horizontal	4160	36	132.8
2C	CONUS	Horizontal	5965	2C	CONUS	Vertical	3740	36	132.8
4C	CONUS	Horizontal	6005	4C	CONUS	Vertical	3780	36	132.8
6C	CONUS	Horizontal	6045	6C	CONUS	Vertical	3820	36	132.8
8C	CONUS	Horizontal	6085	8C	CONUS	Vertical	3860	36	132.8
10C	CONUS	Horizontal	6125	10C	CONUS	Vertical	3900	36	132.8
12C	CONUS	Horizontal	6165	12C	CONUS	Vertical	3940	36	132.8
14C	CONUS	Horizontal	6205	14C	CONUS	Vertical	3980	36	132.8
16C	CONUS	Horizontal	6245	16C	CONUS	Vertical	4020	36	132.8
18C	CONUS	Horizontal	6285	18C	CONUS	Vertical	4060	36	132.8
20C	CONUS	Horizontal	6325	20C	CONUS	Vertical	4100	36	132.8
22C	CONUS	Horizontal	6365	22C	CONUS	Vertical	4140	36	132.8
24C	CONUS	Horizontal	6405	24C	CONUS	Vertical	4180	36	132.8
Command 1	CONUS	Vertical	6424.5					1.0	
Command 2	GLOBAL	Right Hand Circular	6424.5					1.0	
Command 3	GLOBAL	Right Hand Circular	6424.5					1.0	
				Telemetry 1	CONUS	Horizontal	4198.0	0.5	
				Telemetry 2	CONUS	Horizontal	4199.875	0.5	
				Telemetry 3	GLOBAL	Left Hand Circular	4198.0	0.5	
				Telemetry 4	GLOBAL	Left Hand Circular	4199.875	0.5	
				Telemetry 5	GLOBAL	Left Hand Circular	4198.0	0.5	
				Telemetry 6	GLOBAL	Left Hand Circular	4199.875	0.5	

Exhibit 2A: C-Band Uplink Beam

Beam Polarization: Horizontal

Antenna Gain @ Beam Peak: 30.7 dBi

Beam Peak G/T: 3.5 dB/K

Saturated Flux Density @ Beam Peak G/T: -75.5 to -111.5 dBW/m^2

[Schedule S Beam ID: CHUP]

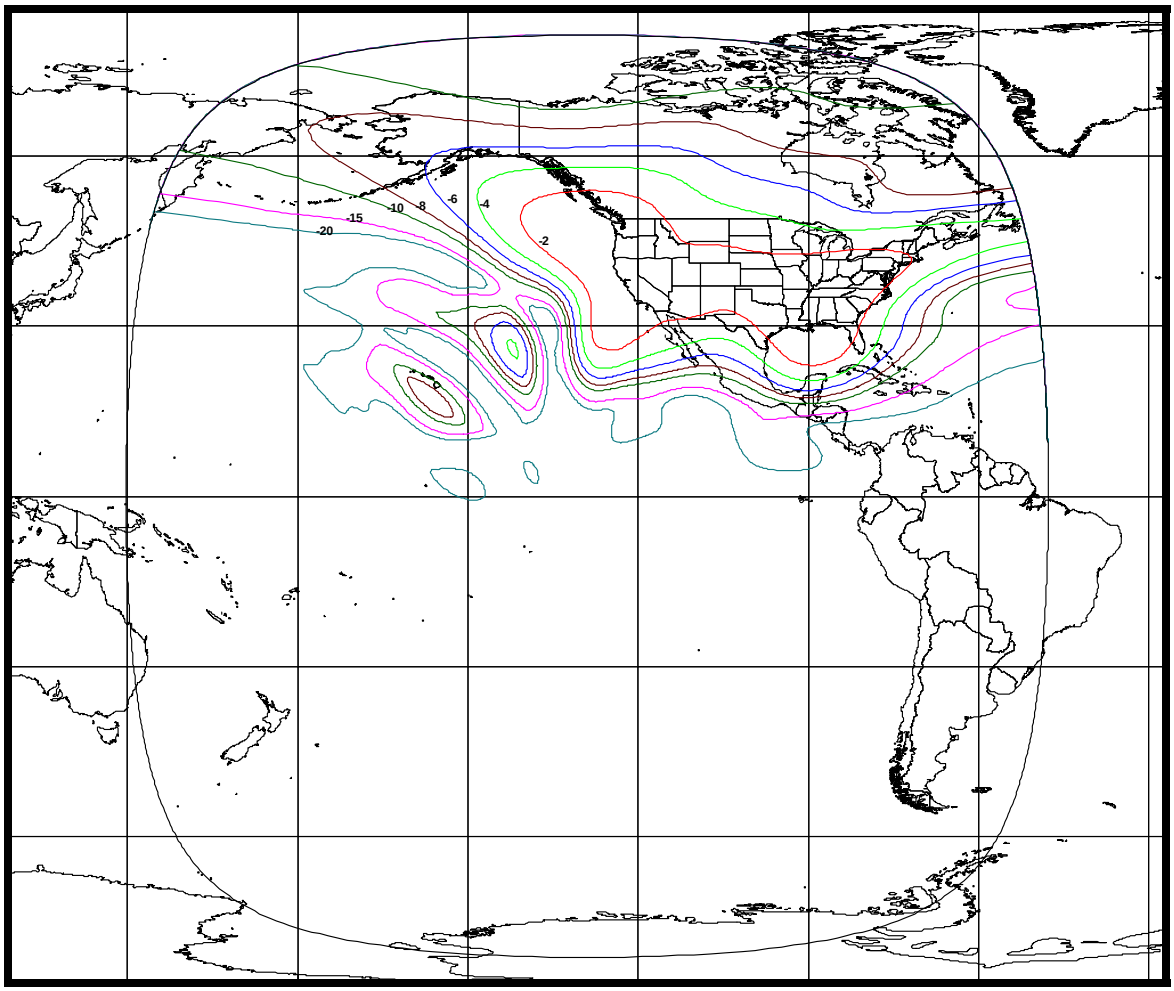


Exhibit 2B: C-Band Uplink Beam

Beam Polarization: Vertical

Antenna Gain @ Beam Peak: 30.7 dBi

Beam Peak G/T: 3.5 dB/K

Saturated Flux Density @ Beam Peak G/T: -75.5 to -111.5 dBW/m^2

[Schedule S Beam ID: CVUP]

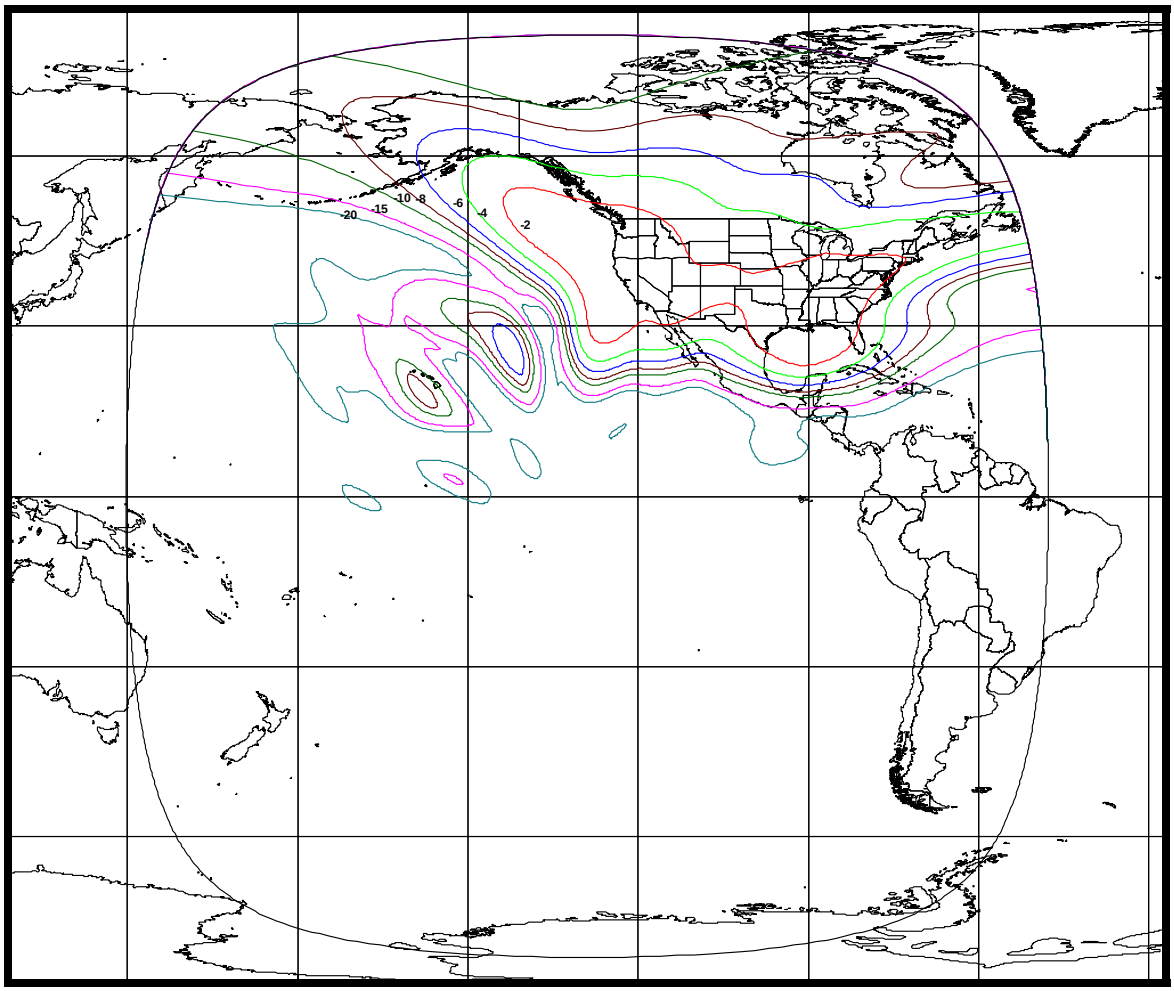


Exhibit 2C: C-Band Downlink Beam

Beam Polarization: Horizontal

Antenna Gain @ Beam Peak: 29.5 dBi

Beam EIRP: 44.2 dBW

[Schedule S Beam ID: CHDN]

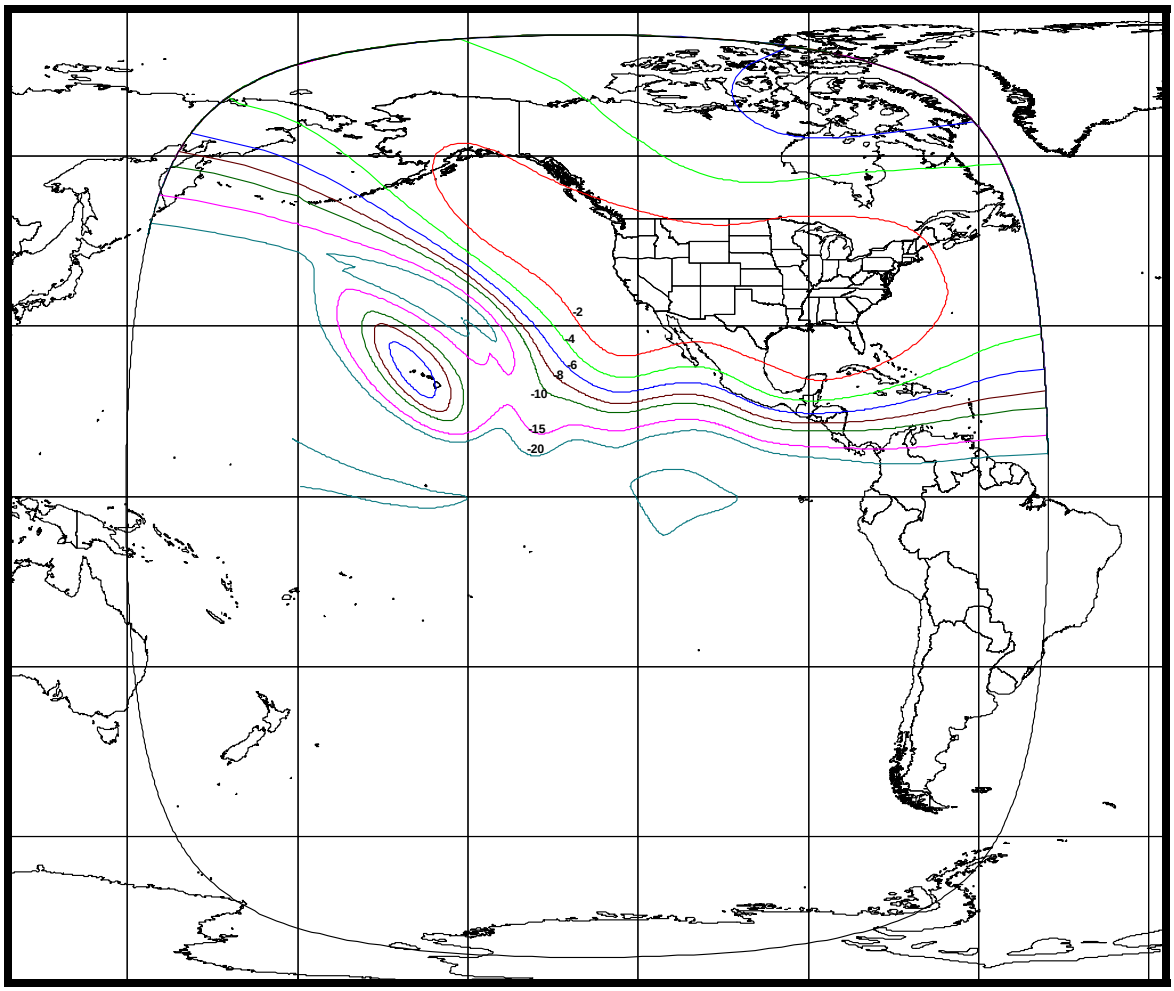


Exhibit 2D: C-Band Downlink Beam

Beam Polarization: Vertical

Antenna Gain @ Beam Peak: 29.5 dBi

Beam EIRP: 44.2 dBW

[Schedule S Beam ID: CVDN]

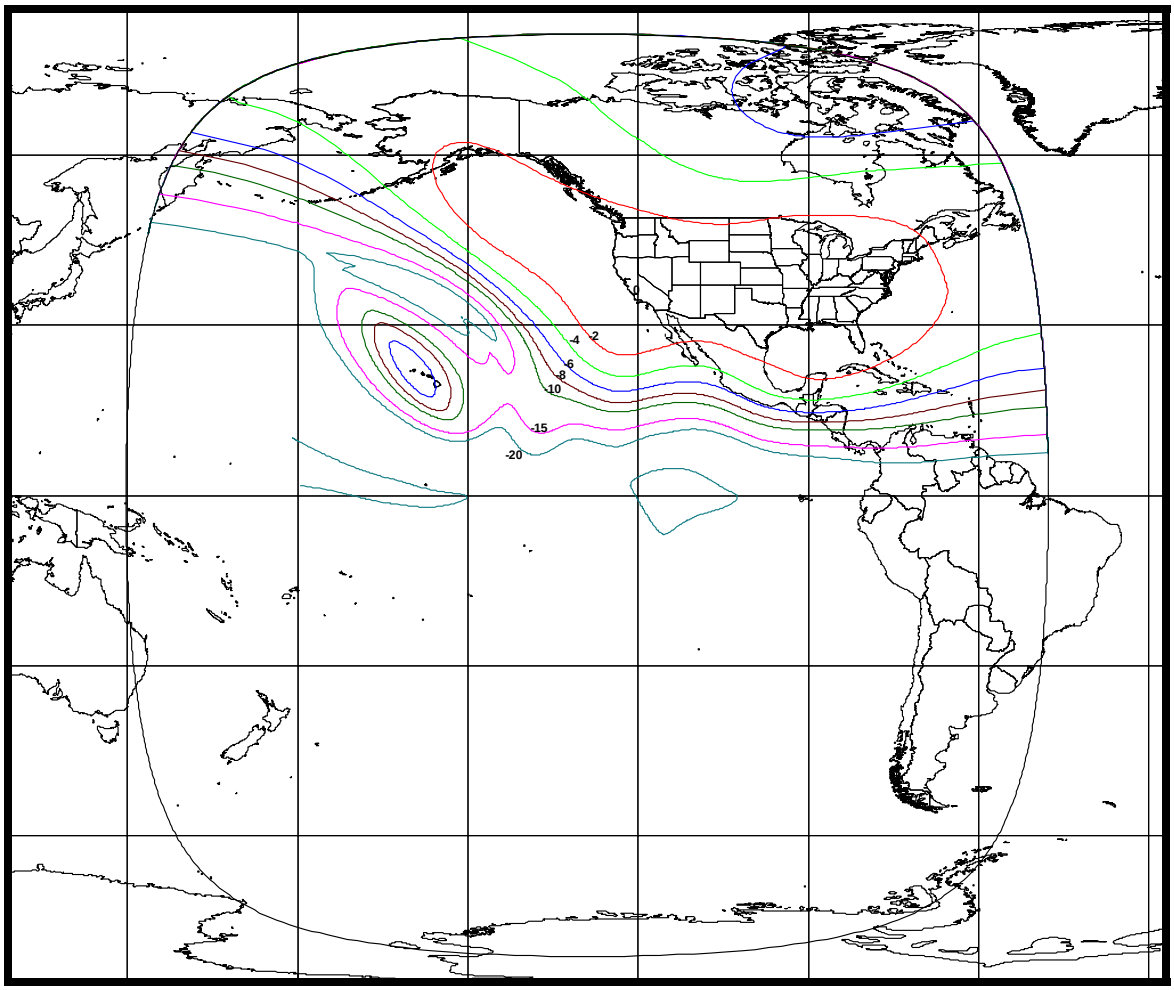
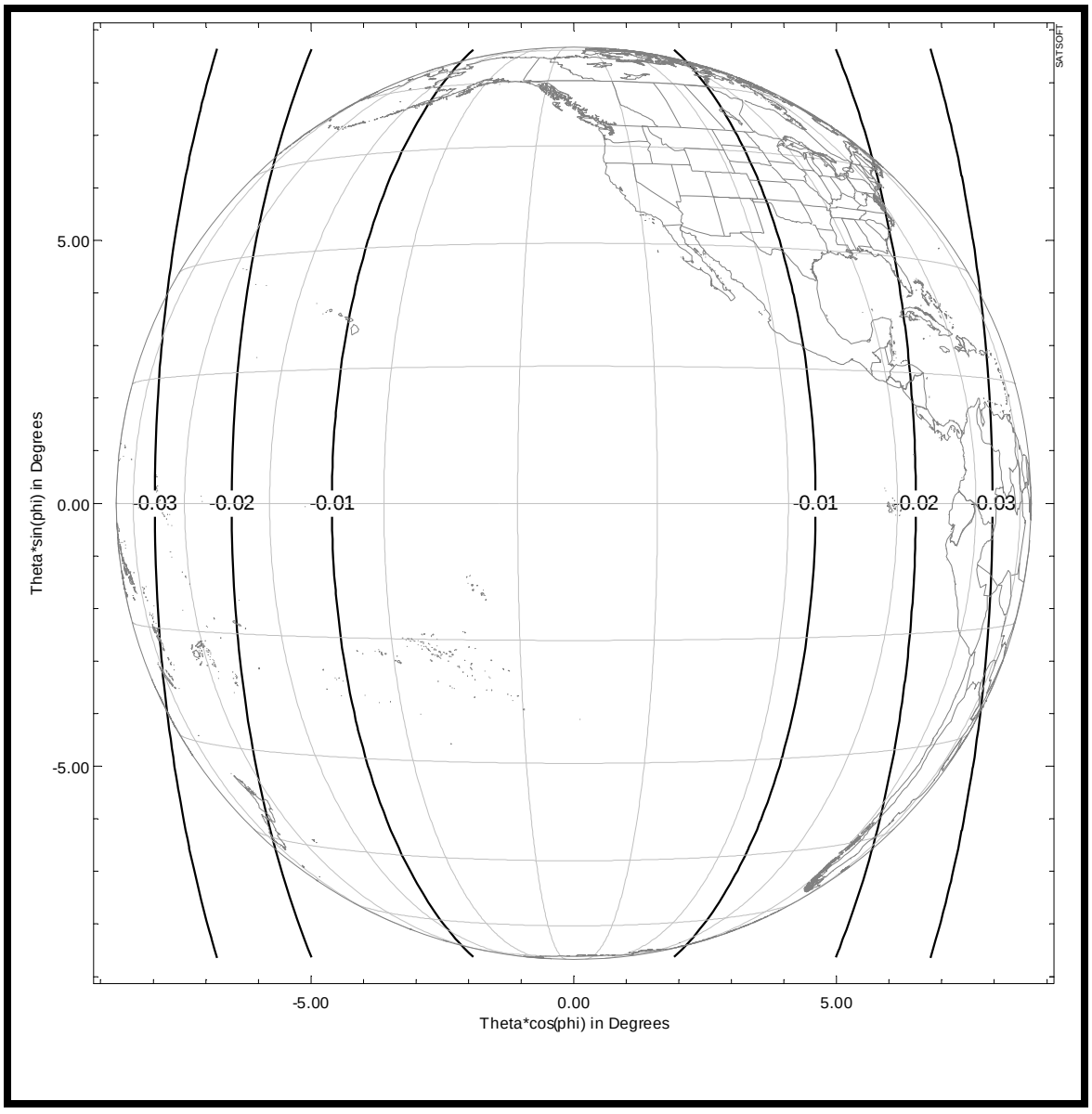


Exhibit 2E: C-Band Command Beam (Omni Antenna)

Beam Polarization: Right Hand Circular
Antenna Gain @ Beam Peak: 2.1 dBi
Beam Peak G/T: -25.4 dB/K
Command Threshold Flux Density @ Beam Peak: -87.5 dBW/m^2
[Schedule S Beam ID: OMNC]



Relative Gain Contour Levels Shown: -0.01, -0.02 and -0.03 dB

Exhibit 2F: C-Band Command Beam (WCA Antennas)

Beam Polarization: Right Hand Circular

Antenna Gain @ Beam Peak: 13.1 dBi

Beam Peak G/T: -14.4 dB/K

Command Threshold Flux Density @ Beam Peak: -94 dBW/m^2

[Schedule S Beam ID: WCAC]

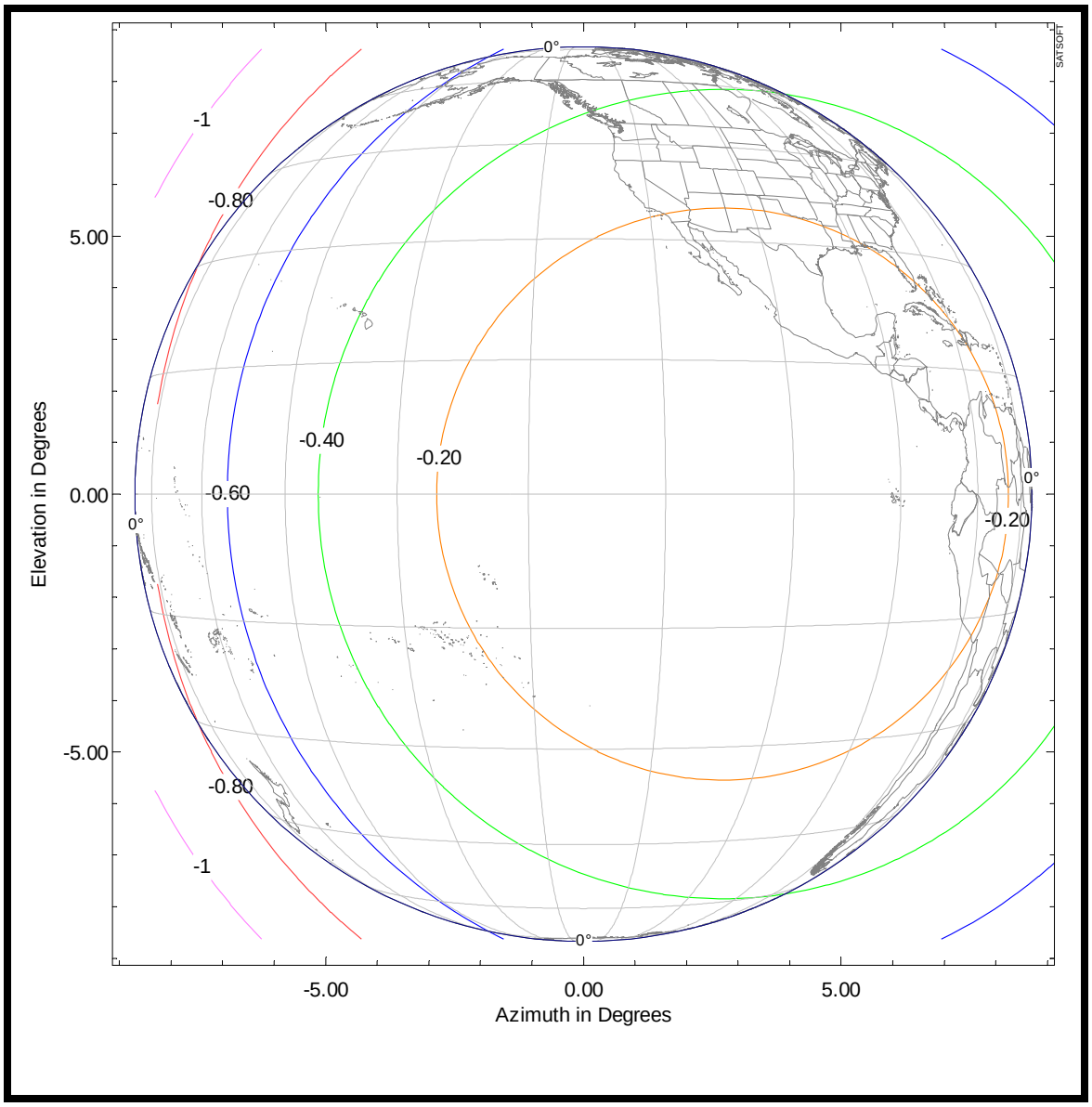


Exhibit 2G: C-Band Command Beam (Communication Antenna)

Beam Polarization: Vertical
Antenna Gain @ Beam Peak: 30.7 dBi
Beam Peak G/T: -4.5 dB/K
Command Threshold Flux Density @ Beam Peak: -114.7 dBW/m^2
[Schedule S Beam ID: CMDC]

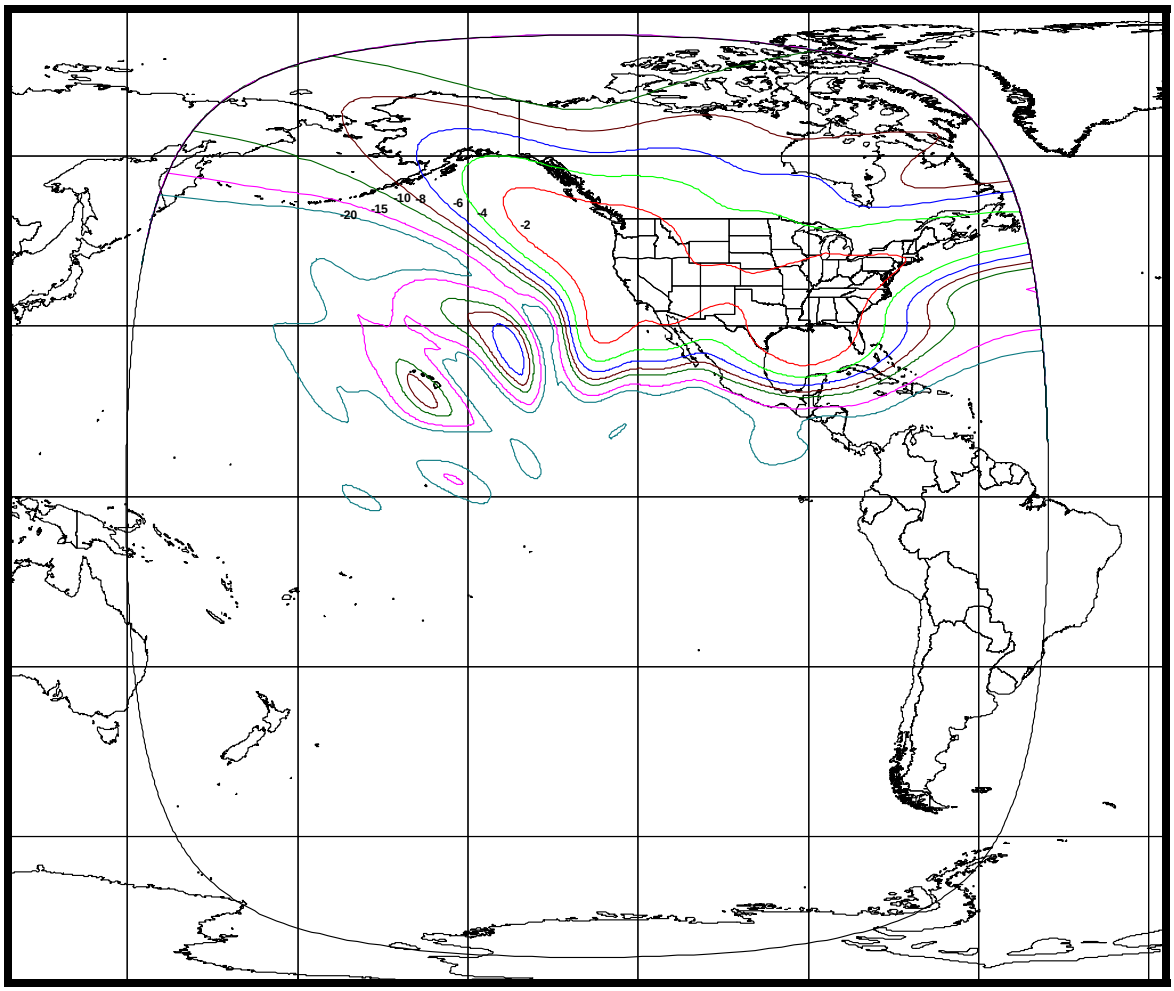
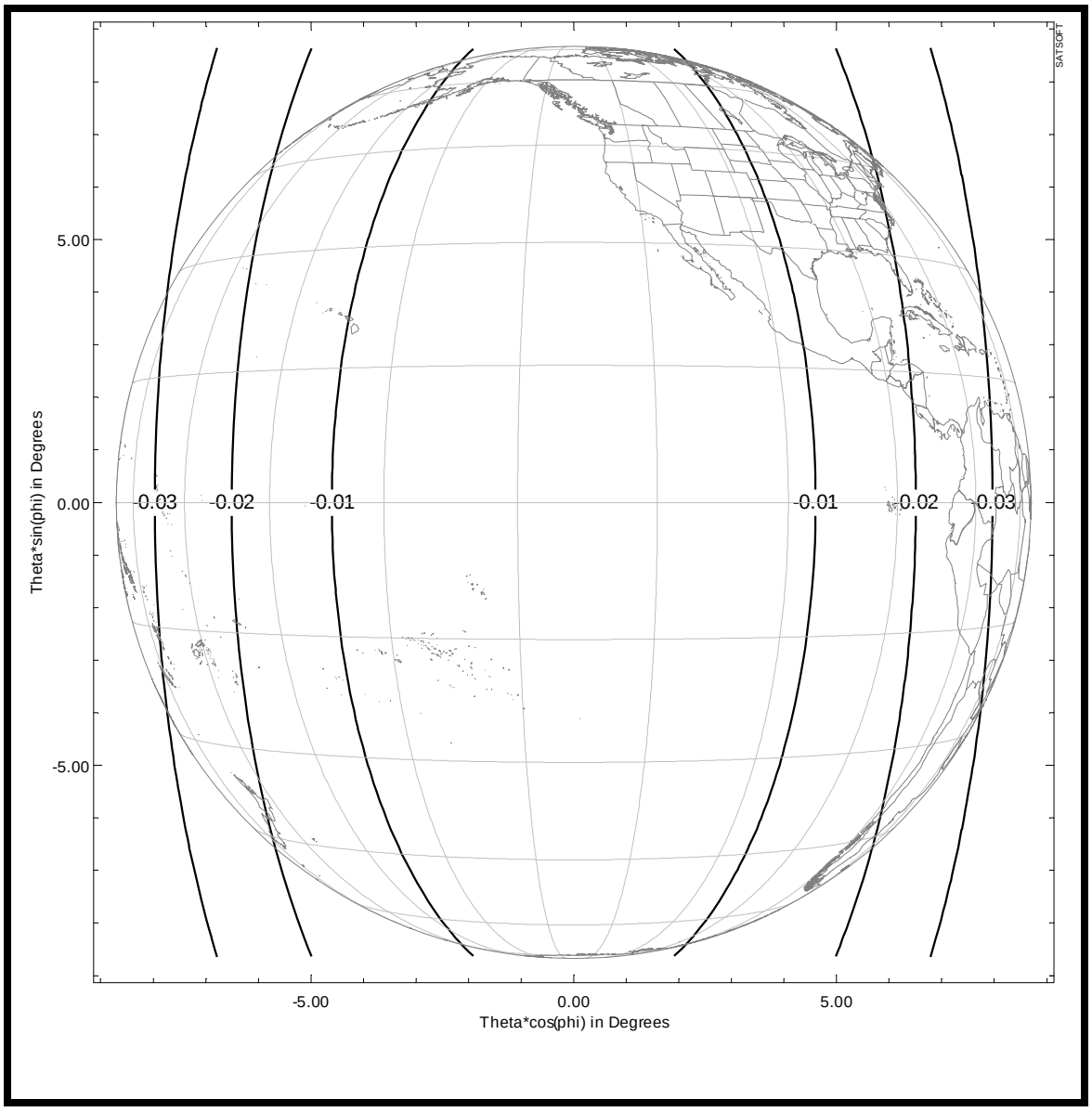


Exhibit 2H: C-Band Telemetry Beam (Omni Antenna)

Beam Polarization: Left Hand Circular
Antenna Gain @ Beam Peak: 2.1 dBi
Beam Peak EIRP: 5.8 dBW
[Schedule S Beam ID: OMNT]



Relative Gain Contour Levels Shown: -0.01, -0.02 and -0.03 dB

Exhibit 2I: C-Band Telemetry Beam (WCA Antennas)

Beam Polarization: Left Hand Circular

Antenna Gain @ Beam Peak: 13.1 dBi

Beam Peak EIRP: 4.8 dBW

[Schedule S Beam ID: WCAT]

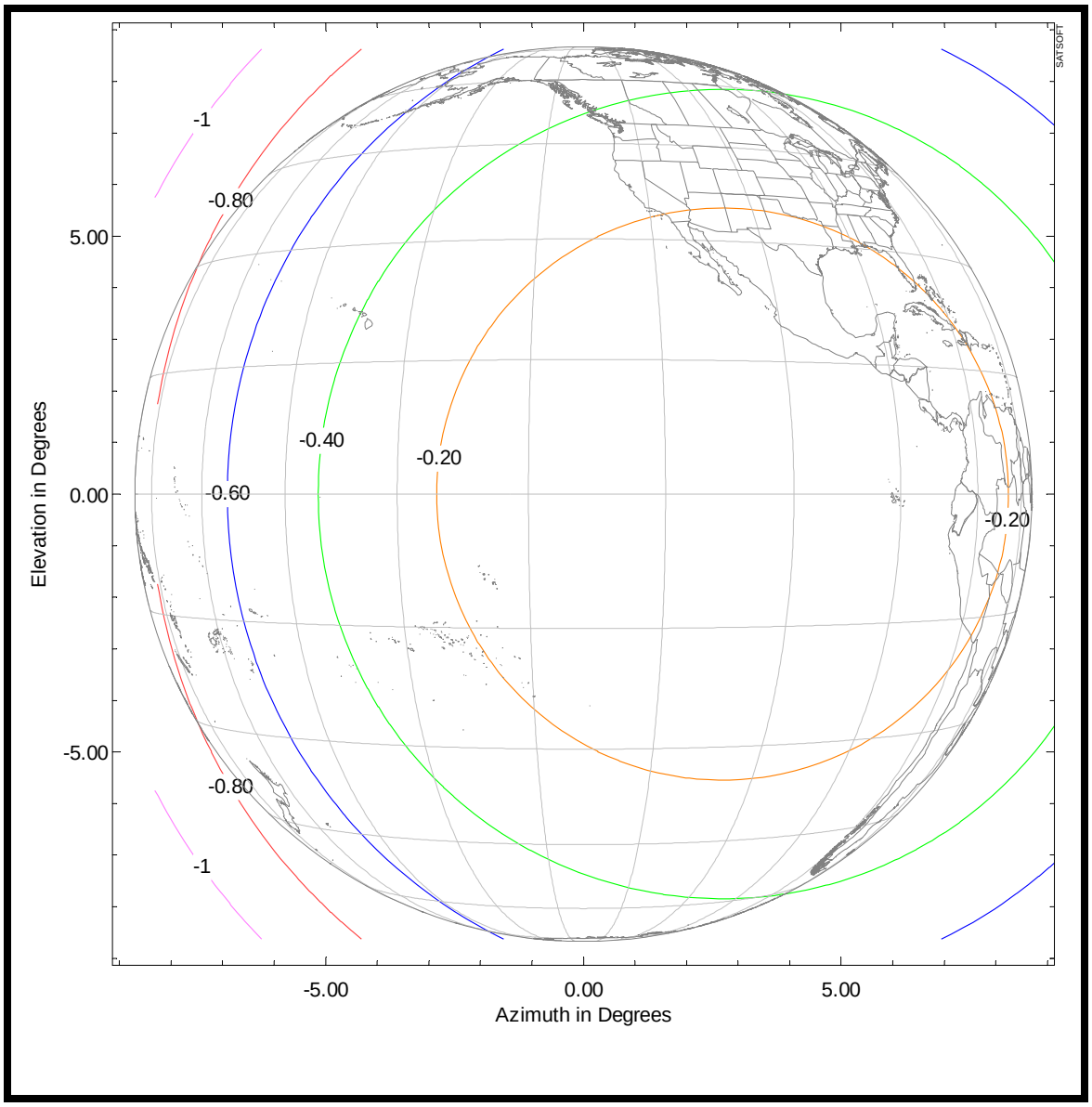


Exhibit 2J: C-Band Telemetry Beam (Communication Antenna)

Beam Polarization: Horizontal

Antenna Gain @ Beam Peak: 29.5 dBi

Beam Peak EIRP: 20 dBW

[Schedule S Beam ID: TLMT]

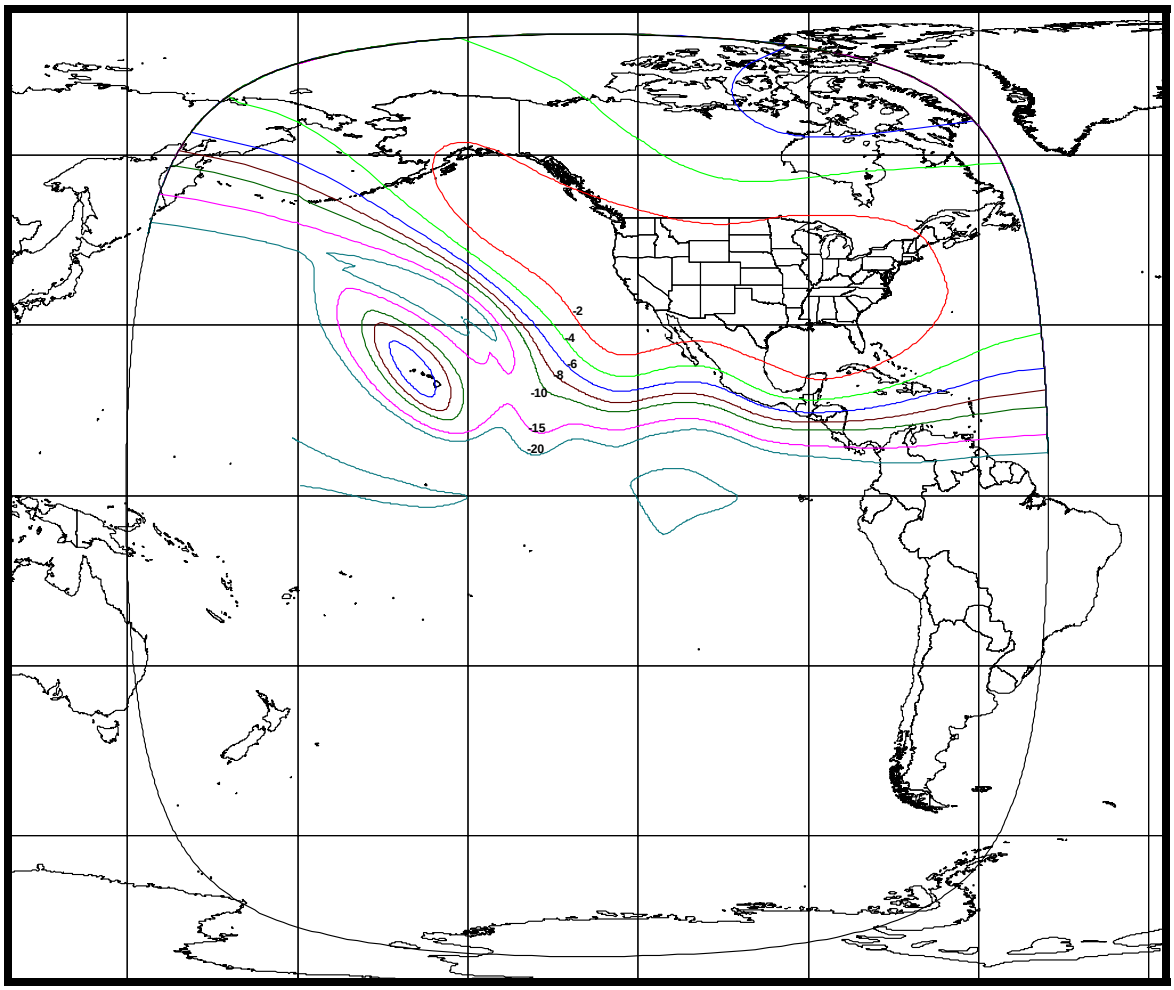


EXHIBIT 3: POWER FLUX DENSITY CALCULATIONS

Digital Carrier (36M0G7W)

Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	44.2	44.2	44.2	44.2	44.2	44.2	44.2
Occupied Bandwidth (kHz)	30133	30133	30133	30133	30133	30133	30133
Spreading loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum PFD (dB/m^2/4kHz)	-158	-157.8	-157.8	-157.6	-157.5	-157.4	-156.6
PFD Limit (dB/m^2/4kHz)	-152	-152	-149.5	-147	-144.5	-142	-142
Margin (dB)	6.0	5.8	8.3	10.6	13.0	15.4	14.6

Analog TV Carrier (36M0F3F)

Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	41.3*	41.3*	*43.7	44.2	44.2	44.2	44.2
Occupied Bandwidth (kHz)	4000	4000	4000	4000	4000	4000	4000
Spreading loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum PFD (dB/m^2/4kHz)	-152.1	-152.0	-149.5	-148.8	-148.7	-148.6	-147.9
PFD Limit (dB/m^2/4kHz)	-152	-152	-149.5	-147	-144.5	-142	-142
Margin (dB)	0.1	0.0	0.0	1.8	4.2	6.6	5.9

* This is the maximum allowable EIRP level at the specified elevation angle. The actual EIRP level of the beam at this particular elevation angle will be made to be equal to or lower than the value listed in the table through reduction in the output power of the channel and/or restriction on the movement/placement of the beam.

Telemetry (OMNI Antenna)

Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Occupied Bandwidth (kHz)	250	250	250	250	250	250	250
Spreading loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum PFD (dB/m^2/4kHz)	-175.6	-175.5	-175.4	-175.2	-175.1	-175.0	-174.2
PFD Limit (dB/m^2/4kHz)	-152	-152	-149.5	-147	-144.5	-142	-142
Margin (dB)	23.6	23.5	25.9	28.2	30.6	33.0	32.2

Telemetry (Wide Coverage Antenna)

Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Occupied Bandwidth (kHz)	250	250	250	250	250	250	250
Spreading loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum PFD (dB/m^2/4kHz)	-176.6	-176.5	-176.4	-176.2	-176.1	-176.0	-175.2
PFD Limit (dB/m^2/4kHz)	-152	-152	-149.5	-147	-144.5	-142	-142
Margin (dB)	24.6	24.5	26.9	29.2	31.6	34.0	33.2

Telemetry (Communication Antenna)

Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	20	20	20	20	20	20	20
Occupied Bandwidth (kHz)	250	250	250	250	250	250	250
Spreading loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum PFD (dB/m^2/4kHz)	-161.4	-161.3	-161.2	-161.0	-160.9	-160.8	-160.0
PFD Limit (dB/m^2/4kHz)	-152	-152	-149.5	-147	-144.5	-142	-142
Margin (dB)	9.4	9.3	11.7	14.0	16.4	18.8	18.0

EXHIBIT 4: GALAXY 12 LINK BUDGETS

Uplink Beam Name	CONUS	CONUS	CONUS	CONUS
Uplink Frequency (GHz)	6.175	6.175	6.175	6.175
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	-.5	-.5	-.5	-.5
Uplink SFD (dBW/m2)	-84.5	-89.5	-87.5	-87.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	CONUS	CONUS	CONUS	CONUS
Downlink Frequency (GHz)	3.950	3.950	3.950	3.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	40.2	40.2	40.2	40.2
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	127.0W	127.0W	127.0W	127.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-29.7	-29.7	-29.7	-29.7
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	131.0W	131.0W	131.0W	131.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-31.8	-31.8	-31.8	-31.8
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
CARRIER INFORMATION				
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4
Allocated Bandwidth(kHz)	36000	36000	10300	100
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79
UPLINK EARTH STATION				
Earth Station Diameter (meters)	10.0	6.1	6.1	6.1
Earth Station Gain (dBi)	54.1	49.4	49.4	49.4
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	4.5	3.0	3.0	3.0
Earth Station Gain (dBi)	43.9	39.7	39.7	39.7
Earth Station G/T (dB/K)	23.6	19.2	19.2	19.2
Earth Station Elevation Angle	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE				
Uplink Earth Station EIRP (dBW)	78.4	73.4	66.5	46.1
Uplink Path Loss, Clear Sky (dB)	-200.2	-200.2	-200.2	-200.2
Uplink Rain Attenuation	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-.5	-.5	-.5	-.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8
Uplink C/N(dB)	30.7	26.5	26.1	25.2
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	40.2	40.2	32.8	12.4
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-196.3	-196.3	-196.3	-196.3
Downlink Rain Attenuation	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	23.6	19.2	19.2	19.2
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8
Downlink C / N(dB)	20.0	16.4	15.5	14.6
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	30.7	26.5	26.1	25.2
C/N Downlink (dB)	20.0	16.4	15.5	14.6
C/I Intermodulation (dB)	N/A	N/A	20.6	19.7
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.6	25.3
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.6	25.3
C/I Uplink Adjacent Satellite 1 (dB)	19.5	15.3	14.9	14.0
C/I Downlink Adjacent Satellite 1 (dB)	17.9	15.0	14.1	13.3
C/I Uplink Adjacent Satellite 2 (dB)	19.5	15.3	14.9	14.0
C/I Downlink Adjacent Satellite 2 (dB)	17.5	8.4	7.5	6.6
C/(N+I) Composite (dB)	11.3	5.7	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.3	4.7	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.3	1.4	0.0	0.0
Number of Carriers	1	1.0	2.4	269.3
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-41.7	-50.8	-51.2	-52.0
Downlink EIRP Density At Beam Peak (dBW/Hz)	-21.8	-30.6	-31.5	-32.4

EXHIBIT 5: GALAXY 13 LINK BUDGETS

UPLINK BEAM INFORMATION						
Uplink Beam Name	CONUS	CONUS	CONUS	CONUS	CONUS	CONUS
Uplink Frequency (GHz)	6.175	6.175	6.175	6.175	6.175	6.175
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.4	-4.4	-4.4	-4.4	-4.4	-4.4
Uplink Contour G/T (dB/K)	0.0	0.0	0.0	0.0	0.0	0.0
Uplink SFD (dBW/m2)	-86	-89	-81	-81	-81	-81
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	CONUS	CONUS	CONUS	CONUS	CONUS	CONUS
Downlink Frequency (GHz)	3.950	3.950	3.950	3.950	3.950	3.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	41.1	41.1	41.1	41.1	41.1	41.1
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	125W	125W	125W	125W	125W	125W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0	0	0	0	0	0
Downlink EIRP Density (dBW/Hz)	-30.6	-30.6	-30.6	-30.6	-30.6	-30.6
Downlink Polarization Advantage (dB)	0	0	0	0	0	0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	129W	129W	129W	129W	129W	129W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0	0	0	0	0	0
Downlink EIRP Density (dBW/Hz)	-30.6	-30.6	-30.6	-30.6	-30.6	-30.6
Downlink Polarization Advantage (dB)	0	0	0	0	0	0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	6M00G7W	1M45G7W	200KG7W	100KG7W
Carrier Modulation	TV/FM	DTV	DTV	BPSK	BPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	38878	6000	512	64	64
Code Rate	N/A	R3/4	R3/4	R1/2	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	36000	5565	1229.0	153.6	77.0
Allocated Bandwidth(kHz)	36000	36000	6000	1450.0	200.0	100.0
Minimum C/N, Clear Sky (dB)	10.0	6.8	6.8	3.4	3.4	6.8
Minimum C/N, Rain (dB)	10.0	6.8	6.8	2.7	2.7	5.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	8.1	6.1	8.1	8.1	8.1	8.1
Earth Station Gain (dBi)	52.8	49.4	52.8	52.8	52.8	52.8
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	4.5	3.5	3.5	3.0	3.0	3.5
Earth Station Gain (dBi)	43.9	41.1	41.1	39.7	39.7	41.1
Earth Station G/T (dB/K)	23.6	21.0	21.0	19.2	19.2	21.0
Earth Station Elevation Angle	20	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE						
Uplink Earth Station EIRP (dBW)	76.9	73.9	70.8	64.3	55.2	52.2
Uplink Path Loss, Clear Sky (dB)	-200.2	-200.2	-200.2	-200.2	-200.2	-200.2
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	0.0	0.0	0.0	0.0	0.0	0.0
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-75.6	-67.5	-60.9	-51.9	-48.9
Uplink C/N(dB)	29.7	26.7	31.7	31.8	31.8	31.7
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.1	41.1	31.5	25.0	15.9	12.9
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-196.3	-196.3	-196.3	-196.3	-196.3	-196.3
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	23.6	21.0	21.0	19.2	19.2	21.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-75.6	-67.5	-60.9	-51.9	-48.9
Downlink C / N(dB)	20.9	18.3	16.8	15.0	15.0	16.8
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	29.7	26.7	31.7	31.8	31.8	31.7
C/N Downlink (dB)	20.9	18.3	16.8	15.0	15.0	16.8
C/I Intermodulation (dB)	N/A	N/A	19.2	19.2	19.2	19.2
C/I Uplink Co-Channel (dB)*	27.0	27.0	28.6	28.3	27.9	27.8
C/I Downlink Co-Channel (dB)*	27.0	27.0	28.6	28.3	27.9	27.8
C/I Uplink Adjacent Satellite 1 (dB)	17.6	14.6	19.6	19.7	19.7	19.6
C/I Downlink Adjacent Satellite 1 (dB)	17.2	12.5	10.9	5.9	5.9	11.0
C/I Uplink Adjacent Satellite 2 (dB)	17.6	14.6	19.6	19.7	19.7	19.6
C/I Downlink Adjacent Satellite 2 (dB)	19.7	17.2	15.7	14.6	14.6	15.7
C/(N+I) Composite (dB)	11.1	7.8	7.8	4.4	4.4	7.8
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.1	6.8	6.8	3.4	3.4	6.8
Minimum Required C/N (dB)	-10.0	-6.8	-6.8	-3.4	-3.4	-6.8
Excess Link Margin (dB)	.1	0.0	0.0	0.0	0.0	0.0
Number of Carriers	1	1.0	4.1	18.4	146.8	296.6
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-41.9	-51.1	-49.5	-49.4	-49.4	-49.5
Downlink EIRP Density At Beam Peak (dBW/Hz)	-20.9	-30.5	-32.0	-31.9	-31.9	-32.0

EXHIBIT 6: AMC 11 LINK BUDGETS

UPLINK BEAM INFORMATION						
Uplink Beam Name	CONUS	CONUS	CONUS	CONUS	CONUS	CONUS
Uplink Frequency (GHz)	6.145	6.145	6.145	6.145	6.145	6.145
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-3.3	-3.3	-3.3	-3.3	-3.3	-3.3
Uplink Contour G/T (dB/K)	0	0	0.0	0.0	0	0
Uplink SFD (dBW/m2)	-81	-85.0	-90	-85	-80	-83
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	CONUS	CONUS	CONUS	CONUS	CONUS	CONUS
Downlink Frequency (GHz)	3.920	3.920	3.920	3.920	3.920	3.920
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-2.5	-2.5	-4.5	-4.5	-4.5	-4.5
Downlink Contour EIRP (dBW)	40	40	38.0	38.0	38.0	38.0
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	129.0W	129.0W	129W	129W	129.0W	129.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0	0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-30.6	-30.6	-30.6	-30.6	-30.6	-30.6
Downlink Polarization Advantage (dB)	0.0	0.0	0	0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	133.0W	133.0W	133W	133W	133.0W	133.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0	0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-30.6	-30.6	-30.6	-30.6	-30.6	-30.6
Downlink Polarization Advantage (dB)	0.0	0.0	0	0	0.0	0.0
CARRIER INFORMATION						
Carrier ID						
Carrier Modulation	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	110000	60000	40000	8000	1544	56
Code Rate	7/8-RS	2/3-RS	3/4-RS	3/4-RS	3/4-RS	3/4-RS
Occupied Bandwidth(kHz)	33113	33113	26915	2691.5	1023	32.4
Allocated Bandwidth(kHz)	36000	36000	36000	5300	1029	35.0
Minimum C/N, Clear Sky (dB)	16.7	9.8	7.1	10.1	7.2	7.8
Minimum C/N, Rain (dB)	16.7	9.8	7.1	10.1	7.2	7.8
UPLINK EARTH STATION						
Earth Station Diameter (meters)	15.2	10.0	10.0	10.0	8.1	4.5
Earth Station Gain (dBi)	58.4	54.4	54.4	54.4	52.8	47.4
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	13.1	13.1	3.8	6.0	4.5	4.5
Earth Station Gain (dBi)	53.5	53.5	41.8	45.7	43.3	43.3
Earth Station G/T (dB/K)	33.2	33.2	21.8	25.2	23.0	23.0
Earth Station Elevation Angle	20	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE						
Uplink Earth Station EIRP (dBW)	81.9	77.9	72.9	65.9	64.5	47.5
Uplink Path Loss, Clear Sky (dB)	-200.2	-200.2	-200.2	-200.2	-200.2	-200.2
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	0	0	0.0	0.0	0	0
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.2	-75.2	-74.3	-64.3	-60.1	-45.1
Uplink C/N(dB)	35.1	31.1	27.0	30.0	32.8	30.8
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	40.0	40.0	38.0	27.5	21.1	7.1
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-196.3	-196.3	-196.3	-196.3	-196.3	-196.3
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	33.2	33.2	21.8	25.2	23.0	23.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.2	-75.2	-74.3	-64.3	-60.1	-45.1
Downlink C / N(dB)	29.8	29.8	17.3	20.3	15.8	16.8
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	35.1	31.1	27.0	30.0	32.8	30.8
C/N Downlink (dB)	29.8	29.8	17.3	20.3	15.8	16.8
C/I Intermodulation (dB)	N/A	N/A	N/A	21.5	19.2	20.2
C/I Uplink Co-Channel (dB)*	27.0	27.0	27.0	28.3	29.0	29.7
C/I Downlink Co-Channel (dB)*	27.0	27.0	27.0	28.3	29.0	29.7
C/I Uplink Adjacent Satellite 1 (dB)	24.1	20.1	16.0	19.0	21.8	19.8
C/I Downlink Adjacent Satellite 1 (dB)	27.0	27.0	13.0	17.8	12.1	13.0
C/I Uplink Adjacent Satellite 2 (dB)	24.1	20.1	16.0	19.0	21.8	19.8
C/I Downlink Adjacent Satellite 2 (dB)	27.8	27.8	16.0	19.7	14.6	15.5
C/(N+I) Composite (dB)	17.8	15.4	8.2	11.4	8.2	8.8
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	16.8	14.4	7.2	10.4	7.2	7.8
Minimum Required C/N (dB)	-16.7	-9.8	-7.1	-10.1	-7.2	-7.8
Excess Link Margin (dB)	.1	4.6	.1	.3	0.0	0.0
Number of Carriers	1.0	1.0	1.0	5.0	22.0	553.1
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-51.7	-51.7	-55.8	-52.8	-48.4	-45.0
Downlink EIRP Density At Beam Peak (dBW/Hz)	-32.7	-32.7	-31.8	-32.3	-34.5	-33.5