

Engineering Statement

1) Introduction

Intelsat License LLC (“Intelsat”) seeks authority in this application to launch and operate a new satellite designated as Intelsat 21. This spacecraft will operate from 58° W.L and will replace the Intelsat 9 spacecraft currently operating at that location. After start of Intelsat 21’s operation, Intelsat 9 will be relocated to another orbital location. Intelsat 21 will augment the operation of Intelsat 16, which is located at 58.1° W.L. The characteristics of the Intelsat 21 spacecraft, as well as its compliance with the various provisions of Part 25 of the Commission’s rules, are provided in the remainder of this Engineering Statement.

2) Spacecraft Overview

Intelsat 21 is a Boeing model 702 MP spacecraft that operates on the C-band frequencies of 5925 – 6425 MHz, 3700 – 4200 MHz; and Ku-band frequencies of 14000 – 14500 MHz and 11450 – 12200 MHz. The spacecraft utilizes 24 C-band channels to provide service to North and South America and Europe; 43 Ku-band channels (36 of which can operate simultaneously) to provide service to Mexico, Central America, the Caribbean, Brazil, Europe, West Africa and the Atlantic Ocean region.

2.1) Structure

Intelsat 21 is a three-axis stabilized type spacecraft that has a rectangular outer body structure. Internally, the spacecraft is comprised of a central cylinder to which a number of panels are attached. Intelsat 21 utilizes two four-panel deployable solar array wings and four deployable antennas.

The structural design of Intelsat 21 provides mechanical support for all subsystems. The structure externally supports the communication antennas, solar arrays, and the thrusters. It also provides a stable platform for preserving the alignment of critical elements of the spacecraft.

A summary of the basic spacecraft characteristics is provided in Exhibit 1. The Intelsat 21 mass budget is provided in Exhibit 2.

2.2) Thermal Subsystem

Thermal control is accomplished through the use of thermal control coatings, blankets, shields, heaters, heat pipes, special paint/coating and heat rejection surfaces. Heat pipes are embedded in a number of key equipment panels. High thermal dissipation components are located directly on the north and south communication panels. Optical Solar Reflectors (“OSRs”) are used on the outer faces of these panels. Multilayer Insulation (“MLI”) blankets are used on the external east, west, and aft surfaces of the spacecraft. Special paint/coating is applied to the surface of the nadir panel.

The traveling wave tube amplifiers (“TWTAs”) of the Ku-band communication subsystem are equipped with radiators protruding from the spacecraft body which radiate a large percentage of the TWTA heat directly to space. The TWTAs supporting the C-band communications subsystem are conduction cooled via direct contact with the spacecraft panels and heat pipe network. Heaters are employed throughout the spacecraft in order to ensure that temperature variations of the bus and communication units are maintained within appropriate limits throughout the operational life of the satellite. Battery temperatures are maintained within limits through the combined use of heat pipes, heaters, blankets and OSRs.

2.3) Power Subsystem

The Electrical Power Subsystem (“EPS”) generates, stores, conditions and protects the satellite’s electrical power. It provides the energy required to operate the satellite during all modes of operation. The EPS consists of the solar array, batteries, associated power electronics, and power harnesses that integrate and regulate the systems.

Intelsat 21 utilizes two deployable solar array wings, with one wing located on the north side of the spacecraft and the other located on the south side of the spacecraft. Each solar wing is composed of four main panels. The panels support the requisite solar cells. During launch, the solar array wings are in the stowed position. However, during transfer orbit the solar wings are deployed, with each wing extending out on the north and south sides of the spacecraft. The solar array is designed to provide power to the spacecraft for at least 15 years.

During eclipse periods, the primary source of power to the spacecraft is through batteries. Intelsat 21 utilizes two 48-cell Lithium ion batteries.

The Intelsat 21 EPS has been designed so that no single failure in the subsystem will cause a spacecraft failure. The EPS will provide sufficient power to the spacecraft throughout its design life to support all active communication channels as well as all necessary housekeeping loads. The beginning of life (“BOL”) and end of life (“EOL”) power budgets for Intelsat 21 are provided in Exhibit 3.

2.4) Attitude Control Subsystem

The Attitude Control Subsystem (“ACS”) maintains the spacecraft attitude during the transfer orbit, initial acquisition period, and on-station geostationary operations. Additionally, the ACS is responsible for re-acquisition of the spacecraft in case of emergency and its placement into a safe configuration.

The ACS is composed of primary and redundant sun sensors, 2-for-1 star trackers, a scalable space inertial reference unit containing 4-for-3 redundant gyros, 4-for-3 redundant reaction wheels, bipropellant thrusters, monopropellant thrusters and associated electronics. Control of the spacecraft attitude and orientation is accomplished through the use of reaction wheels and by pulsed or continuous firing of selected monopropellant thrusters by the ACS.

2.5) Propulsion Subsystem

The propulsion subsystem provides impulse for the spacecraft maneuvering during all phases of the mission beginning with launch vehicle separation through the operational lifetime of the satellite. The major components of the propulsion subsystem are as follows: 1) one high pressure helium tank, 2) four fuel tanks, 3) one oxidizer tank, 4) a single 450-N thruster, 5) six 22-N dual-mode thrusters, 6) four 22-N monopropellant thrusters, 7) twelve 4-N monopropellant thrusters, and 8) associated pressure regulators, filters, flow control components, and pressure transducers.

The bipropellant system utilizes a combination of Nitrogen Tetroxide and Hydrazine as propellants. The system utilizes Helium gas to pressurize the propellant tanks.

During transfer orbit operations, the propulsion system will be operated in both bi-propellant and monopropellant modes. During normal on-station operations, the spacecraft will be operated in blow-down, monopropellant mode.

The architecture of the dual mode systems are based on a low risk approach with many of the units having been flight proven. The system utilizes space qualified components and incorporates full redundancy for all critical components.

2.6) Communication Subsystem

2.6.1) Overview

Intelsat 21 provides 24 active communication channels at C-band frequencies, 36 active channels at Ku-band frequencies. The C-band payload employs channels having a bandwidth of 36 MHz. The Ku-band payload employs channels having bandwidths of 27 MHz, 36 MHz and 54 MHz. The Intelsat 21 frequency and polarization plans are provided in Exhibit 4.

At C-band, the Intelsat 21 receive and transmit beams provide coverage of North and South America and Europe. At Ku-band, the spacecraft provides coverage of Mexico, Central America, the Caribbean, Brazil, Europe, West Africa and the Atlantic Ocean region.

At C-band and Ku-band frequencies, Intelsat 21 employs full frequency reuse through the use of orthogonal polarization within the same beam and/or through the use of spatially isolated beams. Accordingly, Intelsat 21 is compliant with Section 25.210(f) of the Commission's rules.

Intelsat 21 is not compliant with Section 25.210 (a)(3) of the Commission's rules, which requires a space station providing domestic service using the frequency bands 3700 – 4200 MHz and 5925 – 6425 MHz to be capable of switching polarization upon ground command. Accordingly, Intelsat requests a waiver of Section 25.210(a)(3).

It is noted in this respect that the co-frequency C-band satellites within ± 6 degrees of Intelsat 21 are Intelsat 707 located at 53° W.L., Intelsat 805 and Galaxy 11, both located at the nominal orbital location of 55.5° W.L., and Amazonas-1 and 2, located at 61° W.L.¹ Intelsat 707, Intelsat 805 and Galaxy 11 are licensed to Intelsat. Intelsat will internally coordinate the transmissions to/from these spacecraft and Intelsat 21 in order to ensure that excessive levels of interference are not generated. With regard to Amazonas-1 and 2, Intelsat will operate Intelsat 21 in accordance with the

¹ As noted above, Intelsat 9 is currently operating at 58° W.L. However, this spacecraft will be relocated to another location upon transfer of traffic to Intelsat 21.

terms of the coordination agreement that it has with the operator of the Amazonas satellites. Hence, Intelsat believes that a waiver of Section 25.210(a)(3) of the rules is justified.

With respect to the use of the 11450 – 11700 MHz band, the United States Table of Frequency Allocations, contained in Section 2.106 of the Commission's rules, permits the use of this band by non-federal fixed satellite service for international systems only (see note NG 104). Intelsat requests authorization to operate domestic systems in this band on a non-interference/non-protected basis and therefore seeks a waiver of NG 104 as well as of footnote 2 of Section 25.202(a)(1).

Specifically, the Intelsat 21 Mobility downlink beam operates in the 11450 – 11700 MHz band and provides service to eastern South America, the Atlantic Ocean region, Europe, western Africa and a limited portion of northeast United States. The Mobility downlink beam may be accessed through either the Mobility or Brazil uplink beams. Any communication through the Brazil uplink beam and Mobility downlink beam would be compliant with the provisions of NG 104. However, any transmission through the Mobility uplink and downlink beams may not be fully compliant with NG 104, since both beams provide coverage of a small area within the northeastern section of United States, and there is a possibility the uplink and downlink transmissions may originate and terminate within the small limited area in the northeastern section of United States.

One of the reasons behind the adoption of NG 104 was to limit the proliferation of earth stations operating in this band. However, the Intelsat 21 Mobility uplink and downlink beams provide coverage of a very limited area over northeastern United States. Moreover, the services to be carried on this beam will require a very limited number of earth stations to be located on land mass. Hence, the risk of earth stations operating in this band and proliferating within the United States is quite limited. Accordingly, the Intelsat believes that a waiver of NG 104 and footnote 2 of Section 25.202(a) (1) is justified.

Intelsat 21 is compliant with Section 25.210(a)(2) of the Commission's rules. Additionally, Intelsat shall ensure that the placement of analog video carriers in the 3700 – 4200 MHz is compliant with 25.211(a) of the Commission's rules.

2.6.2) Antennas and Beam Coverages

Intelsat 21 utilizes a single feed C-band transmit/receive reflector antenna, and three single feed Ku-band transmit/receive reflector antennas. The coverage beams of the Intelsat 21 antennas are shown in Exhibits 5A-1 through 5A-12, in the format prescribed in Section 25.114(d)(3) of the Commission's rules.

The performance characteristics for each beam are provided in Exhibits 5A-1 through 5A-12. For the uplink beams, the SFD at any G/T contour may be determined using the following formula:

$$\text{SFD}_D = \text{SFD}_P + [(G/T)_P - (G/T)_D] + A$$

where

SFD_D : SFD at desired G/T level (dBW/m²)

SFD_P : Minimum SFD at peak G/T (dBW/m²)

$(G/T)_D$: Desired G/T level (dB/K)

$(G/T)_P$: Peak G/T (dB/K)

A = Transponder attenuator setting (dB), ranging from 0 to 28 dB

Exhibit 6 provides a detailed calculation of the EIRP, G/T and SFD of the Intelsat 21 uplink and downlink beams.

With the exception of the West Hemi vertically polarized receive beam, all of the remaining Intelsat 21 beams fully comply with the antenna cross-polarization requirement of Section 25.210(i)(1) of the Commission's rules. The West Hemi vertically polarized receive beam has a minimum cross-polarization isolation of 27 dB within limited regions of its primary coverage area. The cross-polarization contour for this beam is shown in Exhibit 5D.

Section 25.210(i)(1) of the Commission's rules requires that the cross-polarization of each beam be at least 30 dB within its primary coverage area. Accordingly, with respect to the West Hemi vertically polarized receive beams, Intelsat requests a waiver of this section of the rules.

The level of cross-polarization isolation achieved for the non-compliant beam was the best that the satellite manufacturer could achieve without causing excessive degradation in the co-polarized gain of the beam and/or in the size of its coverage area. As a result, a reduction in the cross-polarization isolation with respect to the 30 dB requirement was considered

to be the best approach for making efficient use of the orbit/spectrum resources by Intelsat 21.

Moreover, as the Commission has previously recognized, “failure to meet the cross-polarization isolation requirements will not adversely impact any other operator and the only party to suffer an increase in interference” is the applicant itself.² The reduction in Intelsat 21’s cross-polarization isolation in the affected portions of its coverage area will slightly increase the interference to Intelsat 21 carriers from its own oppositely polarized carriers as well as from emissions (of other operators) generated by adjacent satellites. By controlling the power level of Intelsat 21’s carriers, however, Intelsat can compensate for this factor, thereby meeting its transmission objectives and the requirements of its customers.

As noted in the narrative portion of this application, the Commission previously has granted waivers of the requirement in Section 25.210(i)(1) based on the same reasoning that supports the waiver Intelsat is requesting in this application.³ Accordingly, Commission precedent supports a grant of Intelsat’s waiver request.

2.6.3) Transponder description

2.6.3.1) C-Band

The output of the C-band (transmit/receive) antenna is divided into its polarization specific receive signal components through the use of an Ortho-mode Transducer (“OMT”). The (receive) input signal is fed to a diplexer that separates the received and transmitted signals, an input test coupler and then to a transmit reject filter that is designed to further reject the transmit frequency band and other undesired signals and prevent the overloading of the receive section. The output of the transmit reject filter is connected to a Low Noise Amplifier (“LNA”). Intelsat 21 utilizes a bank of 4-for-2 redundant C-band LNAs.

² See *AMC-15 Ku-Band Circular Polarization Amendment*, File Nos. SAT-LOA-20030219-00013 and SAT-AMD-20030422-00069, Attachment Terms and Conditions of Authorization (¶ 5) (Aug. 18, 2004).

³ See *Application to Launch and Operate Intelsat 17, a Replacement Satellite*, at 66.0 E.L., IBFS File No. SAT-LOA-20100726-00167 (stamp grant Nov. 17, 2010; re-issued stamp grant with further conditions Dec. 17, 2010).

The signal is then routed to a frequency down-converter that converts the uplink frequency to the appropriate downlink frequency. Intelsat 21 utilizes a bank of 4-for-2 redundant C-band down-converters. The Intelsat 21 C-band frequency down-converters are able to maintain over the life of the spacecraft the frequency of the transmitted (down converted) signal to within +/- 0.002% of the desired value. Accordingly, Intelsat 21 is compliant with Section 25.202(e) of the Commission's rules.

The output of each down-converter is routed to a bank of hybrids and then to a bank of Input Multiplexers ("IMUXs"). The IMUXs are filters that provide frequency band separation for each channel.

The output of each IMUX channel is connected to a corresponding Linearized Channel Amplifier / Traveling Tube Amplifier ("LCAMP/TWTA") pair through a redundancy switching network. The switching network allows for the output of each IMUX to be routed to a redundant LCAMP/TWTA should the primary unit fail.

The LCAMP/TWTAs are configured in two interconnected redundancy rings of 16-for-12. Each LCAMP/TWTA is comprised of an LCAMP that feeds a 74 Watt, conduction cooled, C-band TWTA.

The LCAMP provides high gain, and amplitude and gain expansion to compensate for the selected TWTA. The LCAMP may only be operated in the Fixed Gain Mode ("FGM"), whereby the output of the LCAMP may be adjusted by ground command from 0 to 28 dB in 1dB increments. Accordingly, Intelsat 21 is compliant with the provisions of Section 25.210(c) of the Commission's rules.

The output of each LCAMP/TWTA is then routed through a bank of switches to an Output Multiplexer ("OMUX"). The switching network allows the output of a redundant LCAMP/TWTA to be forwarded to the appropriate OMUX should the primary LCAMP/TWTA unit fail.

The output of each OMUX is fed in succession to a receive reject filter, a test coupler, a diplexer, an OMT and the antenna feed for transmission to Earth.

2.6.3.2) Ku-Band

The output of each Ku-band (receive) antenna is divided into its polarization specific receive signal components through the use of an OMT. For the

Brazil and Mobility receive beams, the input receive signal is fed to an input test coupler and then to a transmit reject filter that is designed to reject the transmit frequency band and other undesired signals, and prevent overloading of the receive section. For the Mexico receive beam, the input receive signal from the OMT is fed to a diplexer, then to an input test coupler and finally to a transmit reject filter.

The output of the transmit reject filter is connected to an LNA. Intelsat 21 utilizes one 4-for-2 redundant Ku-band LNAs and two 2-for-1 redundant LNAs.

The signal is then routed to a frequency down-converter that converts the uplink frequency to the appropriate downlink frequency. Intelsat 21 utilizes a bank of 5-for-3 redundant Ku-band down-converters having a translation frequency of 2300 MHz, and one 2-for-1 redundant Ku-band down-converter that has a translation frequency of 2543 MHz. The Intelsat 21 Ku-band frequency down-converters are able to maintain over the life of the spacecraft the frequency of the transmitted (down converted) signal to within +/- 0.002% of the desired value. Accordingly, Intelsat 21 is compliant with Section 25.202(e) of the Commission's rules.

The output of each frequency down-converter is routed to a bank of hybrids and then to a bank of IMUXs. The IMUX is a filter that provides frequency band separation for each channel.

The output of each IMUX channel is connected to a corresponding LCAMP/TWTA pair. For the switchable channels, the output of each IMUX is fed to an input switching network prior to being routed to the appropriate LCAMP/LTWTA pair.

Intelsat 21 utilizes 150 Watt radiation cooled Ku-band TWTAs. The LCAMP/TWTAs are arranged in one 10-for-7 redundancy ring, one 6-for-5 redundancy ring and two 16-for-12 redundancy rings.

The LCAMP provides high gain, and amplitude and gain expansion to compensate for the selected TWTA. The LCAMP may be operated in the Fixed Gain Mode ("FGM") or in the Automatic Level Control ("ALC") mode. In the FGM mode, the output of the LCAMP may be adjusted by ground command from 0 to 28 dB in 1 dB increments. Accordingly, Intelsat 21 is compliant with the provisions of Section 25.210(c) of the Commission's rules. In the ALC mode, the LCAMP automatically adjusts its gain depending on the power level of the input signal in order to maintain

a constant output power in the presence of varying uplink power. When operating in the ALC mode, the amplifier operating point may be adjusted (by ground command) over a 10 dB range with a minimum of 21 steps using a nominal 0.5 dB step size

The output of each LCAMP/TWTA is routed to a switch bank which permits connection of the channel to the appropriate OMUX (and downlink beam). For the Ku-band switchable channels, the output switching network in conjunction with the input switching network prior to the IMUXs, enables the connection of the LCAMP/TWTA to the appropriate OMUX.

For the Brazil and Mobility transmit beams, the output of each OMUX is fed to a receive reject filter, a test coupler, and then to the OMT mentioned above. From there the signal is sent to the antenna feed for transmission to Earth. For the Mexico transmit beams, the output of each OMUX is fed to a receive reject filter, a test coupler, a diplexer and then to the OMT.

2.7) Telemetry, Command and Ranging Subsystem

The telemetry, command and ranging (TC&R”) subsystem provides the following functions:

- 1) Acquisition, processing and transmission of spacecraft telemetry data;
- 2) Reception and retransmission of ground station generated ranging signals; and
- 3) Reception, processing and distribution of telecommands.

The TC&R subsystem consists of the following elements: 1) one pipe command antenna located on the nadir side of the spacecraft, 2) one pipe command antenna located on the aft side of the spacecraft, 3) one pipe telemetry antenna located on the nadir side of the spacecraft, 4) one pipe telemetry antenna located on the aft side of the spacecraft, 5) one bicone command antenna, 6) one bicone telemetry antenna, 7) one global horn antenna, 8) three command receivers, 9) two dual frequency telemetry transmitters, 10) baseband digital data handling system, and 11) microwave components including filters, switches, couplers, isolators, cables and waveguide.

2.7.1) Antennas

The coverage patterns of the command and telemetry beams are provided in Exhibits 5B-1 through 5B-6, in the format prescribed in Section 25.114(d)

(3) of the Commission's rules. When on-station, command and telemetry signals are received and transmitted through a global horn antenna and the pipe antennas. The global horn antenna is also utilized for Ku-band Uplink Power Control ("ULPC").

During emergencies and transfer orbit operations, command signals are received through the bicone antenna and the pipe antennas; while the telemetry is transmitted through the bicone antenna and/or the pipe antennas. Intelsat 21 utilizes two pipe antennas for command and two for telemetry – one command and telemetry antenna pair located on the nadir side of the spacecraft and the other pair located on the aft side.

2.7.2) Command

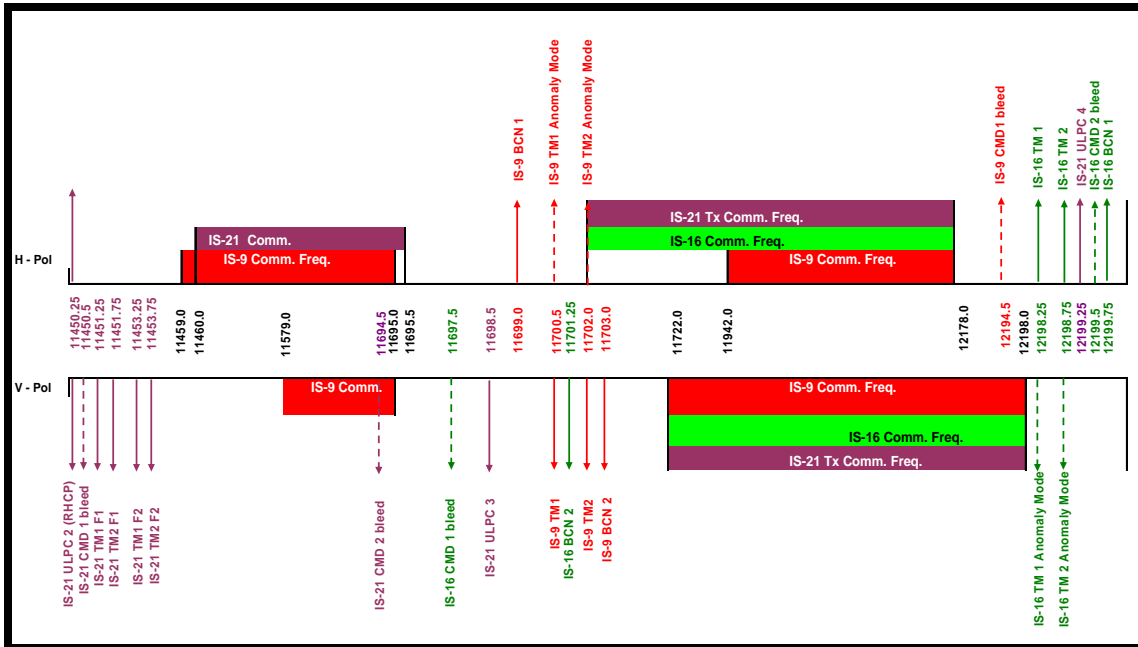
The Intelsat 21 command subsystem performance summary is provided in Exhibit 7. Detailed calculation of the G/T and SFD for each command beam is provided in Exhibit 8.

During on-station operations, commands are sent to the spacecraft by transmission of two independent FM signals on the frequencies of 13750.5 MHz and 13994.5 MHz. The 13994.5 MHz command signal is received through the command global horn antenna, and the 13750.5 MHz signal is received by the pipe antennas. The command signals are routed to three command receivers through a series of hybrids and diplexers. The receivers amplify and demodulate the signal, and convert the command signal into a digital stream. The output of the command receivers are forwarded to the Central Telemetry and Command Unit ("CTCU"), where the commands are decoded and sent to the appropriate unit.

During transfer orbit and emergency operations, the operation of the command subsystem is similar to that for on-station operations, except that the transmitted command signals are received by the bicone and pipe antennas.

Intelsat 21 command carriers utilize center frequencies that fall outside of the allocated frequency band of 14000 – 14500 GHz band. Accordingly, Intelsat 21 is not compliant with the provisions of Section 25.202(g) of the rules. The placement of the Intelsat 21 command carriers was predicated on minimizing the risk of interference to and from the Intelsat 9 and Intelsat 16 command and communication channels, including from oppositely polarized signals that would be transmitted to these two spacecraft.

The diagram below shows the payload and command frequencies that are utilized by Intelsat 9, Intelsat 16 as well as those proposed for use by Intelsat 21.



In order to minimize the risk of interference from errant oppositely polarized payload transmissions, the Intelsat 21 command channel should not be located within the frequency band that is utilized by the spacecraft (or any other co-located spacecraft) in the opposite polarization. With its newer generation spacecraft, Intelsat requires that its spacecraft be designed such that it can be commanded through at least one of two command frequencies and that a minimum frequency separation of approximately three MHz be maintained between any two command channels.

In view of the co-located operation of Intelsat 9, Intelsat 16 and Intelsat 21 from the nominal orbital location of 58° W.L and the above technical requirements, it was not possible to identify suitable command frequencies for Intelsat 21 that would lie within the allocated (payload) frequency bands of this spacecraft. In view of the fact that Intelsat 16 operates in the 13.75 – 14.0 GHz band as well as the 14.0 – 14.5 GHz band, Intelsat determined that the best option, from a technical perspective, was to place the Intelsat 21 command frequencies within the 13.75 – 14.0 GHz band. With the exception of Intelsat 16, the nearest satellite to Intelsat 21 that utilizes the 13.75 – 14.0 GHz band is Galaxy 11, located at 55.5° W.L, and Amazonas-1 and 2, located at 61° W.L. However, in light of the fact that for the transmission of commands to Intelsat 21 large earth station antennas will be

used, the impact of the off-axis transmissions from Intelsat 21 command carriers towards Galaxy 11, Amazonas 1 and 2, is not expected to be significant. Accordingly, in view of the foregoing, Intelsat believes that a waiver of provisions of Section 25.202(g) is justified.

2.7.3) Telemetry

The Intelsat 21 telemetry subsystem performance summary is provided in Exhibit 7. Detailed calculation of the EIRP for each telemetry beam is provided in Exhibit 8.

During on-station operations, telemetry is transmitted by the spacecraft on two independent, linearly polarized, PM signals on two frequency pairs: 11451.25/11453.25 MHz or 11451.75/11453.75 MHz. The telemetry frequencies are compliant with the provisions of Section 25.202(g) of the Commission's rules. The telemetry baseband functions are implemented in the CTCU, where data from the various spacecraft units are collected, processed, multiplexed, formatted and encoded onto subcarriers. The output of the CTCU is routed to the telemetry transmitters where the signal is modulated onto the main carrier frequencies.

Intelsat 21 utilizes two dual frequency transmitters. One transmitter can operate on the frequencies of 11451.25 MHz and 11453.25 MHz; and the other transmitter can operate at 11451.75 MHz and 11453.75 MHz. The telemetry transmitters are able to maintain the downlink transmit frequency to within +/- 0.002% of the desired frequency over the life of the spacecraft.

Each telemetry transmitter has a low power output port and a high power output port. During emergency operations, the signal from the high power output port of each telemetry transmitter is routed to either the bicone antenna or the pipe antennas through a switch. During on-station operations, the signal from the low power output port of the transmitter is routed to a hybrid and then to the global horn antenna for transmission back to Earth.

2.7.4) Ranging

During all phases of the mission, the slant range of the spacecraft can be determined to a relatively high level of accuracy through the use of a multiple tone ranging system. The ranging tones selected are combined with the normal command data and modulated onto the command carrier and transmitted to the spacecraft. Once received by the spacecraft through the appropriate receiving antenna, the signal is routed to the command receiver

where it is separated from the normal command data and routed directly to the spacecraft's telemetry transmitter. At the telemetry transmitter, the ranging signal is combined with other telemetry data and modulated onto the main telemetry carrier and transmitted to Earth through the appropriate spacecraft transmitting antenna. On the ground, the ranging tones are separated from the telemetry data, demodulated and their phase compared with that of the transmitted signal to determine the range of the satellite.

Because the ranging subsystem uses the command and telemetry subsystems, the descriptions of the operation of these two latter systems during on-station, transfer orbit and emergency conditions are applicable to the ranging subsystem as well. The performance summary of the Intelsat 21 command, telemetry and ranging subsystems are provided in Exhibit 7.

2.8) Uplink Power Control Subsystem ("ULPC")

2.8.1 Antennas

Intelsat 21 utilizes a dedicated global horn antenna to generate the C-band global ULPC beam. At Ku-band, two Ku-band global horn antennas are utilized to generate the Ku-band global ULPC beams. One of the Ku-band global horn antennas is also utilized for on-station TC&R. The coverage patterns of the C-band and Ku-band ULPC beams are provided in Exhibits 5C-1 through 5C-3.

2.8.2 ULPC System Description

Intelsat 21 provides three Ku-band beacons and one C-band beacon which can be used for uplink power control by customers transmitting to the spacecraft. The C-Band ULPC beacon is circularly polarized and operates on the frequency of 4199.5 MHz. The Ku-Band ULPC beacons are linearly polarized and operate on the frequencies of 11450.25 MHz, 11698.5 MHz and 12199.25 MHz. Detailed calculation of the EIRP for each ULPC beam is provided in Exhibit 6.

The Intelsat 21 C-band and Ku-band ULPC beacon transmitters are able to maintain the downlink transmit frequency to within +/- 0.002% of the desired frequency over the life of the spacecraft. Accordingly, Intelsat 21 is compliant with the provisions of Section 25.202(e) of the Commission's rules.

The C-band ULPC subsystem utilizes a dedicated 2-for-1 redundant transmitter to generate the beacon signal. The output signal from the ULPC transmitter is directed, in sequence, to a low-pass filter, a test coupler, and then to the C-band global horn antenna for transmission to Earth.

For the generation of each Ku-band ULPC frequency, dedicated 2-for-1 redundant transmitters are utilized. The output of each transmitter is directed to a low-pass filter, a test coupler, an OMT and then to the Ku-band global horn antenna for transmission to Earth. For the ULPC channel that shares the global horn antenna with the TC&R, the output of the transmitter is sent to a low-pass filter, a test coupler, a diplexer, an OMT and then to the transmitting global horn antenna.

2.9) Satellite Station-Keeping

The spacecraft will be maintained within 0.05° of its nominal longitudinal position in the east-west direction. Accordingly, it is in compliance with Section 25.210(j) of the Commission's rules.

The attitude of the spacecraft will be maintained with accuracy consistent with the achievement of the specified communications performance, after taking into account all error sources (i.e., attitude perturbations, thermal distortions, misalignments, orbital tolerances and thruster perturbations).

2.10) Satellite Useful Lifetime

The design lifetime of the satellite in orbit is 15 years. This has been determined by a conservative evaluation of the effect of the synchronous orbit environment on the solar array, the amount of fuel aboard the spacecraft, the effect of the charge-discharge cycling on the life of the battery, and the wear-out of the amplifiers and other active units. The mass allocation of propellant for spacecraft station keeping is 15 years. To enhance the probability of survival, equipment/unit redundancy is incorporated into the spacecraft design where possible. Materials and processes have been selected so that aging or wearing effects will not adversely affect spacecraft performance over the estimated life.

2.11) Spacecraft Reliability

Intelsat 21 is designed for an operational and mission life of 15 years. Life and reliability are maximized by incorporating flight proven or flight qualified units and designs to the greatest extent possible. All subsystems

and units have a minimum design life of 15 years. Redundancy concepts are applied to all critical components. All avoidable single-point failure modes have been eliminated.

The projected reliability of the C- and Ku-band payloads is 94.1%. The projected reliability of the bus system is 87.6%. The overall reliability of the Intelsat 21 spacecraft is projected to be 82.3%. The subsystem reliability assessments were based upon the use of failure rates, modeling assumptions from previous spacecraft programs and those specific to Intelsat 21. Failure rates for spacecraft equipment have been calculated using actual electrical stress and operating temperature conditions for each part.

3.0) Services and Emission Designators

Intelsat 21 is to be a general purpose communications satellite and has been designed to support various services offered within Intelsat's satellite system. Depending upon the needs of the users, the transponders on Intelsat 21 can accommodate television, radio, voice and data communications. Typical communication services to be offered include:

- a) Frequency modulated television (TV/FM)
- b) Compressed digital video
- c) High speed digital data
- d) Digital single channel per carrier ("SCPC") data channels
- e) Digital SCPC with 64 kbps and T1 data rates

Emission designators and allocated bandwidths for representative communication carriers are provided in Exhibit 9.

4.0) Power Flux Density ("PFD")

The power flux density ("PFD") limits for space stations operating in the 3700 – 4200 MHz and 11450 - 11700 MHz bands are contained in Section 25.208 of the Commission's rules. Neither the Commission's rules nor the ITU Radio Regulations specify any pfd limits for the 11700 – 12200 MHz band applicable to geostationary satellites operating in the fixed satellite service.

The maximum PFD levels for the Intelsat 21 transmissions were calculated for a number of TV/FM and/or digital carriers listed in Exhibit 9 operating in the 3700 – 4200 MHz and 11450 – 11700 MHz bands. These carriers were chosen because they generally produce high PFD levels on the Earth's

surface. The PFD levels were also calculated for the Intelsat 21 telemetry and ULPC carriers. The results are provided in Exhibit 10 and show that the downlink power flux density levels of the Intelsat 21 carriers do not exceed limits specified in Section 25.208 of the Commission's rules.

5.0) Emission Limitations

The Intelsat 21 receiver and transmitter channel filter response characteristics are provided in Exhibit 11, as required under Section 25.114 (4)(vii) of the Commission's rules.

Intelsat will comply with the provisions of Section 25.202(f) of the Commission's rules with regard to Intelsat 21 emissions.

6.0) Service Area

At C-band, the primary service area of Intelsat 21 is North and South America and Europe. At Ku-band, the primary service area is Mexico, Central America, the Caribbean, Brazil, Europe, West Africa and the Atlantic Ocean region.

7.0) Orbital Location

Intelsat requests that it be assigned the 58° W.L orbital location for Intelsat 21. After transfer of traffic to Intelsat 21, the Intelsat 9 spacecraft, which currently operates from 58° W.L., will be deployed at another orbital location. The 58° W.L location satisfies Intelsat 21 requirements for optimizing coverage, elevation angles and service availability and ensures that maximum operational, economic and public interest benefits will be derived.

8.0) Orbital Arc Limitations

Intelsat 21 is intended to provide video, audio and data services to satellite users within its coverage area. The 58° W.L position affords reasonable earth station angles to the region. The attractiveness of Intelsat 21 to this market would be severely diminished if service to this area is not possible.

9.0) Intelsat 21 Link Budgets and Interference Analysis

Link analysis for Intelsat 21 was conducted for a number of representative carriers, at C- and Ku-band. Excluding Intelsat 9 and Intelsat 16, the nearest

co-frequency satellites to Intelsat 21 are Galaxy 11, located at 55.5° W.L, and Amazonas 1 and 2, located at 61° W.L.

At C-band, it was assumed that the nearest co-frequency satellites to Intelsat 21 were two hypothetical satellites – one located at 56° W.L and the other located at 60° W.L. The hypothetical satellites were assumed to have same operational parameters as Intelsat 21. It was further assumed that each of the hypothetical satellites utilized digital carriers having a maximum uplink power density of -38.7 dBW/Hz, as specified in Section 25.212(d) of the Commission's rules, and a maximum downlink (beam peak) EIRP density of -31.2 dBW/Hz.

At Ku-band, it was assumed that the nearest co-frequency satellites to Intelsat 21 were two hypothetical satellites – one located at 56° W.L and the other located at 60° W.L. The hypothetical satellites were assumed to have the same operational parameters as Intelsat 21. It was further assumed that each of the hypothetical satellites utilized digital carriers having a maximum uplink power density -45 dBW/Hz. The maximum downlink EIRP density of the hypothetical satellites was assumed to be -18.9 or -20.0 dBW/Hz, depending on the Intelsat 21 downlink beam being considered.

Other assumptions made for the link budget analysis were as follows:

- a) In the plane of the geostationary satellite orbit, all C and Ku-band 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) or (a)(2) of the FCC's rules, depending on the frequency band under consideration.
- b) All transmitting and receiving earth stations have a cross-polarization isolation value of at least 30 dB within their main beam.
- c) At C-band frequencies, degradation due to rain is not considered, given that rain attenuation effects are insignificant at C-band.
- d) At Ku-band frequencies rain attenuation predictions are derived using Recommendation ITU-R 618-8.
- e) At Ku-band frequencies, increase in noise temperature of the receiving earth station due to rain is taken into account.
- f) For the cases where the transponder operates in a multi-carrier mode, the effects due to intermodulation interference are taken into account.

At C- and Ku-band frequencies, the impact of the TV/FM carriers from the adjacent satellites at 56° W.L and 60° W.L on the transmissions of Intelsat 21 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 and Ku-band analysis are shown in Exhibit 12 and demonstrate that operation of the Intelsat 21 satellite from 58° W.L. would permit the intended services to achieve their respective performance objectives while maintaining sufficient link margin. Additionally, the power and EIRP density levels of the carriers listed in Exhibit 12 comply with the limits contained in Sections 25.212(c) and (d) of the Commission's rules.

10.0) Adjacent Satellite Link Analysis

At C- and Ku-band, the impact of the proposed Intelsat 21 emissions on the transmissions of hypothetical adjacent satellites located at 56° W.L and 60° W.L was analyzed. It was assumed that each of these satellites had the same operating characteristics as the proposed Intelsat 21 spacecraft.

For the satellite located at 56° W.L, it was assumed that the adjacent satellites were Intelsat 21, located at 58° W.L, and a hypothetical satellite having the same operating characteristics as Intelsat 21 located at 54° W.L. For the satellite located at 60° W.L, it was assumed that the adjacent satellites were Intelsat 21, located at 58° W.L, and a hypothetical satellite having the same operating characteristics as Intelsat 21 located at 62° W.L.

The impact of Intelsat 21 emissions on the TV/FM carriers of the adjacent satellites at 56° W.L and 60° W.L was not considered for the reasons articulated in section 9.0 above. The assumptions made in section 9.0 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 given in Exhibits 13 and 14. The Intelsat 21 transmissions will be limited to those levels contained in Sections 25.212(c) and (d), as applicable, unless higher levels are coordinated with affected adjacent satellite operators. In any case, pursuant to the results in Exhibits 13 and 14, the uplink power density of the Intelsat 21 digital carriers

operating in the 5925 – 6425 MHz and 14000 – 14500 MHz band will not exceed -38.7 dBW/Hz and -45 dBW/Hz, respectively. Within the 3700 – 4200 MHz band, the downlink EIRP density of the Intelsat 21 digital carriers will not exceed -31.2 dBW/Hz. Within the 11450 – 11700 MHz band, the downlink EIRP density of the Intelsat 21 digital carriers will not exceed -20 dBW/Hz. Within the 11700 – 12200 MHz band, the downlink EIRP density of the Intelsat 21 digital carriers would not exceed -18.9 dBW/Hz through the Mexico downlink beam and would not exceed -20 dBW/Hz through the Brazil beam.

11.0) Schedule S Submission

Intelsat is providing with its application a Schedule S for the operations of Intelsat 21 from 58° W.L. In column “g” of Section S13 of the Schedule S, a link budget file has been included for the first link (i.e., the first row of data) contained in that section. This link budget file is applicable to all the links listed in Section S13 and should have been included with each row of data in that section of the Schedule S. However, given that the link budget file is rather large and its inclusion with each link (or data row) would lead to the Schedule S file having an unmanageable size, all other links (or rows of data) contain a small ASCII file that references the link budget file that is attached to the first link (i.e., the link budget file attached to the first row of data).

12.0) 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.

12.1) 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.

12.2) 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 ensure the removal of all stored energy on the spacecraft by depleting all propellant tanks, venting all pressurized systems and by leaving the batteries in a permanent discharge state.

12.3) 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. With the exception of Intelsat 9 during the transition of traffic period, Intelsat 21 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.

During the transition of traffic from Intelsat 9, Intelsat will take all the necessary steps, e.g., “pass-in-the-night maneuver” or slight relocation of Intelsat 9 and/or Intelsat 21, to minimize the risk of collision between Intelsat 21 and Intelsat 9.

With the exception of Intelsat 9, 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 Intelsat 21. Intelsat is also not aware of any system with an overlapping station-keeping volume with Intelsat 21 that is the subject of an ITU filing and that is either in orbit or progressing towards launch.

12.4) Post Mission Disposal

At the end of the mission, Intelsat will dispose of the spacecraft by moving it to a minimum altitude of 285 kilometers above the geostationary arc, which is the altitude established by the IADC formula. Intelsat has reserved 120 kilograms of fuel for this purpose. The reserved fuel figure was determined by the spacecraft manufacturer and 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. The fuel gauging uncertainty has been taken into account in these calculations.

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 ratio ($Cr \cdot A/M$) of the Intelsat 21 spacecraft is 0.045 m²/kg, resulting in a minimum perigee disposal altitude under the IADC formula of at most 285 kilometers above the geostationary arc. Accordingly, the Intelsat 21 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

Jose Albuquerque
Intelsat
Senior Director
Spectrum Strategy

March 22, 2012

Date

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS

GENERAL	
Spacecraft Name	Intelsat 21
Orbital Location	58° W.L.
Spacecraft Manufacturer	Boeing
Spacecraft Model	702 MP
Spacecraft Type	3-axis stabilized
Spacecraft Dimensions	
Length	43.7 meters
Width	9.2 meters
Depth	6.7 meters
Spacecraft Expected Lifetime	≥ 15 years
Eclipse Capability	100%
Station-keeping	
North-South	±0.05°
East-West	±0.05°
Antenna Pointing Accuracy	
North-South, East-West, Rotational	0.07°, 0.07°, 0.2°
Spacecraft Reliability	82.3
Payload Reliability	94.1
C-Band	97.9
Ku-Band	96.2
Bus Reliability	87.6
Propulsion Type	Liquid Propulsion
Deployed Area of Solar Array	70.3 m ²
Ranging Accuracy	≤ 20 m

EXHIBIT 2: SPACECRAFT MASS BUDGET

Mass of Spacecraft without Fuel (kg)	2477
Mass of Fuel and Disposables (kg)	3507
Launch Mass (kg)	5984
Mass of Fuel, in orbit, at Beginning of Life (kg)	735

EXHIBIT 3: SPACECRAFT POWER BUDGET

	BEGINNING OF LIFE		END OF LIFE	
	AUTUMN EQUINOX	SUMMER SOLSTICE	AUTUMN EQUINOX	SUMMER SOLSTICE
PAYLOAD (WATTS)	11260	11260	11260	11260
BUS (WATTS)	2203	1198	2139	963
TOTAL POWER (WATTS)	13463	12458	13399	12223
SOLAR ARRAY POWER (WATTS)	14007	13071	13942	12872
DEPTH OF BATTERY DISCHARGE (%)	67.5	N/A	74.8	N/A

EXHIBIT 4: FREQUENCY ASSIGNMENTS

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)	Maximum Channel Gain (dB)
1C	West Hemi	Horizontal	5945	1C	West Hemi	Vertical	3720	36	134.9
3C	West Hemi	Horizontal	5985	3C	West Hemi	Vertical	3760	36	134.9
5C	West Hemi	Horizontal	6025	5C	West Hemi	Vertical	3800	36	134.9
7C	West Hemi	Horizontal	6065	7C	West Hemi	Vertical	3840	36	134.9
9C	West Hemi	Horizontal	6105	9C	West Hemi	Vertical	3880	36	134.9
11C	West Hemi	Horizontal	6145	11C	West Hemi	Vertical	3920	36	134.9
13C	West Hemi	Horizontal	6185	13C	West Hemi	Vertical	3960	36	134.9
15C	West Hemi	Horizontal	6225	15C	West Hemi	Vertical	4000	36	134.9
17C	West Hemi	Horizontal	6265	17C	West Hemi	Vertical	4040	36	134.9
19C	West Hemi	Horizontal	6305	19C	West Hemi	Vertical	4080	36	134.9
21C	West Hemi	Horizontal	6345	21C	West Hemi	Vertical	4120	36	134.9
23C	West Hemi	Horizontal	6385	23C	West Hemi	Vertical	4160	36	134.9
2C	West Hemi	Vertical	5945	2C	West Hemi	Horizontal	3720	36	134.9
4C	West Hemi	Vertical	5985	4C	West Hemi	Horizontal	3760	36	134.9
6C	West Hemi	Vertical	6025	6C	West Hemi	Horizontal	3800	36	134.9
8C	West Hemi	Vertical	6065	8C	West Hemi	Horizontal	3840	36	134.9
10C	West Hemi	Vertical	6105	10C	West Hemi	Horizontal	3880	36	134.9
12C	West Hemi	Vertical	6145	12C	West Hemi	Horizontal	3920	36	134.9
14C	West Hemi	Vertical	6185	14C	West Hemi	Horizontal	3960	36	134.9
16C	West Hemi	Vertical	6225	16C	West Hemi	Horizontal	4000	36	134.9
18C	West Hemi	Vertical	6265	18C	West Hemi	Horizontal	4040	36	134.9
20C	West Hemi	Vertical	6305	20C	West Hemi	Horizontal	4080	36	134.9
22C	West Hemi	Vertical	6345	22C	West Hemi	Horizontal	4120	36	134.9
24C	West Hemi	Vertical	6385	24C	West Hemi	Horizontal	4160	36	134.9
				UPC	Global	Right Hand Circular	4199.5	0.025	
1K	Mexico	Vertical	14020	1K	Mexico	Horizontal	11720	36	137.6
3K	Mexico	Vertical	14060	3K	Mexico	Horizontal	11760	36	137.6
5K	Mexico	Vertical	14100	5K	Mexico	Horizontal	11800	36	137.6
7K	Mexico	Vertical	14140	7K	Mexico	Horizontal	11840	36	137.6
9K	Mexico	Vertical	14180	9K	Mexico	Horizontal	11880	36	137.6
11K	Mexico	Vertical	14220	11K	Mexico	Horizontal	11920	36	137.6
13K	Mexico	Vertical	14260	13K	Mexico	Horizontal	11960	36	137.6
15K	Mexico	Vertical	14300	15K	Mexico	Horizontal	12000	36	137.6
17K	Mexico	Vertical	14340	17K	Mexico	Horizontal	12040	36	137.6
19K	Mexico	Vertical	14380	19K	Mexico	Horizontal	12080	36	137.6
21K	Mexico	Vertical	14420	21K	Mexico	Horizontal	12120	36	137.6
23K	Mexico	Vertical	14460	23K	Mexico	Horizontal	12160	36	137.6
2K	Mexico	Horizontal	14040	2K	Mexico	Vertical	11740	36	136.7
4K	Mexico	Horizontal	14080	4K	Mexico	Vertical	11780	36	136.7
6K	Mexico	Horizontal	14120	6K	Mexico	Vertical	11820	36	136.7
8K	Mexico	Horizontal	14160	8K	Mexico	Vertical	11860	36	136.7
10K	Mexico	Horizontal	14200	10K	Mexico	Vertical	11900	36	136.7
12K	Mexico	Horizontal	14240	12K	Mexico	Vertical	11940	36	136.7
14K	Mexico	Horizontal	14280	14K	Mexico	Vertical	11980	36	136.7
16K	Mexico	Horizontal	14320	16K	Mexico	Vertical	12020	36	136.7
18K	Mexico	Horizontal	14360	18K	Mexico	Vertical	12060	36	136.7
20K	Mexico	Horizontal	14400	20K	Mexico	Vertical	12100	36	136.7
22K	Mexico	Horizontal	14440	22K	Mexico	Vertical	12140	36	136.7
24K	Mexico	Horizontal	14480	24K	Mexico	Vertical	12180	36	136.7
26K	Brazil	Horizontal	14040	26K	Brazil	Vertical	11740	36	141.1
28K	Brazil	Horizontal	14080	28K	Brazil	Vertical	11780	36	141.1
30K	Brazil	Horizontal	14120	30K	Brazil	Vertical	11820	36	141.1
32K	Brazil	Horizontal	14160	32K	Brazil	Vertical	11860	36	141.1
34K	Brazil	Horizontal	14200	34K	Brazil	Vertical	11900	36	141.1
36K	Brazil	Horizontal	14240	36K	Brazil	Vertical	11940	36	141.1
38K	Brazil	Horizontal	14280	38K	Brazil	Vertical	11980	36	141.1
40K	Brazil	Horizontal	14320	40K	Brazil	Vertical	12020	36	141.1
42K	Brazil	Horizontal	14360	42K	Brazil	Vertical	12060	36	141.1
44K	Brazil	Horizontal	14400	44K	Brazil	Vertical	12100	36	141.1

EXHIBIT 4: FREQUENCY ASSIGNMENTS (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)	Maximum Channel Gain (dB)
46K	Brazil	Horizontal	14440	46K	Brazil	Vertical	12140	36	141.1
48K	Brazil	Horizontal	14480	48K	Brazil	Vertical	12180	36	141.1
25K	Mobility	Vertical	14030	25K	Mobility	Horizontal	11487	54	140.2
27K	Mobility	Vertical	14075	27K	Mobility	Horizontal	11532	27	140.2
29K	Mobility	Vertical	14105	29K	Mobility	Horizontal	11562	27	140.2
31K	Mobility	Vertical	14135	31K	Mobility	Horizontal	11592	27	140.2
33K	Mobility	Vertical	14165	33K	Mobility	Horizontal	11622	27	140.2
35K	Mobility	Vertical	14195	35K	Mobility	Horizontal	11652	27	140.2
37K	Mobility	Vertical	14225	37K	Mobility	Horizontal	11682	27	140.2
36K	Brazil	Horizontal	14240	37K	Mobility	Horizontal	11940	27	141.1
38K	Brazil	Horizontal	14280	35K	Mobility	Horizontal	11980	27	141.1
40K	Brazil	Horizontal	14320	33K	Mobility	Horizontal	12020	27	141.1
42K	Brazil	Horizontal	14360	31K	Mobility	Horizontal	12060	27	141.1
44K	Brazil	Horizontal	14400	29K	Mobility	Horizontal	12100	27	141.1
46K	Brazil	Horizontal	14440	27K	Mobility	Horizontal	12140	27	141.1
48K	Brazil	Horizontal	14480	25K	Mobility	Horizontal	12180	36	141.1
25K	Mobility	Vertical	14030	48K	Brazil	Vertical	11487	36	140.2
27K	Mobility	Vertical	14075	46K	Brazil	Vertical	11532	27	140.2
29K	Mobility	Vertical	14105	44K	Brazil	Vertical	11562	27	140.2
31K	Mobility	Vertical	14135	42K	Brazil	Vertical	11592	27	140.2
33K	Mobility	Vertical	14165	40K	Brazil	Vertical	11622	27	140.2
35K	Mobility	Vertical	14195	38K	Brazil	Vertical	11652	27	140.2
37K	Mobility	Vertical	14225	36K	Brazil	Vertical	11682	27	140.2
CMD1	Global	Horizontal	13994.5					1.0	
CMD2	Global (bicone)	Horizontal	13994.5					1.0	
CMD3	Global (pipe)	Left Hand Circular	13750.5					1.0	
				TM1	Global	Vertical	11451.25	0.5	
				TM2	Global	Vertical	11451.75	0.5	
				TM3	Global	Vertical	11453.25	0.5	
				TM4	Global	Vertical	11453.75	0.5	
				TM5	Global (bicone)	Vertical	11451.25	0.5	
				TM6	Global (bicone)	Vertical	11451.75	0.5	
				TM7	Global (bicone)	Vertical	11453.25	0.5	
				TM8	Global (bicone)	Vertical	11453.75	0.5	
				TM9	Global (pipe)	Left Hand Circular	11451.25	0.5	
				TM10	Global (pipe)	Left Hand Circular	11451.75	0.5	
				TM11	Global (pipe)	Left Hand Circular	11453.25	0.5	
				TM12	Global (pipe)	Left Hand Circular	11453.75	0.5	
				UPK1	Global	Horizontal	11450.25	0.025	
				UPK2	Global	Vertical	11698.50	0.025	
				UPK3	Global	Horizontal	12199.25	0.025	

EXHIBIT 5A-1: WEST HEMI RECEIVE BEAM
(Schedule S Beam ID: WHHU)

Beam Polarization: Horizontal

Peak Beam Gain: 28.2 dBi

Peak Beam G/T: 2.5 dB/K

Saturated Flux Density @ Peak Beam G/T: -108.5 to -80.5 dBW/m²

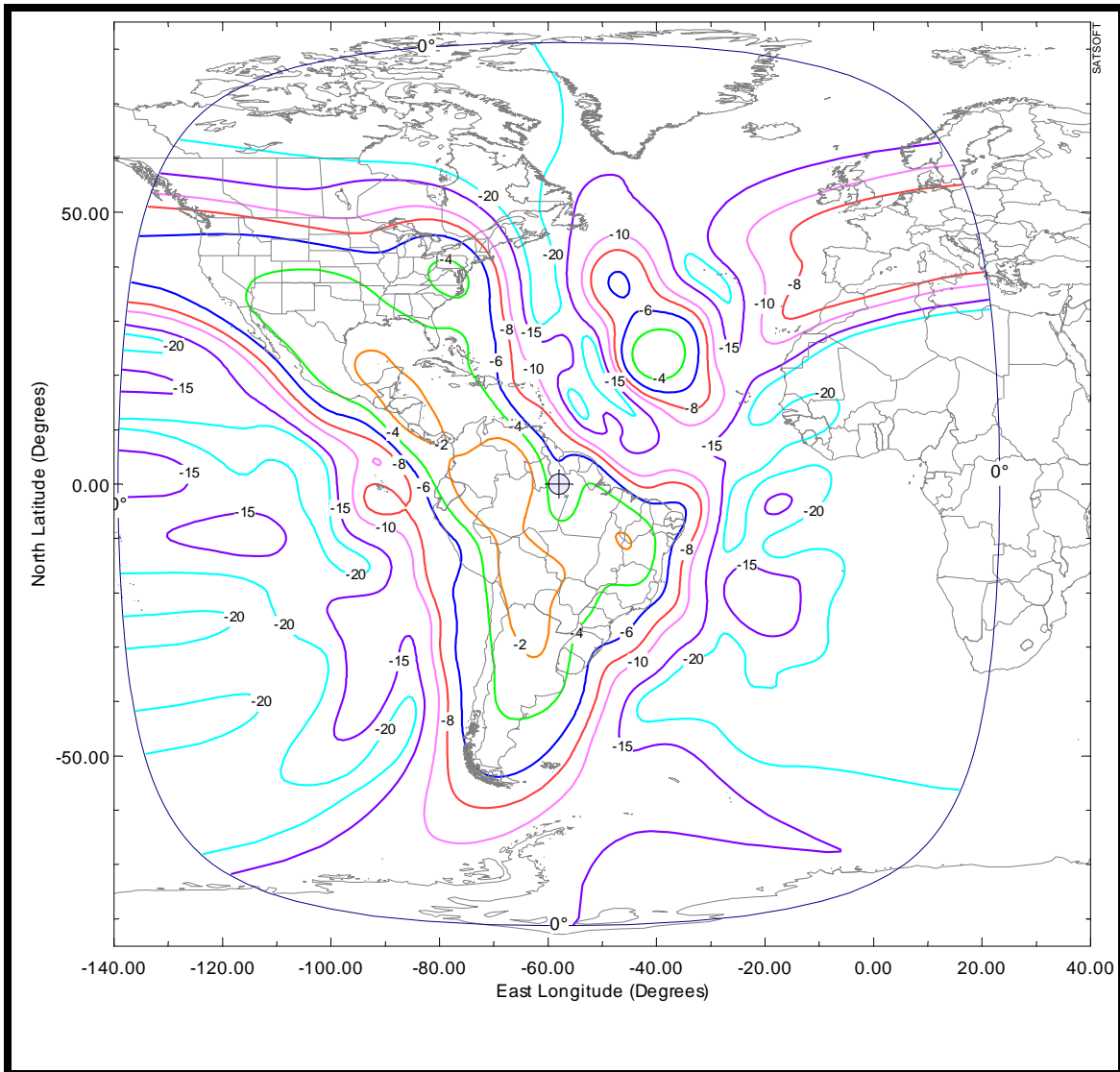


EXHIBIT 5A-2: WEST HEMI RECEIVE BEAM
(Schedule S Beam ID: WHVU)

Beam Polarization: Vertical

Peak Beam Gain: 28.2 dBi

Peak Beam G/T: 2.5 dB/K

Saturated Flux Density @ Peak Beam G/T: -108.5 to -80.5 dBW/m²

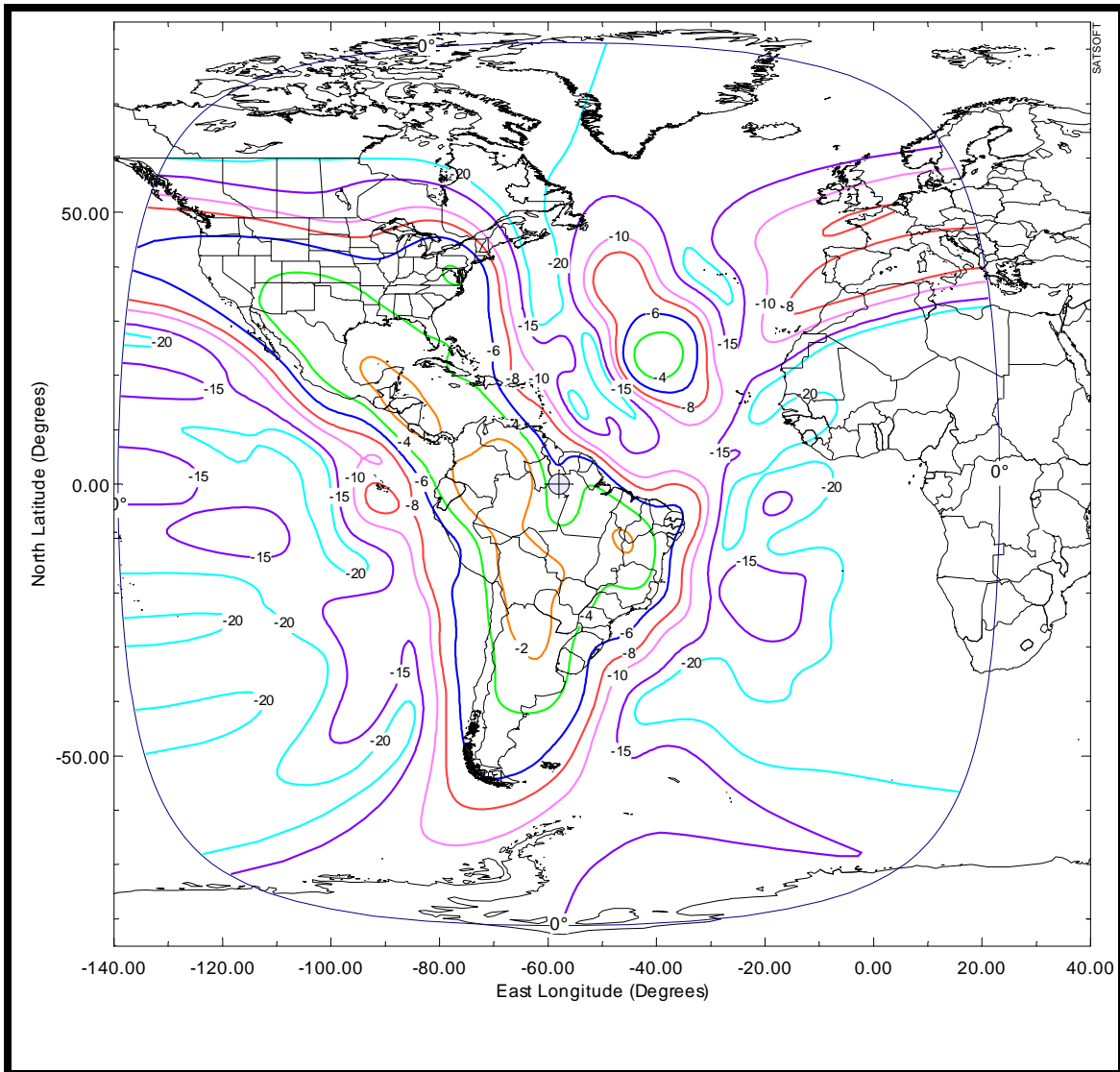


EXHIBIT 5A-3: MEXICO RECEIVE BEAM
(Schedule S Beam ID: MXHU)

Beam Polarization: Horizontal
Peak Beam Gain: 36.9 dBi
Peak Beam G/T: 10.5 dB/K
Saturated Flux Density @ Peak Beam G/T: -108.5 to -80.5 dBW/m²

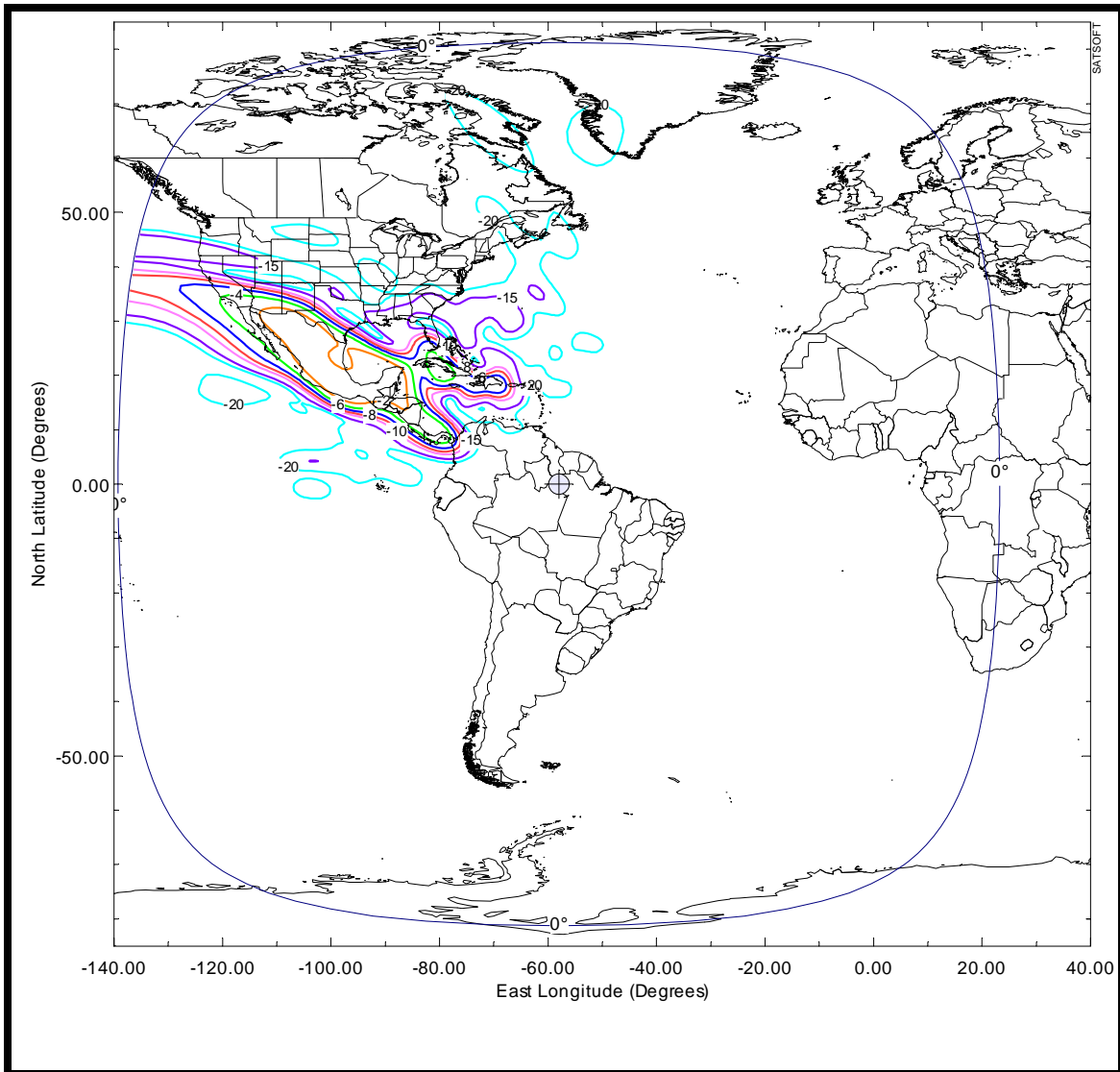


EXHIBIT 5A-4: MEXICO HEMI RECEIVE BEAM
(Schedule S Beam ID: MXVU)

Beam Polarization: Vertical

Peak Beam Gain: 36.4 dBi

Peak Beam G/T: 10.5 dB/K

Saturated Flux Density @ Peak Beam G/T: -108.5 to -80.5 dBW/m²

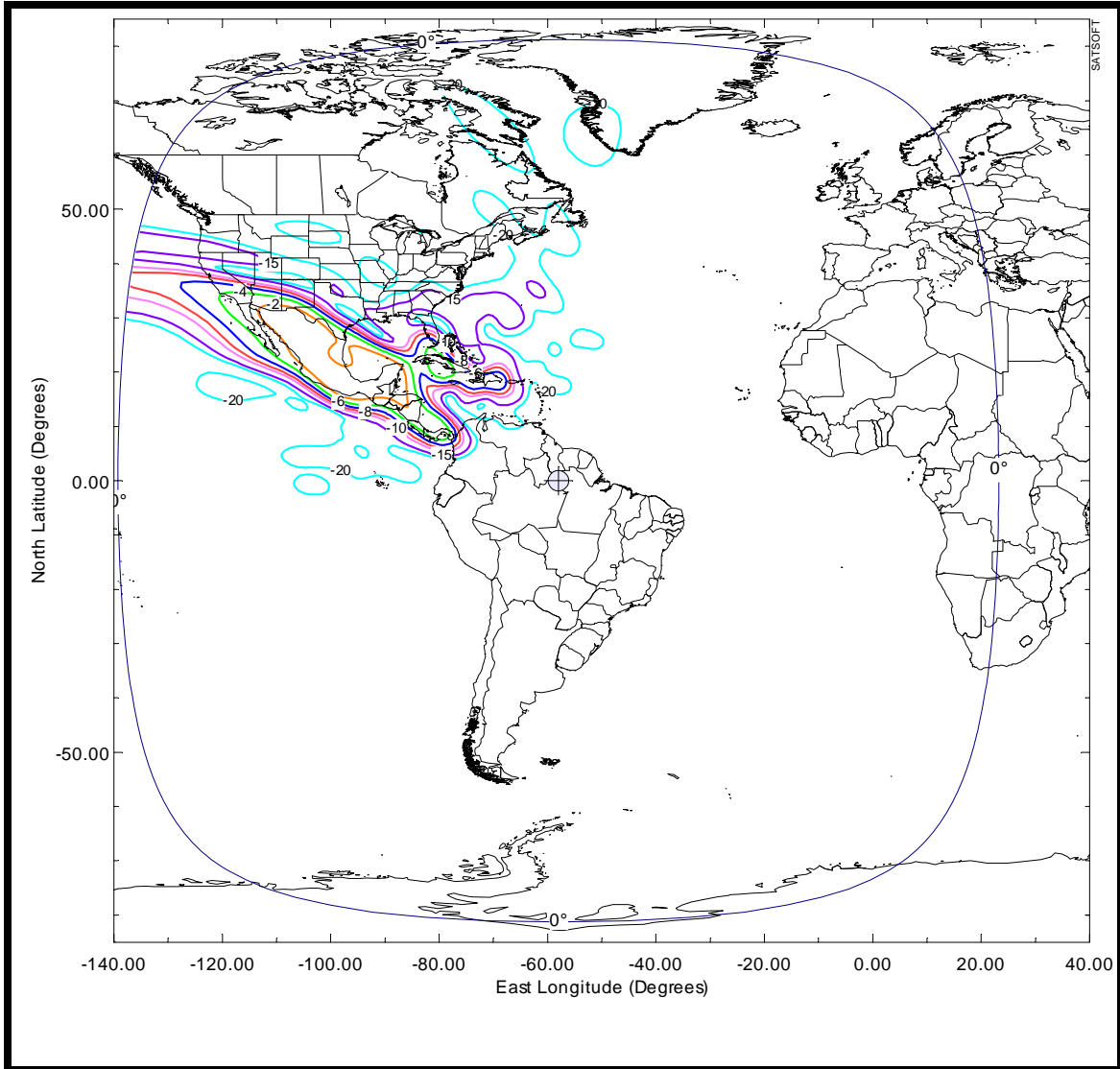


EXHIBIT 5A-5: BRAZIL RECEIVE BEAM
(Schedule S Beam ID: BZHU)

Beam Polarization: Horizontal

Peak Beam Gain: 31.7 dBi

Peak Beam G/T: 5.5 dB/K

Saturated Flux Density @ Peak Beam G/T: -107.5 to -79.5 dBW/m²

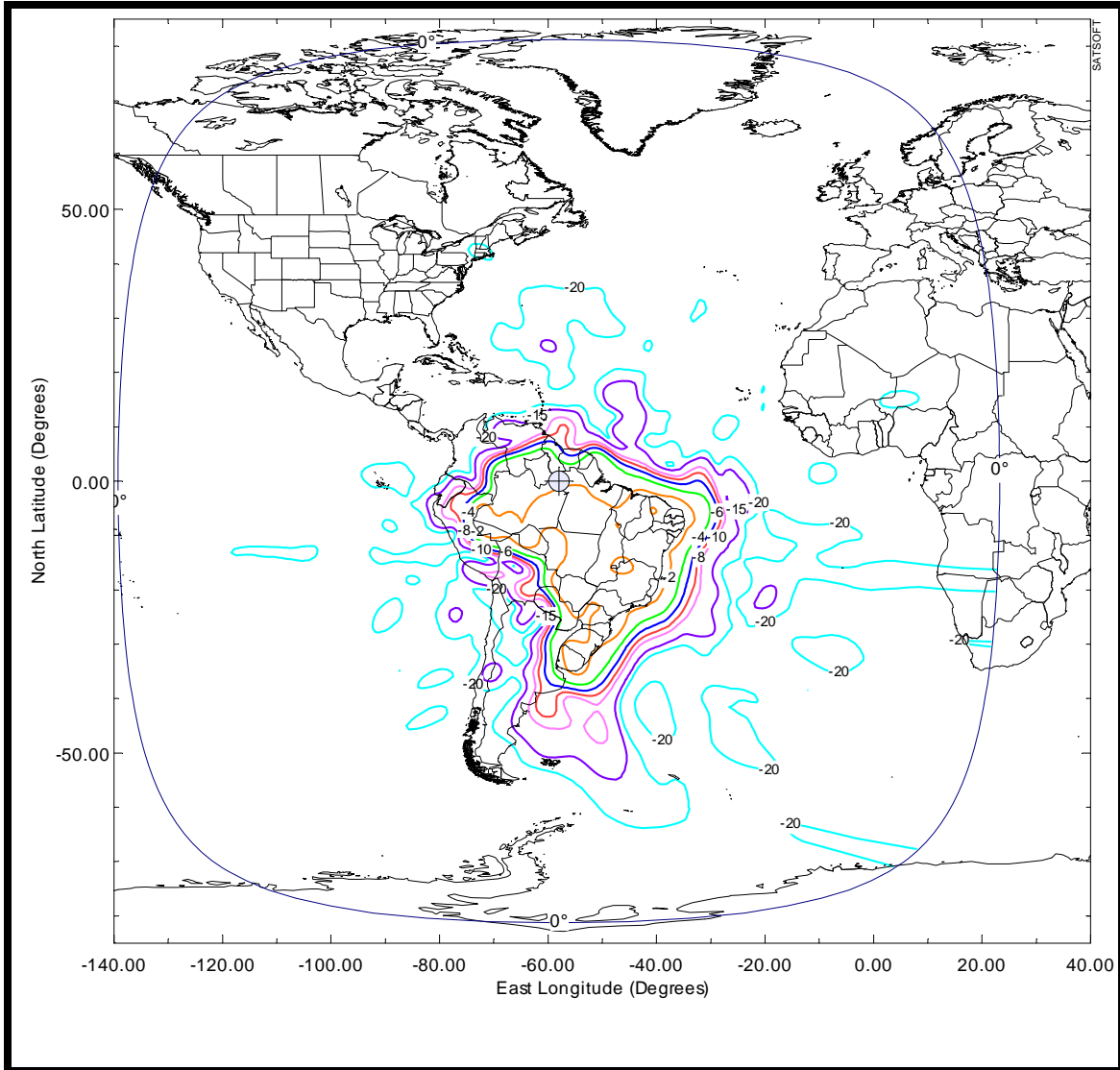


EXHIBIT 5A-6: MOBILITY RECEIVE BEAM
(Schedule S Beam ID: MOVU)

Beam Polarization: Vertical

Peak Beam Gain: 27.8 dBi

Peak Beam G/T: 2.8 dB/K

Saturated Flux Density @ Peak Beam G/T: -102.8 to -74.8 dBW/m²

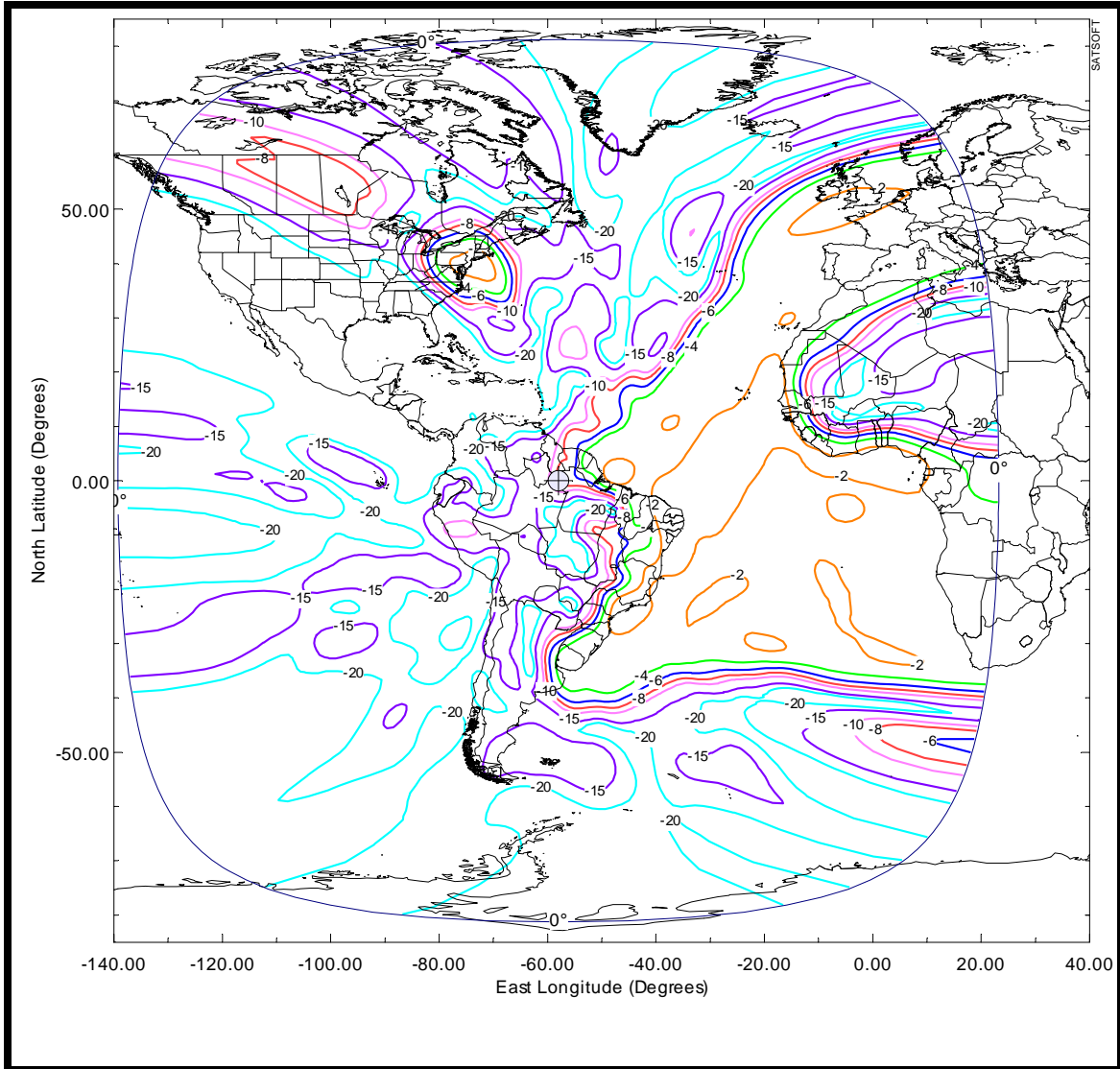


EXHIBIT 5A-7: WEST HEMI TRANSMIT BEAM
(Schedule S Beam ID: WHHD)

Beam Polarization: Horizontal
Peak Beam Gain: 26.3 dBi
Peak Beam EIRP: 43.6 dBW

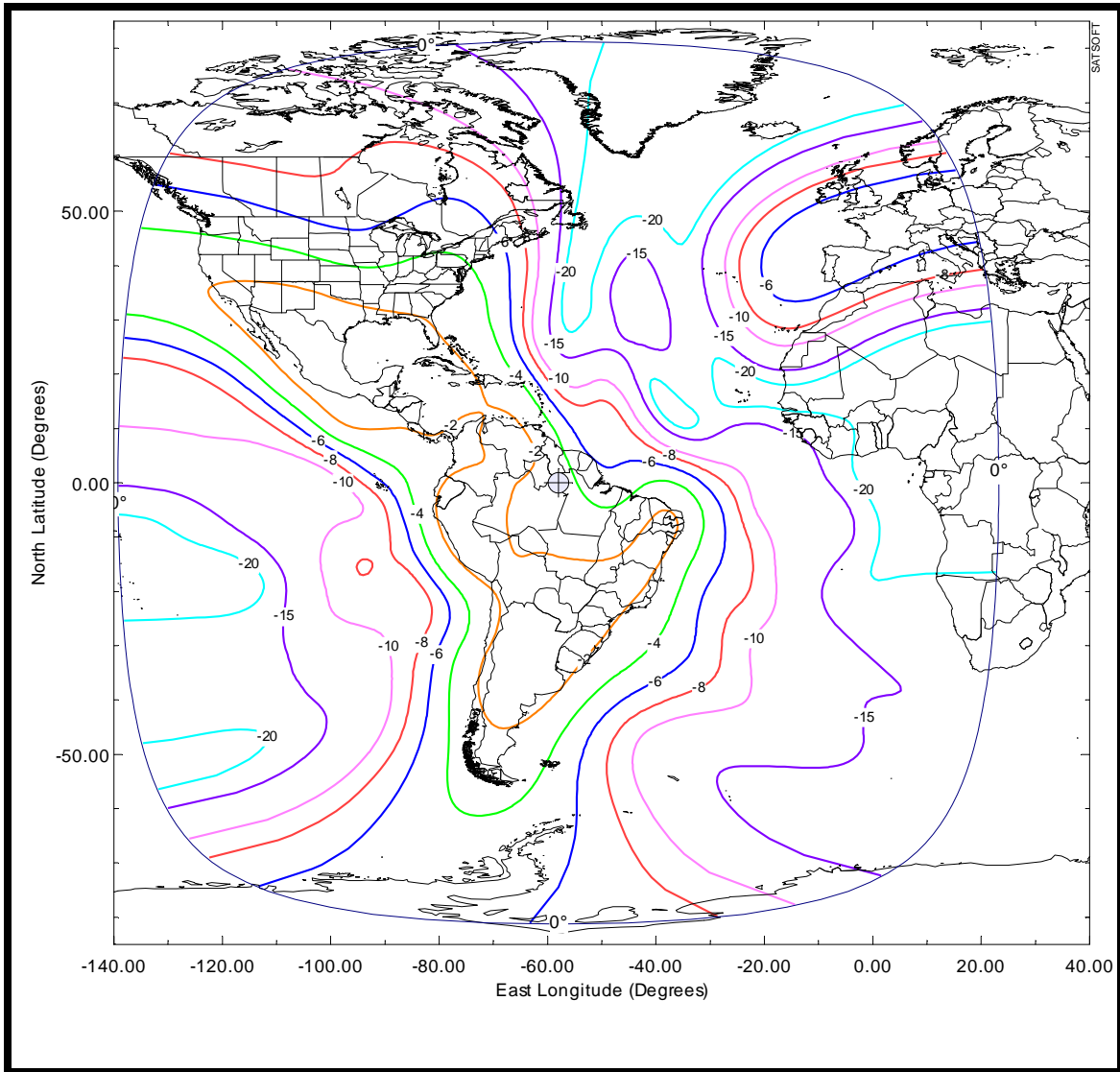


EXHIBIT 5A-8: WEST HEMI TRANSMIT BEAM
(Schedule S Beam ID: WHVD)

Beam Polarization: Vertical
Peak Beam Gain: 26.3 dBi
Peak Beam EIRP: 43.6 dBW

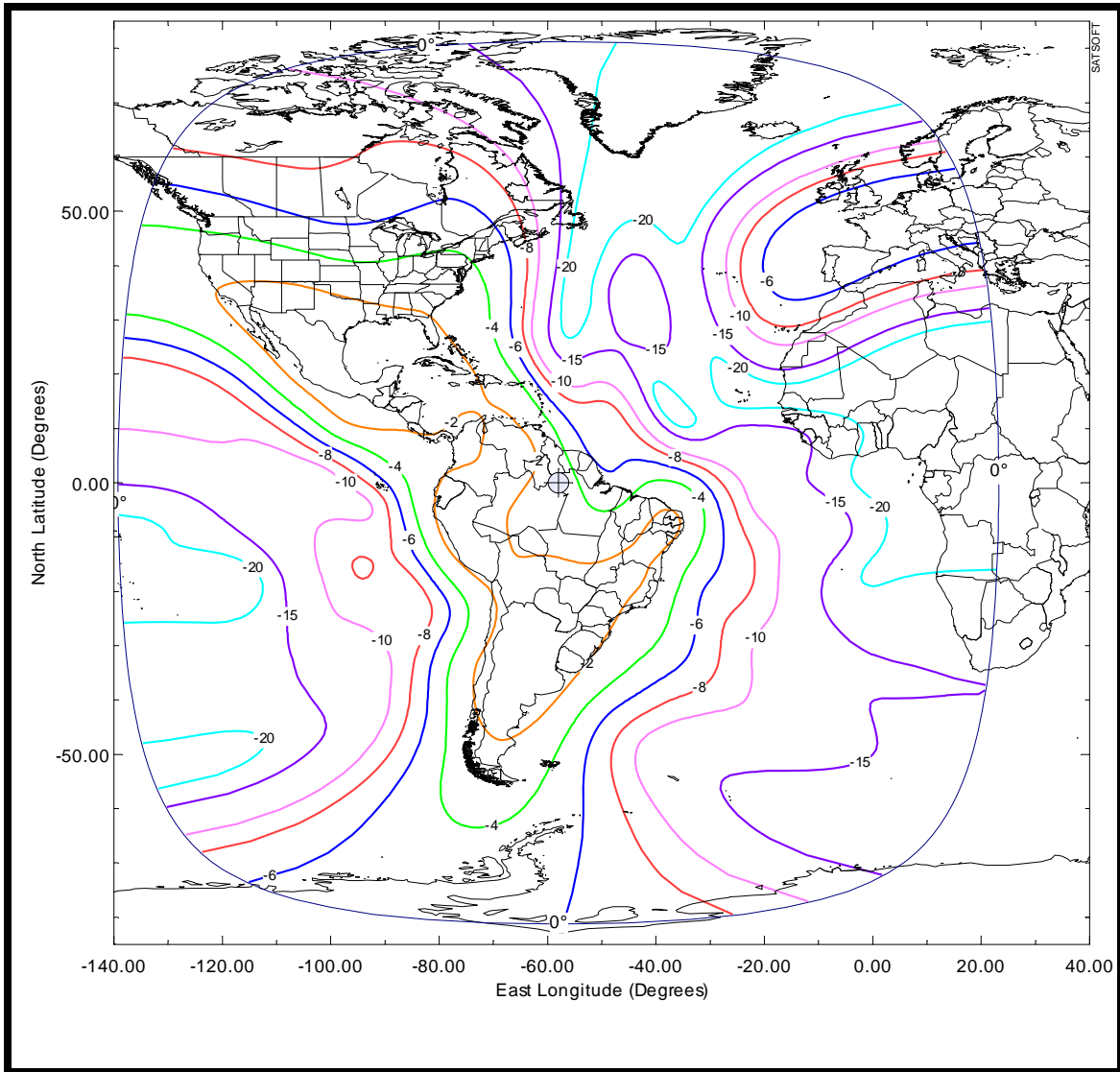


EXHIBIT 5A-9: MEXICO TRANSMIT BEAM
(Schedule S Beam ID: MXHD)

Beam Polarization: Horizontal
Peak Beam Gain: 34.9 dBi
Peak Beam EIRP: 55.9 dBW

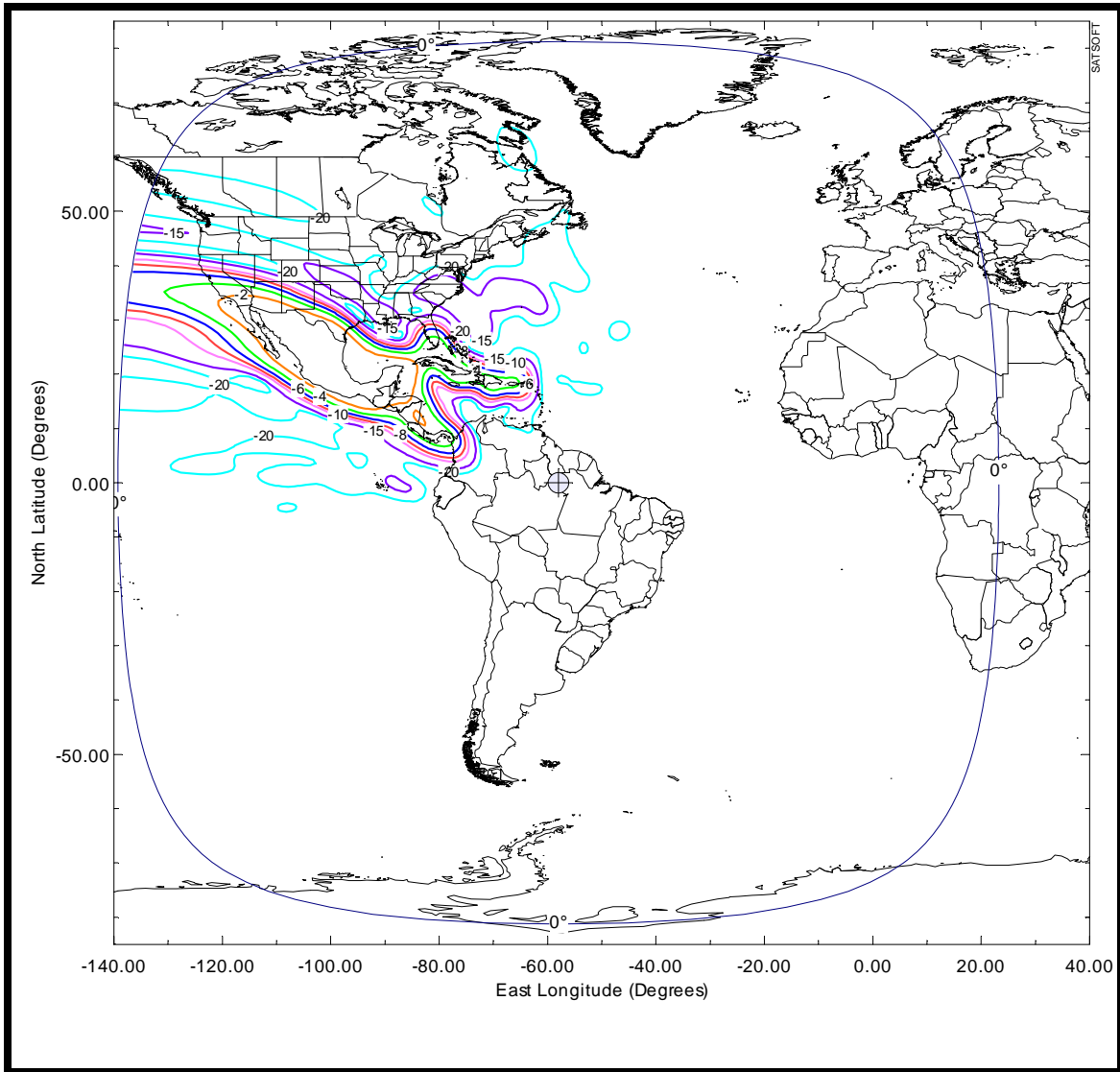


EXHIBIT 5A-10: MEXICO TRANSMIT BEAM
(Schedule S Beam ID: MXVD)

Beam Polarization: Vertical
Peak Beam Gain: 35.3 dBi
Peak Beam EIRP: 55.9 dBW

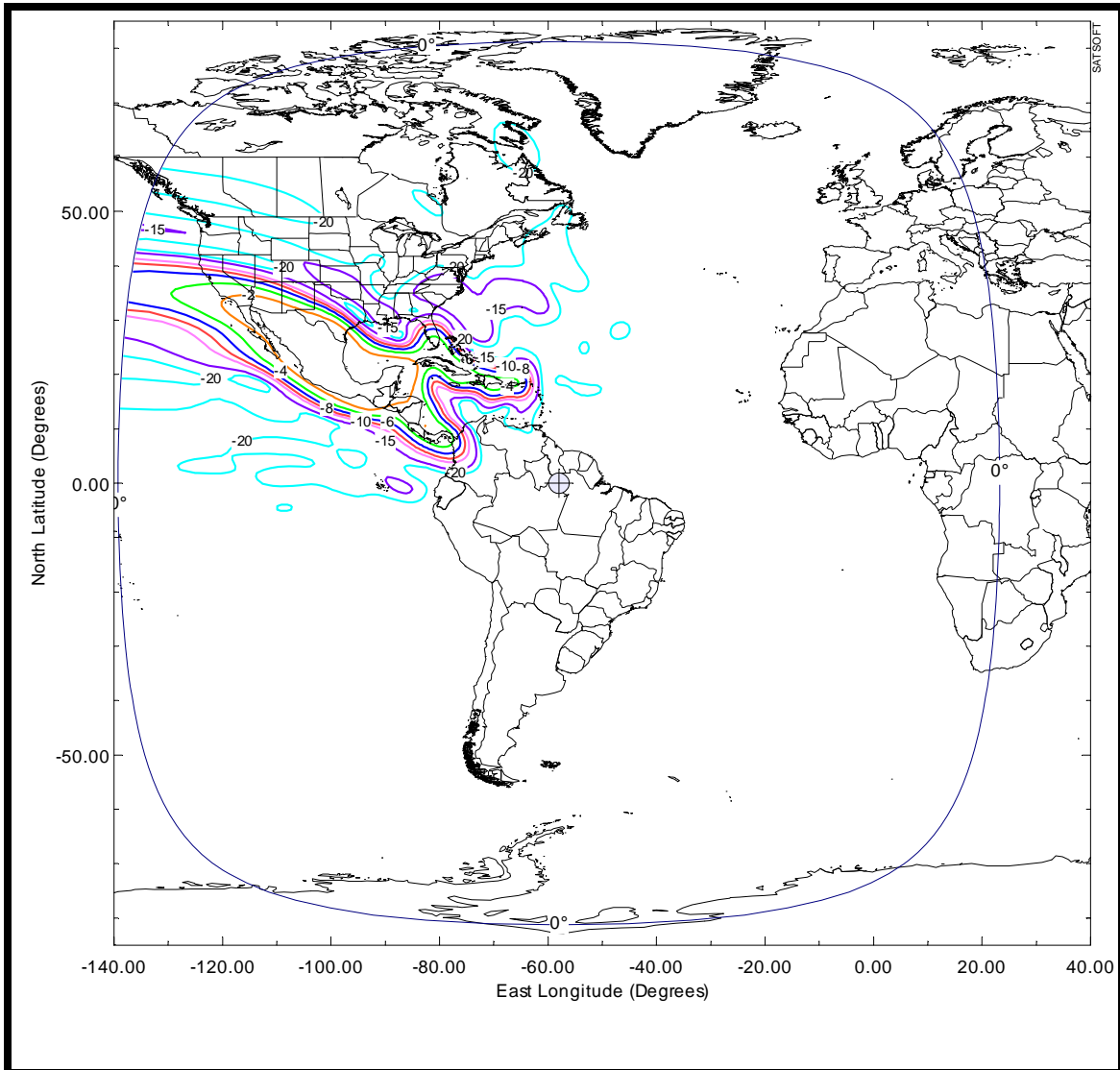


EXHIBIT 5A-11: BRAZIL TRANSMIT BEAM
(Schedule S Beam ID: BZVD)

Beam Polarization: Vertical
Peak Beam Gain: 30.7 dBi
Peak Beam EIRP: 51.5 dBW

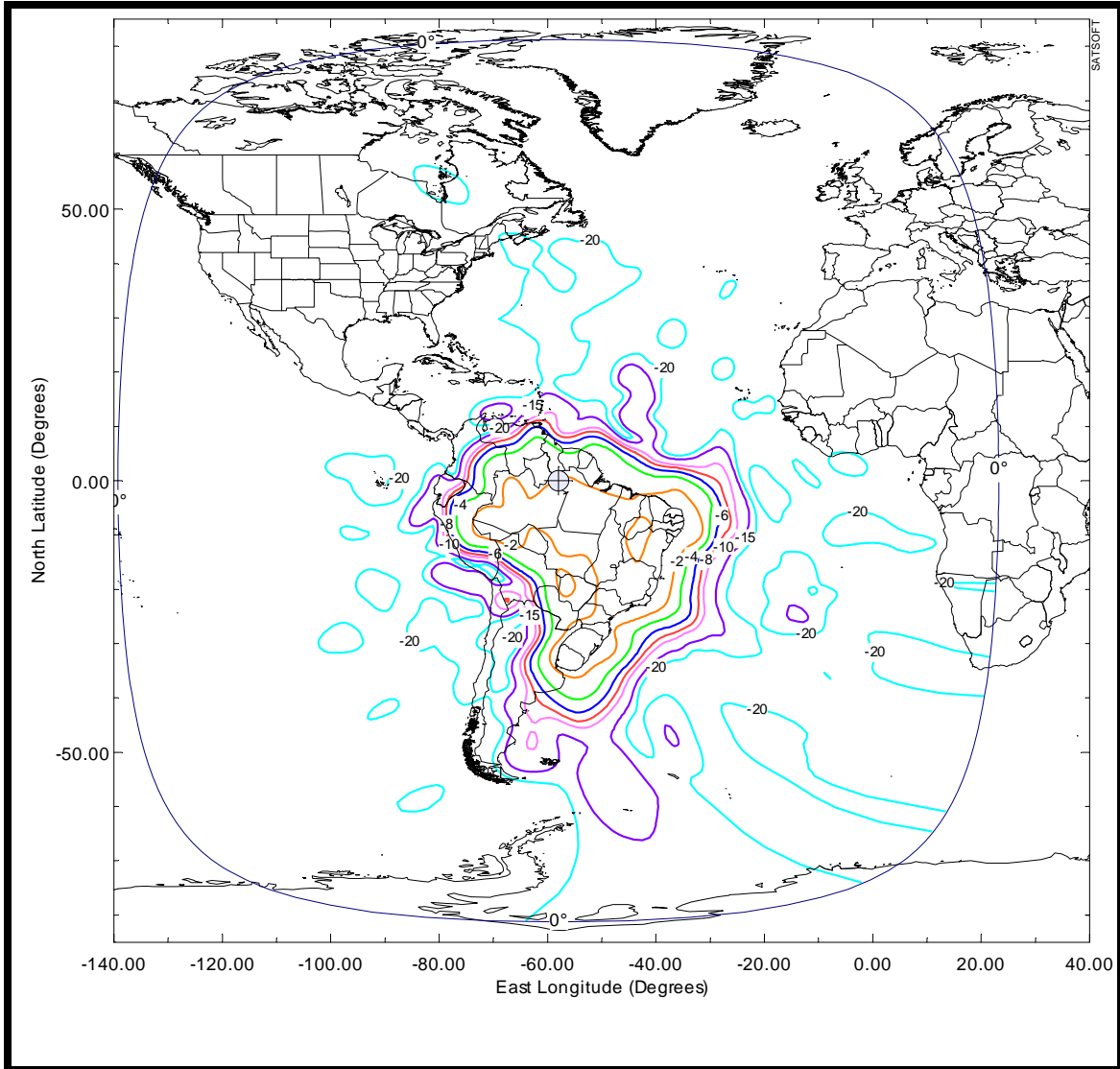


EXHIBIT 5A-12: MOBILITY TRANSMIT BEAM
(Schedule S Beam ID: MOHD)

Beam Polarization: Horizontal
Peak Beam Gain: 26.7 dBi
Peak Beam EIRP: 47.5 dBW

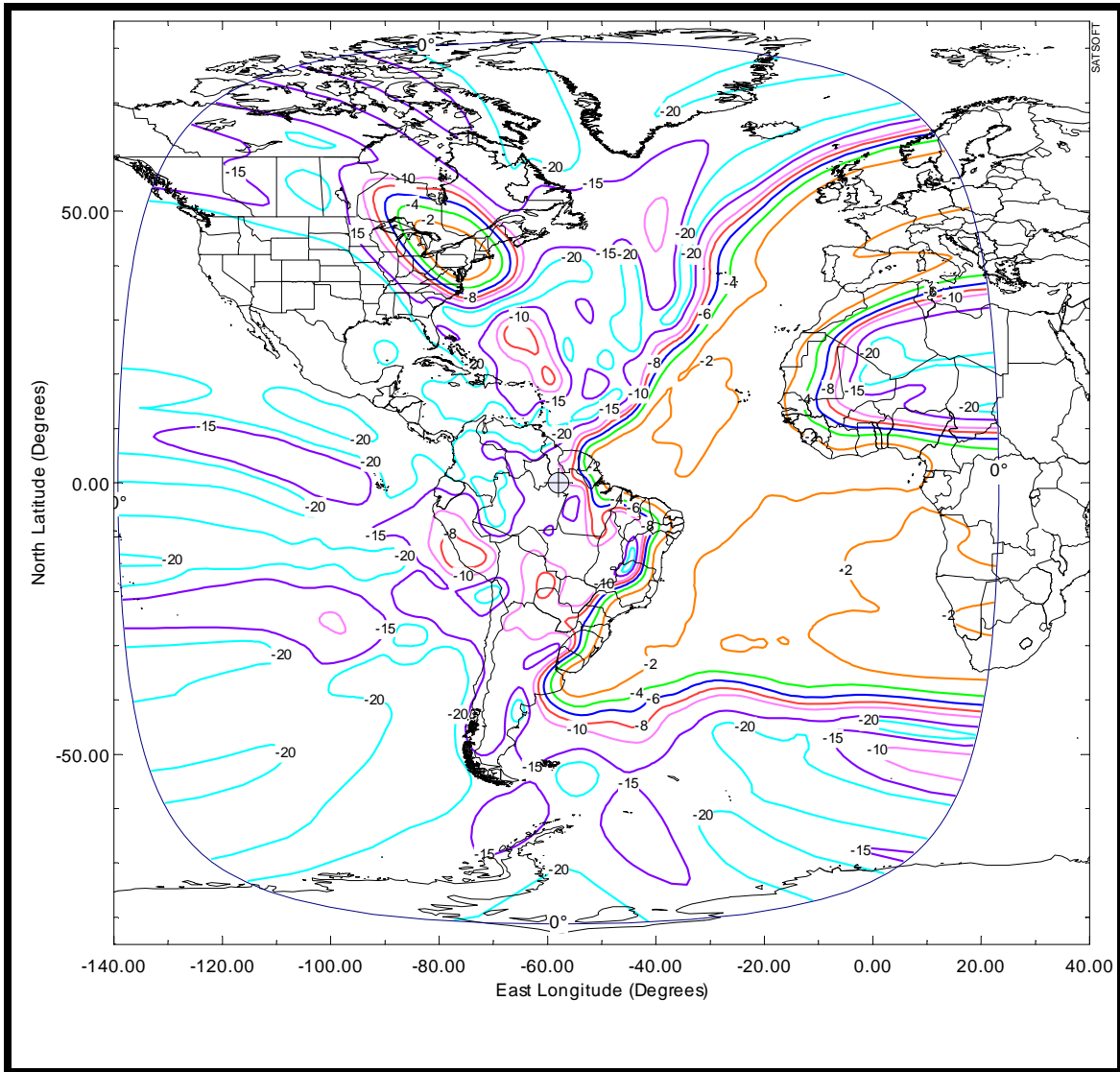


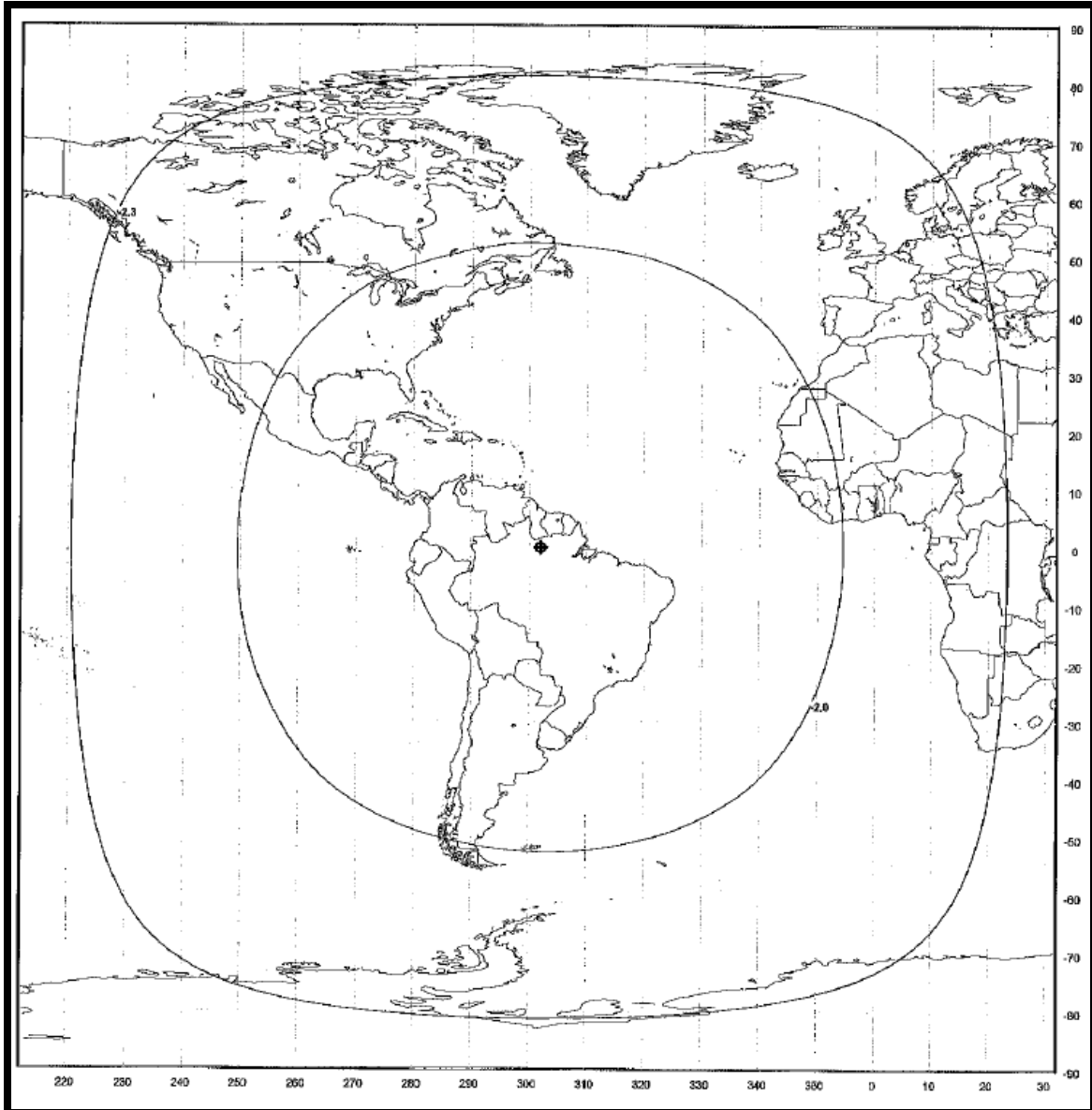
EXHIBIT 5B-1: COMMAND RECEIVE BEAM (Global Horn Antenna)
(Schedule S Beam ID: CMDG)

Beam Polarization: Horizontal

Peak Beam Gain: 19.1 dBi

Peak Beam G/T: -13 dB/K

Command Threshold Flux Density @ Peak Beam G/T: -105.8 dBW/m²



Relative Gain Contours Shown: -2, -2.3 dB

EXHIBIT 5B-2: COMMAND RECEIVE BEAM (Bicone Antenna)
(Schedule S Beam ID: CMDDB)

Beam Polarization: Horizontal

Peak Beam Gain: 11.3 dBi

Peak Beam G/T: -20.8 dB/K

Command Threshold Flux Density @ Peak Beam G/T: -97.6 dBW/m²



Relative Gain Contour Shown: -0.5 dB

EXHIBIT 5B-3: COMMAND RECEIVE BEAM (Pipe Antenna)
(Schedule S Beam ID: CMDP)

Beam Polarization: Left Hand Circular

Peak Beam Gain: 9.1 dBi

Peak Beam G/T: -23.5 dB/K

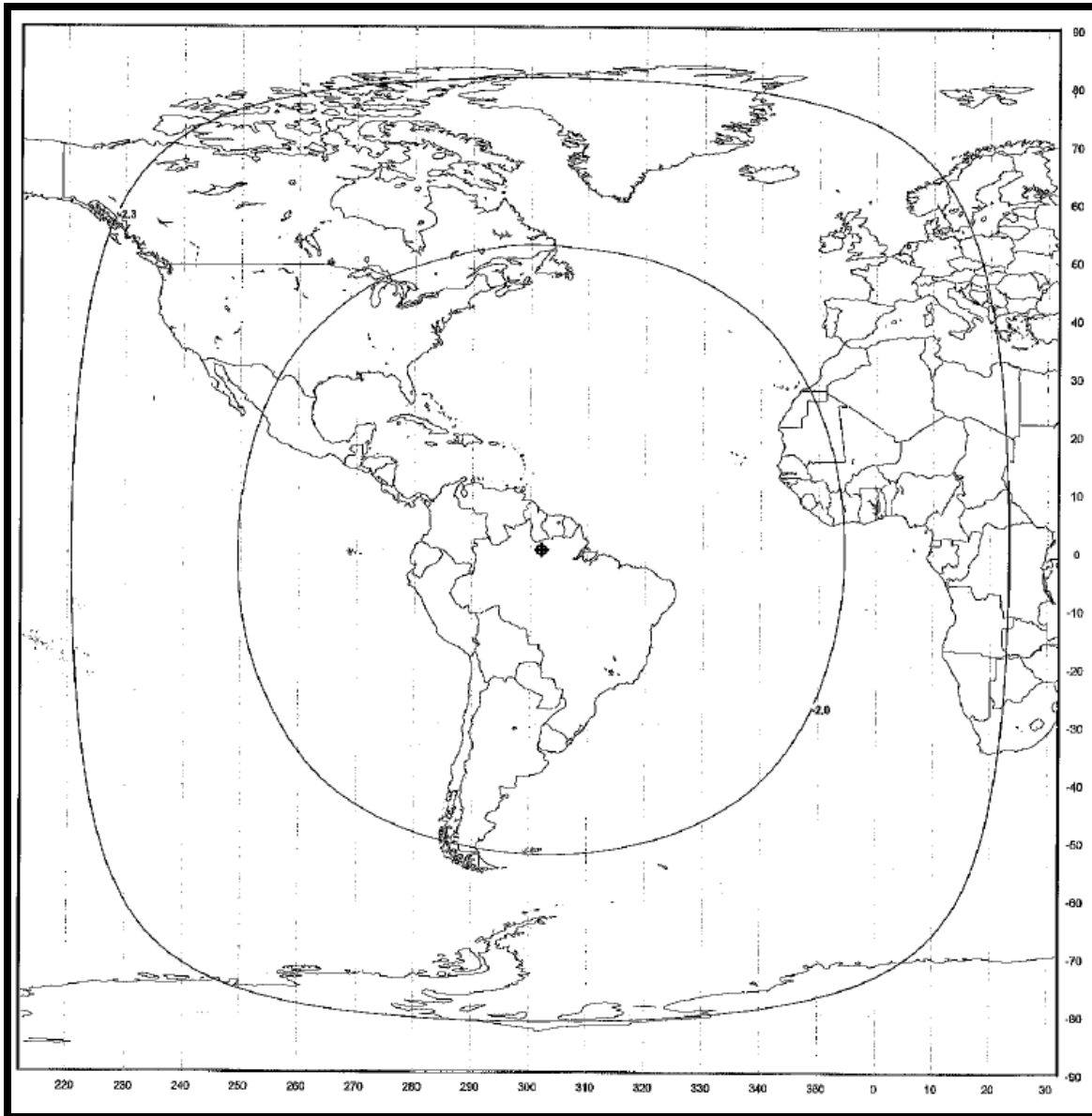
Command Threshold Flux Density @ Peak Beam G/T: -95.1 dBW/m²



Relative Gain Contour Shown: -0.5 dB

EXHIBIT 5B-4: TELEMETRY TRANSMIT BEAM (Global Horn Antenna)
(Schedule S Beam ID: TLMG)

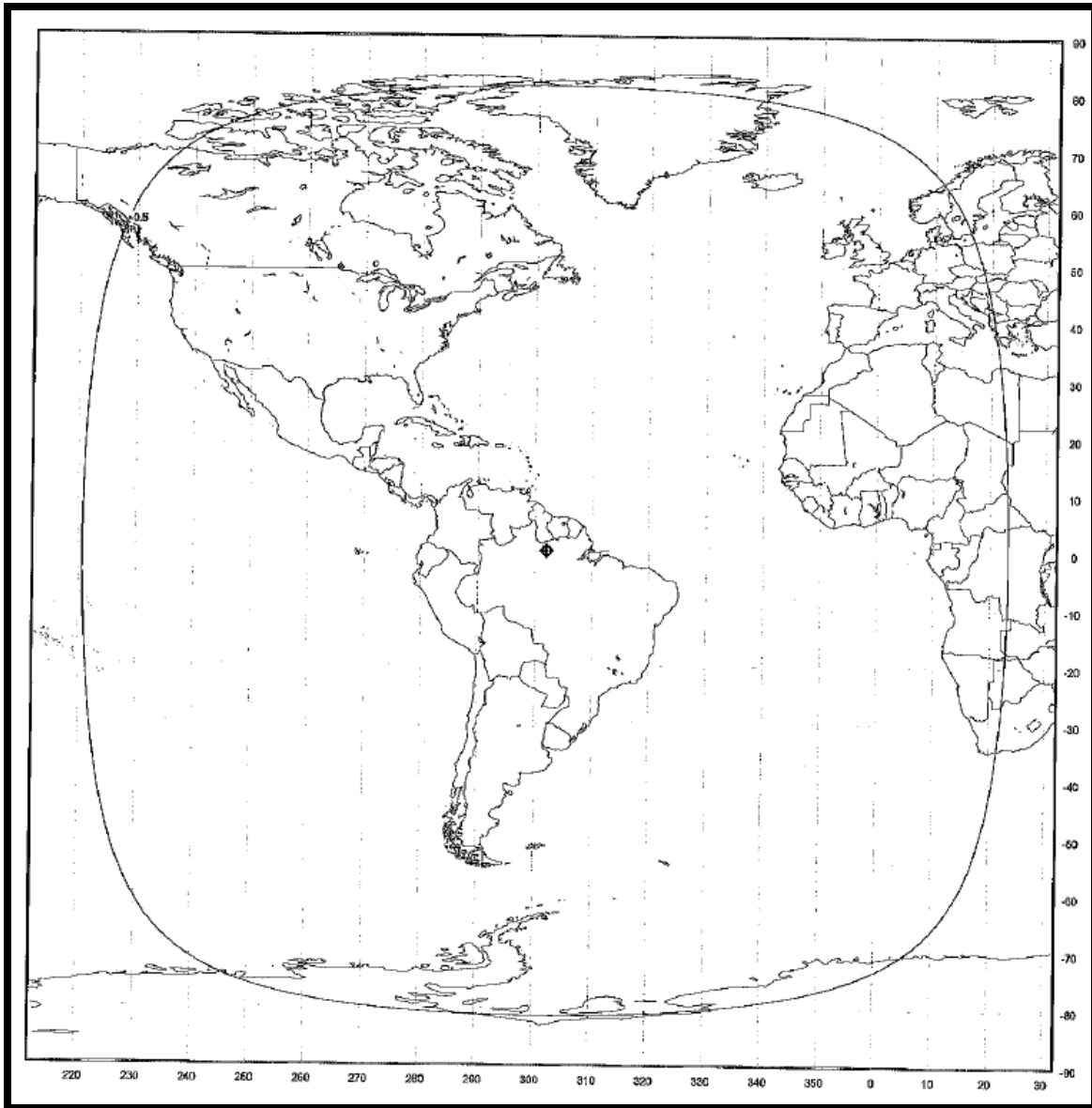
Beam Polarization: Vertical
Peak Beam Gain: 19.3 dBi
Peak Beam EIRP: 13.5 dBW



Relative Gain Contours Shown: -2, -2.3 dB

EXHIBIT 5B-5: TELEMETRY TRANSMIT BEAM (Bicone Antenna)
(Schedule S Beam ID: TLMB)

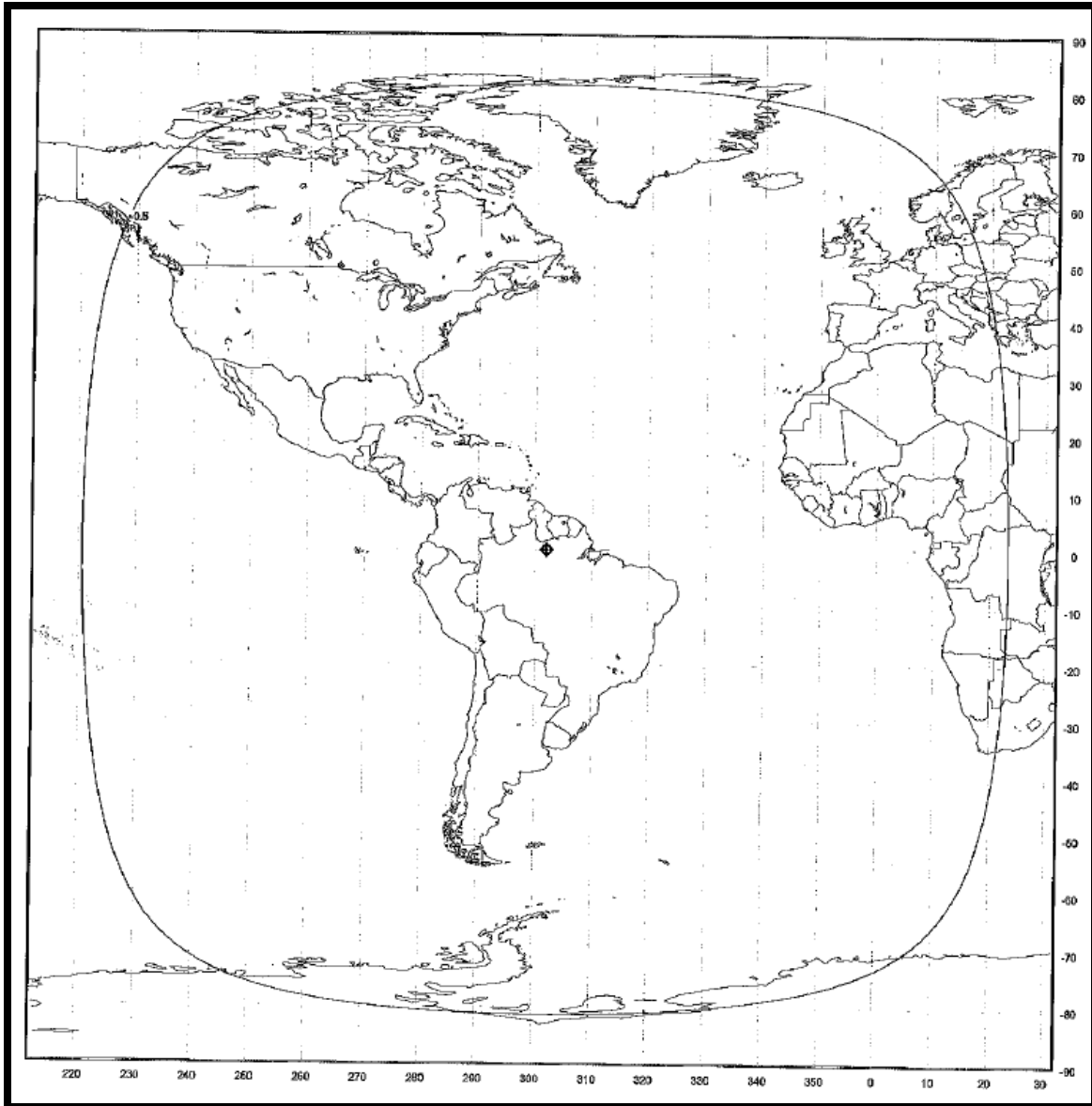
Beam Polarization: Vertical
Peak Beam Gain: 9.6 dBi
Peak Beam EIRP: 14.9 dBW



Relative Gain Contour Shown: -0.5 dB

EXHIBIT 5B-6: TELEMETRY TRANSMIT BEAM (Pipe Antenna)
(Schedule S Beam ID: TLMP)

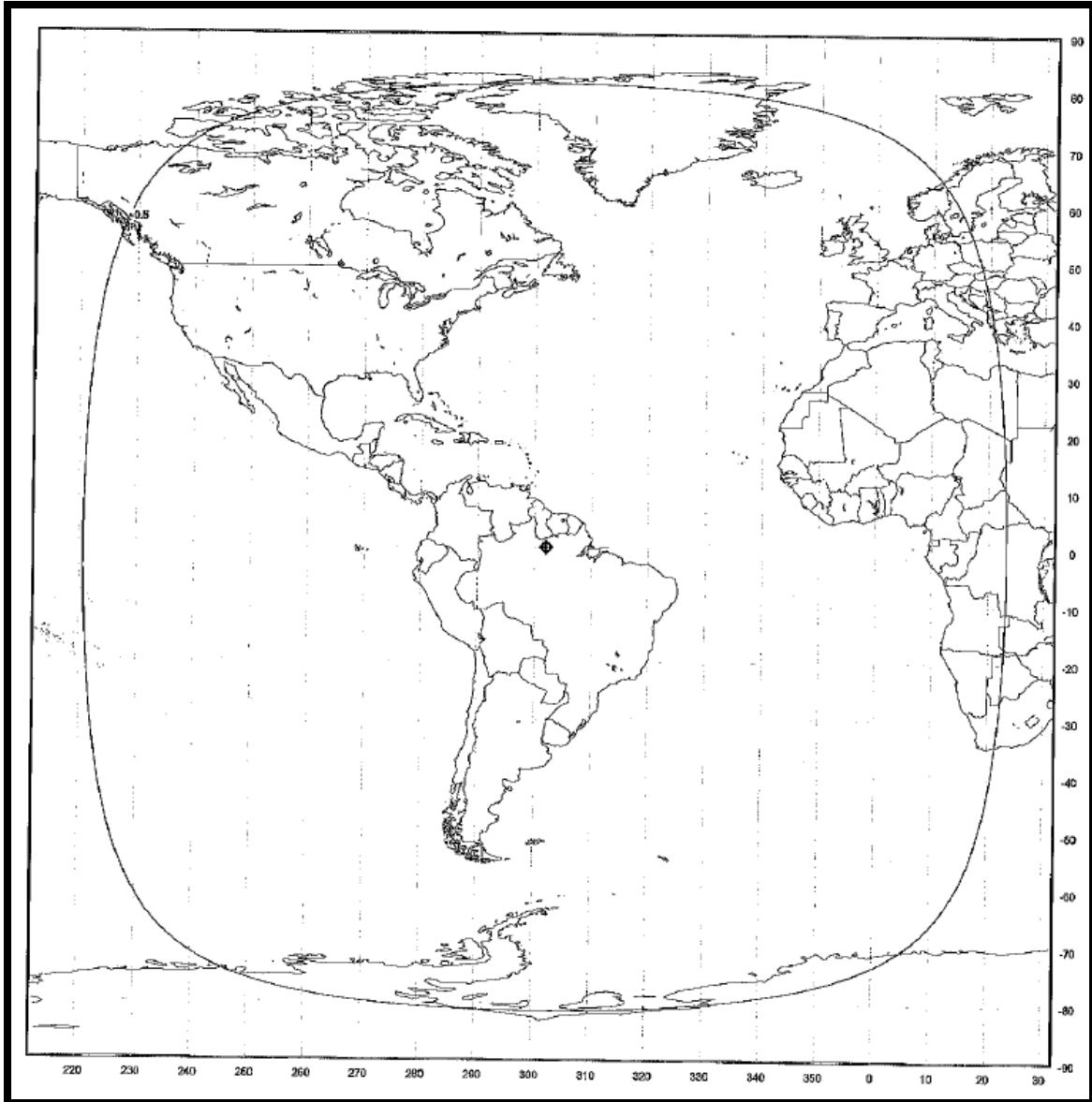
Beam Polarization: Left Hand Circular
Peak Beam Gain: 9.6 dBi
Peak Beam EIRP: 11.5 dBW



Relative Gain Contour Shown: -0.5 dB

EXHIBIT 5C-1: C-BAND ULPC TRANSMIT BEAM
(Schedule S Beam ID: UPCR)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 14.4 dBi
Peak Beam EIRP: 12.6 dBW



Relative Gain Contour Shown: -0.5 dB

EXHIBIT 5C-2: KU-BAND ULPC TRANSMIT BEAM
(Schedule S Beam ID: UPKH)

Beam Polarization: Horizontal
Peak Beam Gain: 19.3 dBi
Peak Beam EIRP: 17.5 dBW



Relative Gain Contour Shown: -0.5 dB

EXHIBIT 5C-3: Ku-BAND ULPC TRANSMIT BEAM
(Schedule S Beam ID: UPKV)

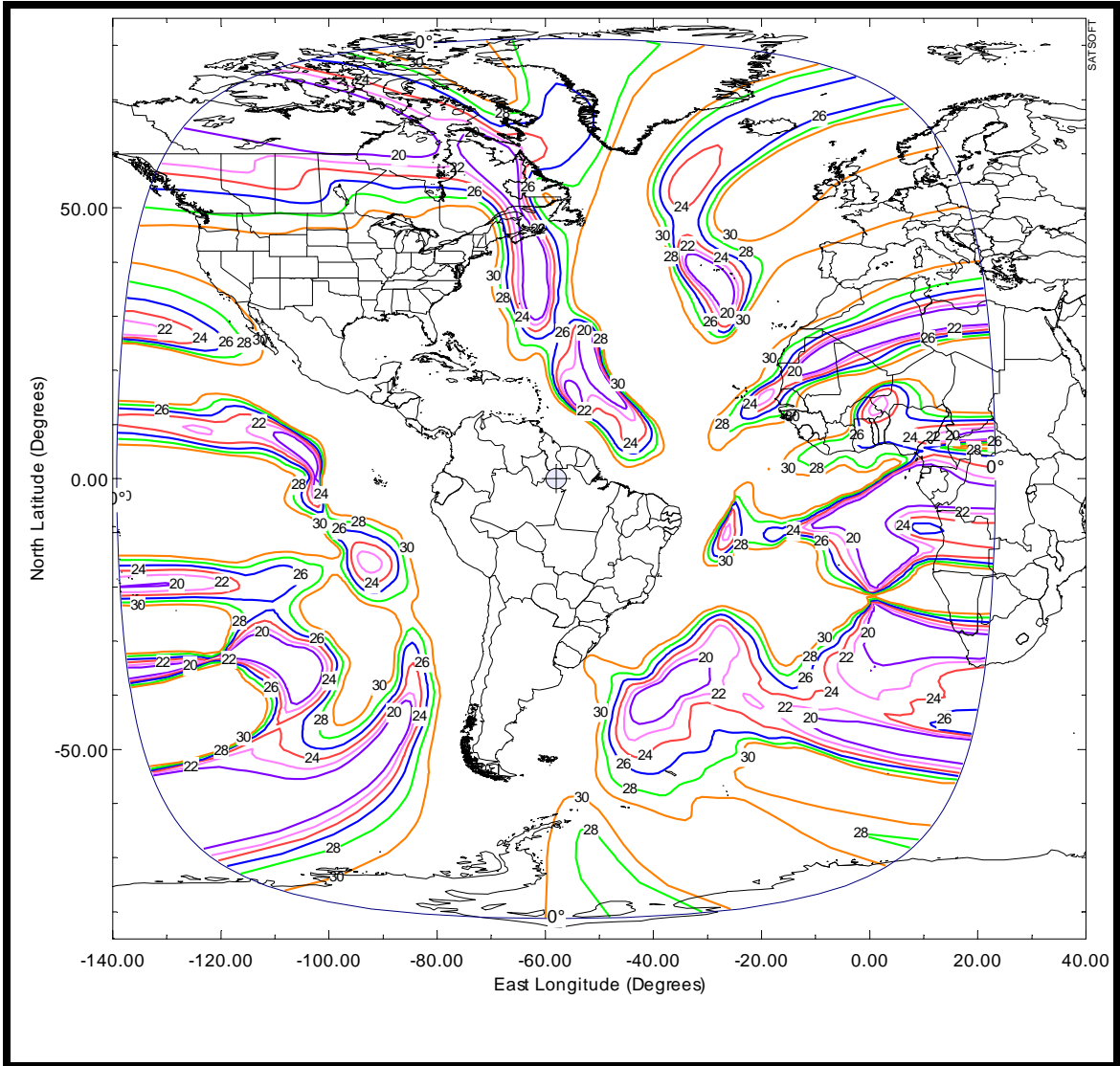
Beam Polarization: Vertical
Peak Beam Gain: 19.3 dBi
Peak Beam EIRP: 17.5 dBW



Relative Gain Contour Shown: -0.5 dB

EXHIBIT 5D: WEST HEMI UPLINK BEAM – Cross Polarization Contours
(Schedule S Beam ID: WHVU_XP)

Beam Polarization: Vertical



Absolute Cross-Polarization Isolation Contours Shown: 30, 28, 26, 24, 22, 20 dB

EXHIBIT 6: COMMUNICATION SUBSYSTEM
EIRP AND G/T BUDGETS

Beam Name	West Hemi	West Hemi	Mexico	Mexico
Frequency Band (MHz)	5925 – 6425	5925 - 6425	14000 - 14500	14000 - 14500
Polarization	Horizontal	Vertical	Horizontal	Vertical
Channel Bandwidth (MHz)	36	36	36	36
Antenna Noise Temperature (°Kelvin)	195	195	230	230
Receiver Noise Temperature (°Kelvin)	180	180	211	161
Total System Noise Temperature (°Kelvin)	375	375	441	391
Total System Noise Temperature (dB/K)	25.7	25.7	26.4	25.9
Peak Gain of Satellite Receive Antenna (dBi)	28.2	28.2	36.9	36.4
Peak G/T (dB/K)	2.5	2.5	10.5	10.5
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m²)	-108.5	-108.5	-108.5	-108.5
Beam Name	Brazil	Mobility		
Frequency Band (MHz)	14000 – 14500	14000 - 14240		
Polarization	Horizontal	Vertical		
Channel Bandwidth (MHz)	36	27 / 54		
Antenna Noise Temperature (°Kelvin)	255	175		
Receiver Noise Temperature (°Kelvin)	162	143		
Total System Noise Temperature (°Kelvin)	417	318		
Total System Noise Temperature (dB/K)	26.2	25.0		
Peak Gain of Satellite Receive Antenna (dBi)	31.7	27.8		
Peak G/T (dB/K)	5.5	2.8		
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m²)	-107.5	-102.8		

EXHIBIT 6: COMMUNICATION SUBSYSTEM
EIRP AND G/T BUDGETS (continued)

Beam Name	West Hemi	West Hemi	Mexico	Mexico
Frequency Band (MHz)	3700 – 4200	3700 – 4200	11700 – 12200	11700 – 12200
Polarization	Horizontal	Vertical	Horizontal	Vertical
Channel Bandwidth (MHz)	36	36	36	36
Maximum Power At The Output of Last Stage Amplifier (dBW)	18.7	18.7	21.8	21.8
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	1.4	1.4	0.8	1.2
Power Into Transmit Antenna (dBW)	17.3	17.3	21.0	20.6
Power Into Transmit Antenna (Watts)	53.5	54.2	125.3	115.9
Peak Gain of Satellite Transmit Antenna (dBi)	26.3	26.3	34.9	35.3
Maximum Downlink EIRP (dBW)	43.6	43.6	55.9	55.9
Beam Name	Brazil	Mobility		
Frequency Band (MHz)	11700 – 12200	11450 - 11700		
Polarization	Vertical	Horizontal		
Channel Bandwidth (MHz)	36	27 / 54		
Maximum Power At The Output of Last Stage Amplifier (dBW)	21.8	21.8		
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	1.0	1.0		
Power Into Transmit Antenna (dBW)	20.8	20.8		
Power Into Transmit Antenna (Watts)	119.7	119.7		
Peak Gain of Satellite Transmit Antenna (dBi)	30.7	26.7		
Maximum Downlink EIRP (dBW)	51.5	47.5		
Beam Name	UPC1	UPK1	UPK2	UPK3
Frequency Band (MHz)	4199.5	11450.25	11698.5	12199.25
Polarization	Right Hand Circular	Horizontal	Vertical	Horizontal
Channel Bandwidth (MHz)	0.025	0.025	0.025	0.025
Maximum Power At The Output of Last Stage Amplifier (dBW)	-1.0	-1.0	-1.0	-1.0
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	0.8	0.8	0.8	0.8
Power Into Transmit Antenna (dBW)	-1.8	-1.8	-1.8	-1.8
Power Into Transmit Antenna (Watts)	0.7	0.7	0.7	0.7
Peak Gain of Satellite Transmit Antenna (dBi)	14.4	19.3	19.3	19.3
Maximum Downlink EIRP (dBW)	12.6	17.5	17.5	17.5

EXHIBIT 7: TC&R SUBSYSTEM CHARACTERISTICS

	Spacecraft Antenna		
	Global	Bicone	Pipes
Command Frequency (MHz) / Polarization <small>(see note)</small>			
Transfer Orbit / Emergency	n/a	13994.5 (H)	13750.5 (LHCP)
On-Station	13994.5 (H)	n/a	n/a
Command Modulation	FM	FM	FM
Bandwidth of Command Carrier (kHz)			
Occupied Bandwidth	856	856	856
Allocated Bandwidth	1000	1000	1000
Command Threshold (dBW/m²)			
Beam Peak	-105.8	-97.6	-95.1
Edge of Coverage	-103.5	-97.1	-94.6
Command G/T (dB/K)			
Beam Peak	-13.0	-20.8	-23.5
Edge of Coverage	-15.3	-21.3	-24.0
Telemetry Frequency (MHz) / Polarization <small>(see note)</small>			
Transfer Orbit / Emergency	n/a	11451.25 (V) 11451.75 (V) 11453.25 (V) 11453.75 (V)	11451.25 (LHCP) 11451.75 (LHCP) 11453.25 (LHCP) 11453.75 (LHCP)
On-Station	11451.25 (V) 11451.75 (V) 11453.25 (V) 11453.75 (V)	n/a	n/a
Telemetry Modulation	PM	PM	PM
Bandwidth of Telemetry Carrier (kHz)			
Occupied	300	300	300
Allocated	500	500	500
Telemetry EIRP			
Beam Peak	13.5	14.9	11.5
Edge of Coverage	11.2	14.4	11.0
On-Station Ranging Accuracy (meters)	≤ 20	≤ 20	≤ 20

Note:

H: Horizontal Polarization

V: Vertical Polarization

RHCP: Right Hand Circular Polarization

LHCP: Left Hand Circular Polarization

EXHIBIT 8: TC&R SUBSYSTEM EIRP and G/T BUDGETS

Operating Mode	On-Station	Back-up	Back-up
Antenna Type	Global Horn	Bicone	Pipes
Frequency (MHz)	13994.5	13994.5	13750.5
Polarization	Horizontal	Horizontal	Left Hand Circular
Antenna Noise Temperature (°Kelvin)	290	290	290
Receiver Noise Temperature (°Kelvin)	1326	1341	1527
Total System Noise Temperature (°Kelvin)	1616	1631	1817
Total System Noise Temperature (dB/K)	32.1	32.1	32.6
Peak Gain of Satellite Receive Antenna (dBi)	19.1	11.3	9.1
Peak G/T (dB/K) <small>(see Note 1)</small>	-13.0	-20.8	-23.5
SFD Threshold at Peak G/T (dBW/m²) <small>(see Note 2)</small>	-105.8	-97.6	-95.1
Operating Mode	On-Station	Back-up	Back-up
Antenna Type	Global Horn	Bicone	Pipes
Frequency (MHz)	11451.25 11451.75 11453.25 11453.75	11451.25 11451.75 11453.25 11453.75	11451.25 11451.75 11453.25 11453.75
Polarization	Vertical	Vertical	Left Hand Circular
Maximum Power At The Output of Last Stage Amplifier (dBW)	-2.0	6.0	6.0
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	3.8	0.7	4.1
Power Into The Transmit Antenna (dBW)	-5.8	5.3	1.9
Power Into The Transmit Antenna (Watts)	0.3	3.4	1.6
Peak Gain of Satellite Transmit Antenna (dBi)	19.3	9.6	9.6
Maximum Downlink EIRP (dBW)	13.5	14.9	11.5

EXHIBIT 9: EMISSION DESIGNATORS

Signal Type	Emission Designator	Allocated Bandwidth (kHz)
Analog TV/FM Carrier	36M0F3F	36000
Analog TV/FM Carrier	24M0F3F	24000
64 kbps Carrier	100KG7W	100
128 kbps Carrier	400KG7W	400
512 kbps Carrier	1M45G7W	1450
6000 kbps carrier	10M3G7W	10300
18431 kbps carrier	27M0G7W	27000
24575 kbps Carrier	36M0G7W	36000
36862 kbps Carrier	54M0G7W	54000

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS

FREQUENCY BAND : 3700 - 4200 MHz							
West Hemi Beam (H) - 36M0F3F							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	41.4*	41.3*	43.6	43.6	43.6	43.6	43.6
Carrier Occupied Bandwidth (kHz)	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-152.0	-152.0	-149.6	-149.4	-149.3	-149.2	-148.5
FCC Limit (dBW/m ² /4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	0.0	0.0	0.1	2.4	4.8	7.2	6.5
West Hemi Beam (H) - 36M0G7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	43.6	43.6	43.6	43.6	43.6	43.6	43.6
Carrier Occupied Bandwidth (kHz)	30133.0	30133.0	30133.0	30133.0	30133.0	30133.0	30133.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-158.6	-158.4	-158.3	-158.2	-158.1	-158.0	-157.2
FCC Limit (dBW/m ² /4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	6.6	6.4	8.8	11.2	13.6	16.0	15.2

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 3700 – 4200 MHz							
West Hemi Beam (V) - 36M0F3F							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	41.4*	41.3*	43.6	43.6	43.6	43.6	43.6
Carrier Occupied Bandwidth (kHz)	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-152.0	-152.0	-149.6	-149.4	-149.3	-149.2	-148.5
FCC Limit (dBW/m ² /4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	0.0	0.0	0.1	2.4	4.8	7.2	6.5
West Hemi Beam (V) - 36M0G7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	43.6	43.6	43.6	43.6	43.6	43.6	43.6
Carrier Occupied Bandwidth (kHz)	30133.0	30133.0	30133.0	30133.0	30133.0	30133.0	30133.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-158.6	-158.4	-158.3	-158.2	-158.1	-158.0	-157.2
FCC Limit (dBW/m ² /4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	6.6	6.4	8.8	11.2	13.6	16.0	15.2

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 3700 – 4200 MHz							
C-Band ULPC Beam (RHCP) - 25K0G7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	12.6	12.6	12.6	12.6	12.6	12.6	12.6
Carrier Occupied Bandwidth (kHz)	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-158.7	-158.6	-158.5	-158.4	-158.3	-158.2	-157.4
FCC Limit (dBW/m ² /4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	6.7	6.6	9.0	11.4	13.8	16.2	15.4

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11450 - 11700 MHz							
Mobility Beam (H) - 24M0F3F							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	43.4*	43.3*	45.7*	47.5	47.5	47.5	47.5
Carrier Occupied Bandwidth (kHz)	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-150.0	-150.0	-147.5	-145.5	-145.4	-145.3	-144.6
FCC Limit (dBW/m ² /4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	0.5	2.9	5.3	4.6
Mobility Beam (H) - 27MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	47.5	47.5	47.5	47.5	47.5	47.5	47.5
Carrier Occupied Bandwidth (kHz)	22600.0	22600.0	22600.0	22600.0	22600.0	22600.0	22600.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-153.4	-153.3	-153.2	-153.1	-153.0	-152.8	-152.1
FCC Limit (dBW/m ² /4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	3.4	3.3	5.7	8.1	10.5	12.8	12.1

FREQUENCY BAND : 11450 - 11700 MHz

FREQUENCY BAND : 11450 - 11700 MHz							
Brazil Beam (V) - 24M0F3F							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	43.4*	43.3*	45.7*	48.0*	50.4*	51.5	51.5
Carrier Occupied Bandwidth (kHz)	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-150.0	-150.0	-147.5	-145.0	-142.5	-141.3	-140.6
FCC Limit (dBW/m ² /4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	0.0	0.0	1.3	0.6
Brazil Beam (V) - 27MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	50.9*	50.8*	51.5	51.5	51.5	51.5	51.5
Carrier Occupied Bandwidth (kHz)	22600.0	22600.0	22600.0	22600.0	22600.0	22600.0	22600.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-150.0	-150.0	-149.2	-149.1	-149.0	-148.8	-148.1
FCC Limit (dBW/m ² /4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	1.7	4.1	6.5	8.8	8.1

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11450 - 11700 MHz							
ULPC Beam (H) - 25K0G7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Carrier Occupied Bandwidth (kHz)	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-153.8	-153.7	-153.6	-153.5	-153.4	-153.3	-152.5
FCC Limit (dBW/m ² /4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	3.8	3.7	6.1	8.5	10.9	13.3	12.5
ULPC Beam (V) - 25K0G7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Carrier Occupied Bandwidth (kHz)	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-153.8	-153.7	-153.6	-153.5	-153.4	-153.3	-152.5
FCC Limit (dBW/m ² /4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	3.8	3.7	6.1	8.5	10.9	13.3	12.5

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11450 - 11700 MHz							
Global Horn Telemetry Beam (V) – 300KG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Carrier Occupied Bandwidth (kHz)	300.0	300.0	300.0	300.0	300.0	300.0	300.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-168.6	-168.5	-168.4	-168.3	-168.2	-168.1	-167.3
FCC Limit (dBW/m ² /4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	18.6	18.5	20.9	23.3	25.7	28.1	27.3
Bicone Antenna Telemetry Beam (V) – 300KG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	14.9	14.9	14.9	14.9	14.9	14.9	14.9
Carrier Occupied Bandwidth (kHz)	300.0	300.0	300.0	300.0	300.0	300.0	300.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-167.2	-167.1	-167.0	-166.9	-166.8	-166.7	-165.9
FCC Limit (dBW/m ² /4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	17.2	17.1	19.5	21.9	24.3	26.7	25.9

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11450 - 11700 MHz							
Pipe Antenna Telemetry Beam (LHCP) – 300KG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Carrier Occupied Bandwidth (kHz)	300.0	300.0	300.0	300.0	300.0	300.0	300.0
Spreading Loss (dB/m ²)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m ² /4kHz)	-170.6	-170.5	-170.4	-170.3	-170.2	-170.1	-169.3
FCC Limit (dBW/m ² /4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	20.6	20.5	22.9	25.3	27.7	30.1	29.3

* This is the maximum allowable EIRP level at the specified elevation angle. The actual EIRP level of the carrier 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.

EXHIBIT 11: RECEIVE AND TRANSMIT SECTION FILTER RESPONSE CHARACTERISTICS

Frequency Offset Relative to Channel Center Frequency (MHz)	Attenuation Relative To Peak Level (dB)		
	Input Section	Output Section	Total
C-Band: 36 MHz Channel			
±8	0.20	0.20	0.33
±12	0.27	0.34	0.50
±14	0.33	0.40	0.60
±16	0.49	0.57	0.91
±18	0.81	1.40	2.04
Ku-Band: 27 MHz Channel			
±6	0.26	0.24	0.44
±9	0.34	0.49	0.74
±10.5	0.46	0.76	1.11
±12	0.93	1.31	2.13
±13.5	2.29	3.16	5.32
Ku-Band: 36 MHz Channel			
±8	0.17	0.23	0.33
±12	0.24	0.42	0.55
±14	0.41	0.60	0.88
±16	0.75	1.00	1.62
±18	1.69	2.48	4.02
Ku-Band: 54 MHz Channel			
±12	0.26	0.20	0.38
±18	0.36	0.39	0.63
±21	0.42	0.53	0.80
±24	0.62	0.88	1.34
±27	1.10	2.51	3.43

EXHIBIT 12: INTELSAT 21 LINK BUDGETS

UPLINK BEAM INFORMATION				
Uplink Beam Name	W HEMI	W HEMI	W HEMI	W HEMI
Uplink Frequency (GHz)	6.175	6.175	6.175	6.175
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0
Uplink Contour G/T (dB/K)	-5.5	-5.5	-5.5	-5.5
Uplink SFD (dBW/m2)	-83.5	-90.5	-83.5	-83.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	W HEMI	W HEMI	W HEMI	W HEMI
Downlink Frequency (GHz)	3.950	3.950	3.950	3.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0
Downlink Contour EIRP (dBW)	35.6	35.6	35.6	35.6
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	56.0W	56.0W	56.0W	56.0W
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)	-39.2	-39.2	-39.2	-39.2
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	60.0W	60.0W	60.0W	60.0W
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)	-39.2	-39.2	-39.2	-39.2
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)	13.0	6.1	6.1	6.1
Earth Station Gain (dBi)	56.4	49.4	49.4	49.4
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	6.1	3.0	3.0	3.0
Earth Station Gain (dBi)	46.5	39.7	39.7	39.7
Earth Station G/T (dB/K)	26.2	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)	79.4	72.4	67.6	47.1
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	-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)	26.7	20.5	22.2	21.3
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	35.6	35.6	28.5	8.0
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)	26.2	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)	18.0	11.8	11.1	10.2
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	26.7	20.5	22.2	21.3
C/N Downlink (dB)	18.0	11.8	11.1	10.2
C/I Intermodulation (dB)	N/A	N/A	20.2	19.4
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.8	25.5
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.8	25.5
C/I Uplink Adjacent Satellite 1 (dB)	16.5	10.3	12.0	11.1
C/I Downlink Adjacent Satellite 1 (dB)	23.3	11.2	10.5	9.6
C/I Uplink Adjacent Satellite 2 (dB)	16.5	10.3	12.0	11.1
C/I Downlink Adjacent Satellite 2 (dB)	25.1	19.9	19.3	18.4
C/(N+I) Composite (dB)	11.1	4.5	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.1	3.5	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.1	.1	0.0	0.0
Number of Carriers	1	1.0	2.3	254.2
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-43.0	-51.8	-50.1	-51.0
Downlink EIRP Density At Beam Peak (dBW/Hz)	-22.4	-31.2	-31.9	-32.7

EXHIBIT 12: INTELSAT 21 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO
Uplink Frequency (GHz)	14.250	14.250	14.250	14.250	14.250	14.250
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	4.5	4.5	4.5	4.5	4.5	4.5
Uplink SFD (dBW/m2)	-86.5	-74.5	-77.5	-77.5	-77.5	-77.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO
Downlink Frequency (GHz)	11.950	11.950	11.950	11.950	11.950	11.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	49.9	49.9	49.9	49.9	49.9	49.9
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	56.0W	56.0W	56.0W	56.0W	56.0W	56.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.9	-24.9	-24.9	-24.9	-24.9	-24.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	60.0W	60.0W	60.0W	60.0W	60.0W	60.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.9	-24.9	-24.9	-24.9	-24.9	-24.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100K67W	1M45G7W	400K67W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	49.0
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	2.4	3.0	2.4	2.4	6.1
Earth Station Gain (dBi)	47.5	47.5	49.2	47.5	47.5	55.5
Earth Station G/T (dB/K)	25.0	25.0	26.7	25.0	25.0	33.1
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)	76.4	75.4	67.1	47.6	59.6	51.5
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	4.5	4.5	4.5	4.5	4.5	4.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	26.5	26.2	24.5	24.4	24.4	22.2
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	49.9	42.8	36.3	16.8	28.8	20.6
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	25.0	25.0	26.7	25.0	25.0	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	21.5	15.1	16.8	15.1	15.0	21.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	26.5	26.2	24.5	24.4	24.4	22.2
C/N Downlink (dB)	21.5	15.1	16.8	15.1	15.0	21.0
C/I Intermodulation (dB)	N/A	N/A	13.8	13.8	13.7	11.6
C/I Uplink Co-Channel (dB)*	24.0	24.0	19.4	20.0	20.4	17.8
C/I Downlink Co-Channel (dB)*	24.0	24.0	19.4	20.0	20.4	17.8
C/I Uplink Adjacent Satellite 1 (dB)	21.8	21.6	19.8	19.8	19.7	17.6
C/I Downlink Adjacent Satellite 1 (dB)	24.4	18.1	20.0	18.1	18.0	24.4
C/I Uplink Adjacent Satellite 2 (dB)	21.8	21.6	19.8	19.8	19.7	17.6
C/I Downlink Adjacent Satellite 2 (dB)	26.0	19.7	21.2	19.7	19.6	25.0
C/(N+I) Composite (dB)	14.4	10.9	9.0	8.4	8.4	8.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.4	9.9	8.0	7.4	7.4	7.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.4	6.5	4.1	4.4	4.0	3.6
Number of Carriers	1	1.0	3.5	360.0	24.8	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-46.5	-56.3	-58.1	-58.1	-58.2	-52.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-10.1	-26.0	-26.0	-26.0	-26.1	-28.2

EXHIBIT 12: INTELSAT 21 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Uplink Frequency (GHz)	14.250	14.250	14.250	14.250	14.250	14.250
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Uplink SFD (dBW/m2)	-82.5	-75.5	-81.5	-81.5	-81.5	-81.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Downlink Frequency (GHz)	11.950	11.950	11.950	11.950	11.950	11.950
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)	47.5	47.5	47.5	47.5	47.5	47.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	56.0W	56.0W	56.0W	56.0W	56.0W	56.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	60.0W	60.0W	60.0W	60.0W	60.0W	60.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	46.4
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	47.5	44.8	44.8	44.8	44.8	55.5
Earth Station G/T (dB/K)	25.0	22.3	22.3	22.3	22.3	33.1
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)	80.4	79.0	67.5	47.4	59.4	48.8
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.5	26.8	21.8	21.3	21.1	16.6
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	47.5	44.8	38.2	18.2	30.2	19.6
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	25.0	22.3	22.3	22.3	22.3	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.1	14.5	14.4	13.9	13.7	20.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.5	26.8	21.8	21.3	21.1	16.6
C/N Downlink (dB)	19.1	14.5	14.4	13.9	13.7	20.0
C/I Intermodulation (dB)	N/A	N/A	18.1	17.7	17.5	13.0
C/I Uplink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.2	19.2
C/I Downlink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.2	19.2
C/I Uplink Adjacent Satellite 1 (dB)	27.8	27.2	22.2	21.7	21.5	17.0
C/I Downlink Adjacent Satellite 1 (dB)	21.1	16.2	16.1	15.7	15.5	22.4
C/I Uplink Adjacent Satellite 2 (dB)	27.8	27.2	22.2	21.7	21.5	17.0
C/I Downlink Adjacent Satellite 2 (dB)	22.7	18.3	18.2	17.8	17.6	23.1
C/(N+I) Composite (dB)	14.1	10.5	9.3	8.8	8.7	8.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.1	9.5	8.3	7.8	7.7	7.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.1	6.2	4.4	4.8	4.3	3.6
Number of Carriers	1	1.0	3.5	360.0	24.0	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.5	-52.7	-57.7	-58.2	-58.4	-52.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.5	-26.0	-26.1	-26.5	-26.7	-31.2

EXHIBIT 12: INTELSAT 21 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-79.8	-83.8	-83.8	-83.8	-83.8	-83.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	56.0W	56.0W	56.0W	56.0W	56.0W	56.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	60.0W	60.0W	60.0W	60.0W	60.0W	60.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	27M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	18431	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	22600	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	27000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	9.0	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	60.1	56.8	56.8	56.8	56.8	48.9
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	4.6	1.8	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	53.2	44.5	47.2	47.2	47.2	55.2
Earth Station G/T (dB/K)	30.7	22.0	24.7	24.7	24.7	32.8
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)	83.1	79.1	67.8	47.9	59.9	50.4
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.3	23.6	17.5	17.2	17.0	13.5
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.5	41.5	34.9	15.0	27.0	17.5
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	30.7	22.0	24.7	24.7	24.7	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	20.8	12.4	13.7	13.4	13.2	17.9
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.3	23.6	17.5	17.2	17.0	13.5
C/N Downlink (dB)	20.8	12.4	13.7	13.4	13.2	17.9
C/I Intermodulation (dB)	N/A	N/A	19.6	19.2	19.0	15.6
C/I Uplink Co-Channel (dB)*	24.5	24.0	25.1	25.4	25.7	21.8
C/I Downlink Co-Channel (dB)*	24.5	24.0	25.1	25.4	25.7	21.8
C/I Uplink Adjacent Satellite 1 (dB)	30.3	26.6	20.5	20.2	20.0	16.5
C/I Downlink Adjacent Satellite 1 (dB)	25.0	15.9	17.5	17.2	17.0	22.0
C/I Uplink Adjacent Satellite 2 (dB)	30.3	26.6	20.5	20.2	20.0	16.5
C/I Downlink Adjacent Satellite 2 (dB)	25.8	18.0	19.1	18.7	18.6	22.6
C/(N+I) Composite (dB)	16.0	9.4	9.0	8.7	8.6	8.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	15.0	8.4	8.0	7.7	7.6	7.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	5.0	5.0	4.2	4.7	4.2	3.6
Number of Carriers	1	1.0	2.0	197.2	12.6	67.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-43.0	-51.3	-57.3	-57.6	-57.8	-53.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.5	-26.0	-27.4	-27.7	-27.9	-31.4

EXHIBIT 12: INTELSAT 21 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-70.8	-82.8	-77.8	-77.8	-77.8	-77.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	56.0W	56.0W	56.0W	56.0W	56.0W	56.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	60.0W	60.0W	60.0W	60.0W	60.0W	60.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	54M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	36862	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	45200	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	54000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	3.7
Earth Station Gain (dBi)	56.8	56.8	56.8	56.8	56.8	52.6
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	9.0	2.4	3.0	3.0	3.7	6.1
Earth Station Gain (dBi)	58.7	47.2	48.9	48.9	50.8	55.2
Earth Station G/T (dB/K)	36.3	24.7	26.4	26.4	28.3	32.8
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)	80.9	80.1	71.5	51.4	61.9	53.6
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-76.6	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	25.1	21.5	21.2	20.6	19.0	16.7
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	35.3	41.5	32.5	12.5	23.0	14.7
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	36.3	24.7	26.4	26.4	28.3	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-76.6	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	20.3	12.1	13.1	12.6	12.9	15.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	25.1	21.5	21.2	20.6	19.0	16.7
C/N Downlink (dB)	20.3	12.1	13.1	12.6	12.9	15.0
C/I Intermodulation (dB)	N/A	N/A	20.2	19.7	18.1	15.8
C/I Uplink Co-Channel (dB)*	24.5	24.0	25.8	25.8	24.7	22.0
C/I Downlink Co-Channel (dB)*	24.5	24.0	25.8	25.8	24.7	22.0
C/I Uplink Adjacent Satellite 1 (dB)	28.1	24.6	24.2	23.7	22.0	19.7
C/I Downlink Adjacent Satellite 1 (dB)	24.6	15.9	17.0	16.5	16.9	17.2
C/I Uplink Adjacent Satellite 2 (dB)	28.1	24.6	24.2	23.7	22.0	19.7
C/I Downlink Adjacent Satellite 2 (dB)	25.0	17.4	18.3	17.8	18.0	17.8
C/(N+I) Composite (dB)	15.3	8.9	9.4	8.9	8.7	8.3
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	14.3	7.9	8.4	7.9	7.7	7.3
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.3	4.6	4.5	4.9	4.3	3.9
Number of Carriers	2	1.0	3.5	353.0	31.4	135.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-41.9	-53.3	-53.7	-54.2	-55.8	-53.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-24.7	-29.1	-29.8	-30.3	-31.9	-34.2

EXHIBIT 12: INTELSAT 21 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Uplink Frequency (GHz)	14.360	14.360	14.360	14.360	14.360	14.360
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Uplink SFD (dBW/m2)	-82.5	-82.5	-85.5	-85.5	-85.5	-85.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	12.060	12.060	12.060	12.060	12.060	12.060
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	56.0W	56.0W	56.0W	56.0W	56.0W	56.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	60.0W	60.0W	60.0W	60.0W	60.0W	60.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	27M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	18431	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	22600	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	27000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	57.0	57.0	57.0	57.0	57.0	49.1
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	3.7	1.8	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	51.2	44.9	47.6	47.6	47.6	55.6
Earth Station G/T (dB/K)	28.7	22.4	25.1	25.1	25.1	33.2
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)	80.4	80.4	66.0	46.2	58.1	48.2
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	29.2	29.4	20.3	20.0	19.8	15.9
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.5	41.5	34.8	15.0	26.9	17.0
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-206.0	-206.0	-206.0	-206.0	-206.0	-206.0
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	28.7	22.4	25.1	25.1	25.1	33.2
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	18.4	12.4	13.7	13.3	13.1	17.4
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	29.2	29.4	20.3	20.0	19.8	15.9
C/N Downlink (dB)	18.4	12.4	13.7	13.3	13.1	17.4
C/I Intermodulation (dB)	N/A	N/A	19.5	19.1	19.0	15.1
C/I Uplink Co-Channel (dB)*	24.5	24.0	25.0	25.3	25.6	21.3
C/I Downlink Co-Channel (dB)*	24.5	24.0	25.0	25.3	25.6	21.3
C/I Uplink Adjacent Satellite 1 (dB)	29.6	29.9	20.7	20.4	20.2	16.4
C/I Downlink Adjacent Satellite 1 (dB)	22.8	16.2	17.8	17.5	17.3	21.9
C/I Uplink Adjacent Satellite 2 (dB)	29.6	29.9	20.7	20.4	20.2	16.4
C/I Downlink Adjacent Satellite 2 (dB)	23.9	18.3	19.4	19.0	18.9	22.5
C/(N+I) Composite (dB)	14.7	9.7	9.4	9.1	8.9	8.3
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.7	8.7	8.4	8.1	7.9	7.3
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.7	5.3	4.5	5.1	4.5	3.9
Number of Carriers	1	1.0	2.1	200.1	12.8	67.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.6	-50.1	-59.2	-59.6	-59.7	-55.7
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.5	-26.0	-27.5	-27.8	-28.0	-31.9

EXHIBIT 12: INTELSAT 21 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Uplink Frequency (GHz)	14.360	14.360	14.360	14.360	14.360	14.360
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Uplink SFD (dBW/m2)	-82.5	-82.5	-80.5	-80.5	-80.5	-80.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	12.060	12.060	12.060	12.060	12.060	12.060
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	56.0W	56.0W	56.0W	56.0W	56.0W	56.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	60.0W	60.0W	60.0W	60.0W	60.0W	60.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	3.0
Earth Station Gain (dBi)	57.0	57.0	57.0	57.0	57.0	49.8
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	4.6	1.8	2.4	2.4	3.0	6.1
Earth Station Gain (dBi)	53.6	44.9	47.6	47.6	49.3	55.6
Earth Station G/T (dB/K)	31.1	22.4	25.1	25.1	26.8	33.2
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)	80.4	80.4	70.4	50.5	61.1	51.2
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.4	28.2	24.6	24.3	22.7	18.8
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.5	41.5	34.2	14.3	24.8	14.9
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-206.0	-206.0	-206.0	-206.0	-206.0	-206.0
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	31.1	22.4	25.1	25.1	26.8	33.2
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.1	11.1	13.0	12.6	12.8	15.3
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.4	28.2	24.6	24.3	22.7	18.8
C/N Downlink (dB)	19.1	11.1	13.0	12.6	12.8	15.3
C/I Intermodulation (dB)	N/A	N/A	20.1	19.7	18.2	14.3
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.6	25.8	24.8	20.5
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.6	25.8	24.8	20.5
C/I Uplink Adjacent Satellite 1 (dB)	27.8	28.6	25.1	24.7	23.2	19.3
C/I Downlink Adjacent Satellite 1 (dB)	23.6	15.0	17.1	16.8	17.1	19.8
C/I Uplink Adjacent Satellite 2 (dB)	27.8	28.6	25.1	24.7	23.2	19.3
C/I Downlink Adjacent Satellite 2 (dB)	24.4	17.1	18.7	18.3	18.3	20.5
C/(N+I) Composite (dB)	14.8	8.5	9.7	9.3	9.1	8.5
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.8	7.5	8.7	8.3	8.1	7.5
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.8	4.2	4.8	5.3	4.7	4.1
Number of Carriers	1	1.0	2.4	235.5	20.6	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.6	-51.4	-54.9	-55.3	-56.8	-53.5
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.5	-27.3	-28.1	-28.5	-30.0	-33.9

EXHIBIT 12: INTELSAT 21 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m ²)	-77.8	-72.8	-77.8	-77.8	-77.8	-77.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
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)	47.5	47.5	47.5	47.5	47.5	47.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	56.0W	56.0W	56.0W	56.0W	56.0W	56.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	60.0W	60.0W	60.0W	60.0W	60.0W	60.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	27M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	18431	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	22600	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	27000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	11.0	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	61.6	56.8	56.8	56.8	56.8	48.9
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	1.8	1.8	1.8	1.8	2.4	6.1
Earth Station Gain (dBi)	44.5	44.5	44.5	44.5	47.2	55.2
Earth Station G/T (dB/K)	22.0	22.0	22.0	22.0	24.7	32.8
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)	85.1	80.3	71.2	51.2	61.4	52.9
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	29.3	24.8	20.9	20.4	18.5	16.0
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	47.5	43.6	38.3	18.3	28.5	20.0
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	22.0	22.0	22.0	22.0	24.7	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	18.1	14.5	14.4	13.9	14.7	20.3
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	29.3	24.8	20.9	20.4	18.5	16.0
C/N Downlink (dB)	18.1	14.5	14.4	13.9	14.7	20.3
C/I Intermodulation (dB)	N/A	N/A	16.9	16.5	14.6	12.0
C/I Uplink Co-Channel (dB)*	24.5	24.0	22.5	22.6	21.2	18.3
C/I Downlink Co-Channel (dB)*	24.5	24.0	22.5	22.6	21.2	18.3
C/I Uplink Adjacent Satellite 1 (dB)	32.3	27.8	23.9	23.4	21.5	19.0
C/I Downlink Adjacent Satellite 1 (dB)	19.6	15.9	15.9	15.4	16.5	22.5
C/I Uplink Adjacent Satellite 2 (dB)	32.3	27.8	23.9	23.4	21.5	19.0
C/I Downlink Adjacent Satellite 2 (dB)	21.7	18.0	18.0	17.5	18.1	23.1
C/(N+I) Composite (dB)	13.7	10.4	9.0	8.6	8.3	7.9
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	12.7	9.4	8.0	7.6	7.3	6.9
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	2.7	6.0	4.1	4.6	3.9	3.5
Number of Carriers	1	1.0	2.6	270.0	18.6	67.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.5	-50.1	-54.0	-54.4	-56.3	-50.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.5	-26.0	-26.1	-26.5	-28.4	-30.9

EXHIBIT 12: INTELSAT 21 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-80.8	-73.8	-78.8	-78.8	-78.8	-78.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
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)	47.5	47.5	47.5	47.5	47.5	47.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	56.0W	56.0W	56.0W	56.0W	56.0W	56.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	60.0W	60.0W	60.0W	60.0W	60.0W	60.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	7.0	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	58.0	56.8	56.8	56.8	56.8	46.3
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	47.2	44.5	44.5	44.5	44.5	55.2
Earth Station G/T (dB/K)	24.7	22.0	22.0	22.0	22.0	32.8
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)	82.1	80.6	70.1	50.1	62.1	51.2
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	24.5	23.8	19.8	19.3	19.2	14.3
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	47.5	44.7	38.2	18.2	30.1	19.3
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	24.7	22.0	22.0	22.0	22.0	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.1	14.4	14.3	13.8	13.7	19.7
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	24.5	23.8	19.8	19.3	19.2	14.3
C/N Downlink (dB)	19.1	14.4	14.3	13.8	13.7	19.7
C/I Intermodulation (dB)	N/A	N/A	18.1	17.6	17.5	12.6
C/I Uplink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.1	18.9
C/I Downlink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.1	18.9
C/I Uplink Adjacent Satellite 1 (dB)	27.5	26.8	22.8	22.3	22.2	17.3
C/I Downlink Adjacent Satellite 1 (dB)	20.9	15.9	15.8	15.3	15.2	21.8
C/I Uplink Adjacent Satellite 2 (dB)	27.5	26.8	22.8	22.3	22.2	17.3
C/I Downlink Adjacent Satellite 2 (dB)	22.4	18.0	17.9	17.4	17.3	22.5
C/(N+I) Composite (dB)	13.8	10.2	9.1	8.6	8.5	7.5
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	12.8	9.2	8.1	7.6	7.5	6.5
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	2.8	5.9	4.2	4.6	4.1	3.1
Number of Carriers	1	1.0	3.5	360.0	24.2	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-41.9	-51.0	-55.0	-55.5	-55.7	-50.0
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.5	-26.1	-26.1	-26.6	-26.8	-31.6

EXHIBIT 13: ADJACENT SATELLITE (56° W.L) LINK BUDGETS

UPLINK BEAM INFORMATION				
Uplink Beam Name	W HEMI	W HEMI	W HEMI	W HEMI
Uplink Frequency (GHz)	6.175	6.175	6.175	6.175
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0
Uplink Contour G/T (dB/K)	-5.5	-5.5	-5.5	-5.5
Uplink SFD (dBW/m2)	-83.5	-90.5	-83.5	-83.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	W HEMI	W HEMI	W HEMI	W HEMI
Downlink Frequency (GHz)	3.950	3.950	3.950	3.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0
Downlink Contour EIRP (dBW)	35.6	35.6	35.6	35.6
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W
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)	-39.2	-39.2	-39.2	-39.2
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	54.0W	54.0W	54.0W	54.0W
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)	-39.2	-39.2	-39.2	-39.2
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)	13.0	6.1	6.1	6.1
Earth Station Gain (dBi)	56.4	49.4	49.4	49.4
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	6.1	3.0	3.0	3.0
Earth Station Gain (dBi)	46.5	39.7	39.7	39.7
Earth Station G/T (dB/K)	26.2	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)	79.4	72.4	67.6	47.1
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	-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)	26.7	20.5	22.2	21.3
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	35.6	35.6	28.5	8.0
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)	26.2	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)	18.0	11.8	11.1	10.2
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	26.7	20.5	22.2	21.3
C/N Downlink (dB)	18.0	11.8	11.1	10.2
C/I Intermodulation (dB)	N/A	N/A	20.2	19.4
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.8	25.5
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.8	25.5
C/I Uplink Adjacent Satellite 1 (dB)	16.5	10.3	12.0	11.1
C/I Downlink Adjacent Satellite 1 (dB)	23.3	11.2	10.5	9.6
C/I Uplink Adjacent Satellite 2 (dB)	16.5	10.3	12.0	11.1
C/I Downlink Adjacent Satellite 2 (dB)	25.1	19.9	19.3	18.4
C/(N+I) Composite (dB)	11.1	4.5	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.1	3.5	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.1	.1	0.0	0.0
Number of Carriers	1	1.0	2.3	254.2
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-43.0	-51.8	-50.1	-51.0
Downlink EIRP Density At Beam Peak (dBW/Hz)	-22.4	-31.2	-31.9	-32.7

EXHIBIT 13: ADJACENT SATELLITE (56° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO
Uplink Frequency (GHz)	14.250	14.250	14.250	14.250	14.250	14.250
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	4.5	4.5	4.5	4.5	4.5	4.5
Uplink SFD (dBW/m2)	-86.5	-74.5	-77.5	-77.5	-77.5	-77.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO
Downlink Frequency (GHz)	11.950	11.950	11.950	11.950	11.950	11.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	49.9	49.9	49.9	49.9	49.9	49.9
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.9	-24.9	-24.9	-24.9	-24.9	-24.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	54.0W	54.0W	54.0W	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.9	-24.9	-24.9	-24.9	-24.9	-24.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100K67W	1M45G7W	400K67W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	49.0
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	2.4	3.0	2.4	2.4	6.1
Earth Station Gain (dBi)	47.5	47.5	49.2	47.5	47.5	55.5
Earth Station G/T (dB/K)	25.0	25.0	26.7	25.0	25.0	33.1
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)	76.4	75.4	67.1	47.6	59.6	51.5
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	4.5	4.5	4.5	4.5	4.5	4.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	26.5	26.2	24.5	24.4	24.4	22.2
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	49.9	42.8	36.3	16.8	28.8	20.6
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	25.0	25.0	26.7	25.0	25.0	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	21.5	15.1	16.8	15.1	15.0	21.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	26.5	26.2	24.5	24.4	24.4	22.2
C/N Downlink (dB)	21.5	15.1	16.8	15.1	15.0	21.0
C/I Intermodulation (dB)	N/A	N/A	13.8	13.8	13.7	11.6
C/I Uplink Co-Channel (dB)*	24.0	24.0	19.4	20.0	20.4	17.8
C/I Downlink Co-Channel (dB)*	24.0	24.0	19.4	20.0	20.4	17.8
C/I Uplink Adjacent Satellite 1 (dB)	21.8	21.6	19.8	19.8	19.7	17.6
C/I Downlink Adjacent Satellite 1 (dB)	24.4	18.1	20.0	18.1	18.0	24.4
C/I Uplink Adjacent Satellite 2 (dB)	21.8	21.6	19.8	19.8	19.7	17.6
C/I Downlink Adjacent Satellite 2 (dB)	26.0	19.7	21.2	19.7	19.6	25.0
C/(N+I) Composite (dB)	14.4	10.9	9.0	8.4	8.4	8.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.4	9.9	8.0	7.4	7.4	7.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.4	6.5	4.1	4.4	4.0	3.6
Number of Carriers	1	1.0	3.5	360.0	24.8	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-46.5	-56.3	-58.1	-58.1	-58.2	-52.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-10.1	-26.0	-26.0	-26.0	-26.1	-28.2

EXHIBIT 13: ADJACENT SATELLITE (56° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Uplink Frequency (GHz)	14.250	14.250	14.250	14.250	14.250	14.250
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Uplink SFD (dBW/m2)	-82.5	-75.5	-81.5	-81.5	-81.5	-81.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Downlink Frequency (GHz)	11.950	11.950	11.950	11.950	11.950	11.950
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)	47.5	47.5	47.5	47.5	47.5	47.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	54.0W	54.0W	54.0W	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	46.4
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	47.5	44.8	44.8	44.8	44.8	55.5
Earth Station G/T (dB/K)	25.0	22.3	22.3	22.3	22.3	33.1
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)	80.4	79.0	67.5	47.4	59.4	48.8
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.5	26.8	21.8	21.3	21.1	16.6
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	47.5	44.8	38.2	18.2	30.2	19.6
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	25.0	22.3	22.3	22.3	22.3	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.1	14.5	14.4	13.9	13.7	20.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.5	26.8	21.8	21.3	21.1	16.6
C/N Downlink (dB)	19.1	14.5	14.4	13.9	13.7	20.0
C/I Intermodulation (dB)	N/A	N/A	18.1	17.7	17.5	13.0
C/I Uplink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.2	19.2
C/I Downlink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.2	19.2
C/I Uplink Adjacent Satellite 1 (dB)	27.8	27.2	22.2	21.7	21.5	17.0
C/I Downlink Adjacent Satellite 1 (dB)	21.1	16.2	16.1	15.7	15.5	22.4
C/I Uplink Adjacent Satellite 2 (dB)	27.8	27.2	22.2	21.7	21.5	17.0
C/I Downlink Adjacent Satellite 2 (dB)	22.7	18.3	18.2	17.8	17.6	23.1
C/(N+I) Composite (dB)	14.1	10.5	9.3	8.8	8.7	8.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.1	9.5	8.3	7.8	7.7	7.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.1	6.2	4.4	4.8	4.3	3.6
Number of Carriers	1	1.0	3.5	360.0	24.0	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.5	-52.7	-57.7	-58.2	-58.4	-52.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.5	-26.0	-26.1	-26.5	-26.7	-31.2

EXHIBIT 13: ADJACENT SATELLITE (56° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-79.8	-83.8	-83.8	-83.8	-83.8	-83.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	54.0W	54.0W	54.0W	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	27M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	18431	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	22600	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	27000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	9.0	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	60.1	56.8	56.8	56.8	56.8	48.9
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	4.6	1.8	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	53.2	44.5	47.2	47.2	47.2	55.2
Earth Station G/T (dB/K)	30.7	22.0	24.7	24.7	24.7	32.8
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)	83.1	79.1	67.8	47.9	59.9	50.4
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.3	23.6	17.5	17.2	17.0	13.5
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.5	41.5	34.9	15.0	27.0	17.5
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	30.7	22.0	24.7	24.7	24.7	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	20.8	12.4	13.7	13.4	13.2	17.9
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.3	23.6	17.5	17.2	17.0	13.5
C/N Downlink (dB)	20.8	12.4	13.7	13.4	13.2	17.9
C/I Intermodulation (dB)	N/A	N/A	19.6	19.2	19.0	15.6
C/I Uplink Co-Channel (dB)*	24.5	24.0	25.1	25.4	25.7	21.8
C/I Downlink Co-Channel (dB)*	24.5	24.0	25.1	25.4	25.7	21.8
C/I Uplink Adjacent Satellite 1 (dB)	30.3	26.6	20.5	20.2	20.0	16.5
C/I Downlink Adjacent Satellite 1 (dB)	25.0	15.9	17.5	17.2	17.0	22.0
C/I Uplink Adjacent Satellite 2 (dB)	30.3	26.6	20.5	20.2	20.0	16.5
C/I Downlink Adjacent Satellite 2 (dB)	25.8	18.0	19.1	18.7	18.6	22.6
C/(N+I) Composite (dB)	16.0	9.4	9.0	8.7	8.6	8.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	15.0	8.4	8.0	7.7	7.6	7.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	5.0	5.0	4.2	4.7	4.2	3.6
Number of Carriers	1	1.0	2.0	197.2	12.6	67.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-43.0	-51.3	-57.3	-57.6	-57.8	-53.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.5	-26.0	-27.4	-27.7	-27.9	-31.4

EXHIBIT 13: ADJACENT SATELLITE (56° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-70.8	-82.8	-77.8	-77.8	-77.8	-77.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	54.0W	54.0W	54.0W	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	54M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	36862	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	45200	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	54000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	3.7
Earth Station Gain (dBi)	56.8	56.8	56.8	56.8	56.8	52.6
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	9.0	2.4	3.0	3.0	3.7	6.1
Earth Station Gain (dBi)	58.7	47.2	48.9	48.9	50.8	55.2
Earth Station G/T (dB/K)	36.3	24.7	26.4	26.4	28.3	32.8
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)	80.9	80.1	71.5	51.4	61.9	53.6
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-76.6	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	25.1	21.5	21.2	20.6	19.0	16.7
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	35.3	41.5	32.5	12.5	23.0	14.7
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	36.3	24.7	26.4	26.4	28.3	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-76.6	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	20.3	12.1	13.1	12.6	12.9	15.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	25.1	21.5	21.2	20.6	19.0	16.7
C/N Downlink (dB)	20.3	12.1	13.1	12.6	12.9	15.0
C/I Intermodulation (dB)	N/A	N/A	20.2	19.7	18.1	15.8
C/I Uplink Co-Channel (dB)*	24.5	24.0	25.8	25.8	24.7	22.0
C/I Downlink Co-Channel (dB)*	24.5	24.0	25.8	25.8	24.7	22.0
C/I Uplink Adjacent Satellite 1 (dB)	28.1	24.6	24.2	23.7	22.0	19.7
C/I Downlink Adjacent Satellite 1 (dB)	24.6	15.9	17.0	16.5	16.9	17.2
C/I Uplink Adjacent Satellite 2 (dB)	28.1	24.6	24.2	23.7	22.0	19.7
C/I Downlink Adjacent Satellite 2 (dB)	25.0	17.4	18.3	17.8	18.0	17.8
C/(N+I) Composite (dB)	15.3	8.9	9.4	8.9	8.7	8.3
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	14.3	7.9	8.4	7.9	7.7	7.3
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.3	4.6	4.5	4.9	4.3	3.9
Number of Carriers	2	1.0	3.5	353.0	31.4	135.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-41.9	-53.3	-53.7	-54.2	-55.8	-53.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-24.7	-29.1	-29.8	-30.3	-31.9	-34.2

EXHIBIT 13: ADJACENT SATELLITE (56° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Uplink Frequency (GHz)	14.360	14.360	14.360	14.360	14.360	14.360
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Uplink SFD (dBW/m2)	-82.5	-82.5	-85.5	-85.5	-85.5	-85.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	12.060	12.060	12.060	12.060	12.060	12.060
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	54.0W	54.0W	54.0W	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	27M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	18431	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	22600	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	27000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	57.0	57.0	57.0	57.0	57.0	49.1
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	3.7	1.8	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	51.2	44.9	47.6	47.6	47.6	55.6
Earth Station G/T (dB/K)	28.7	22.4	25.1	25.1	25.1	33.2
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)	80.4	80.4	66.0	46.2	58.1	48.2
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	29.2	29.4	20.3	20.0	19.8	15.9
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.5	41.5	34.8	15.0	26.9	17.0
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-206.0	-206.0	-206.0	-206.0	-206.0	-206.0
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	28.7	22.4	25.1	25.1	25.1	33.2
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	18.4	12.4	13.7	13.3	13.1	17.4
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	29.2	29.4	20.3	20.0	19.8	15.9
C/N Downlink (dB)	18.4	12.4	13.7	13.3	13.1	17.4
C/I Intermodulation (dB)	N/A	N/A	19.5	19.1	19.0	15.1
C/I Uplink Co-Channel (dB)*	24.5	24.0	25.0	25.3	25.6	21.3
C/I Downlink Co-Channel (dB)*	24.5	24.0	25.0	25.3	25.6	21.3
C/I Uplink Adjacent Satellite 1 (dB)	29.6	29.9	20.7	20.4	20.2	16.4
C/I Downlink Adjacent Satellite 1 (dB)	22.8	16.2	17.8	17.5	17.3	21.9
C/I Uplink Adjacent Satellite 2 (dB)	29.6	29.9	20.7	20.4	20.2	16.4
C/I Downlink Adjacent Satellite 2 (dB)	23.9	18.3	19.4	19.0	18.9	22.5
C/(N+I) Composite (dB)	14.7	9.7	9.4	9.1	8.9	8.3
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.7	8.7	8.4	8.1	7.9	7.3
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.7	5.3	4.5	5.1	4.5	3.9
Number of Carriers	1	1.0	2.1	200.1	12.8	67.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.6	-50.1	-59.2	-59.6	-59.7	-55.7
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.5	-26.0	-27.5	-27.8	-28.0	-31.9

EXHIBIT 13: ADJACENT SATELLITE (56° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Uplink Frequency (GHz)	14.360	14.360	14.360	14.360	14.360	14.360
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Uplink SFD (dBW/m2)	-82.5	-82.5	-80.5	-80.5	-80.5	-80.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	12.060	12.060	12.060	12.060	12.060	12.060
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	54.0W	54.0W	54.0W	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100K67W	1M45G7W	400K67W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	3.0
Earth Station Gain (dBi)	57.0	57.0	57.0	57.0	57.0	49.8
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	4.6	1.8	2.4	2.4	3.0	6.1
Earth Station Gain (dBi)	53.6	44.9	47.6	47.6	49.3	55.6
Earth Station G/T (dB/K)	31.1	22.4	25.1	25.1	26.8	33.2
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)	80.4	80.4	70.4	50.5	61.1	51.2
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.4	28.2	24.6	24.3	22.7	18.8
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.5	41.5	34.2	14.3	24.8	14.9
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-206.0	-206.0	-206.0	-206.0	-206.0	-206.0
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	31.1	22.4	25.1	25.1	26.8	33.2
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.1	11.1	13.0	12.6	12.8	15.3
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.4	28.2	24.6	24.3	22.7	18.8
C/N Downlink (dB)	19.1	11.1	13.0	12.6	12.8	15.3
C/I Intermodulation (dB)	N/A	N/A	20.1	19.7	18.2	14.3
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.6	25.8	24.8	20.5
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.6	25.8	24.8	20.5
C/I Uplink Adjacent Satellite 1 (dB)	27.8	28.6	25.1	24.7	23.2	19.3
C/I Downlink Adjacent Satellite 1 (dB)	23.6	15.0	17.1	16.8	17.1	19.8
C/I Uplink Adjacent Satellite 2 (dB)	27.8	28.6	25.1	24.7	23.2	19.3
C/I Downlink Adjacent Satellite 2 (dB)	24.4	17.1	18.7	18.3	18.3	20.5
C/(N+I) Composite (dB)	14.8	8.5	9.7	9.3	9.1	8.5
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.8	7.5	8.7	8.3	8.1	7.5
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.8	4.2	4.8	5.3	4.7	4.1
Number of Carriers	1	1.0	2.4	235.5	20.6	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.6	-51.4	-54.9	-55.3	-56.8	-53.5
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.5	-27.3	-28.1	-28.5	-30.0	-33.9

EXHIBIT 13: ADJACENT SATELLITE (56° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name						
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-77.8	-72.8	-77.8	-77.8	-77.8	-77.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
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)	47.5	47.5	47.5	47.5	47.5	47.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	54.0W	54.0W	54.0W	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	27M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	18431	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	22600	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	27000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	11.0	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	61.6	56.8	56.8	56.8	56.8	48.9
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	1.8	1.8	1.8	1.8	2.4	6.1
Earth Station Gain (dBi)	44.5	44.5	44.5	44.5	47.2	55.2
Earth Station G/T (dB/K)	22.0	22.0	22.0	22.0	24.7	32.8
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)	85.1	80.3	71.2	51.2	61.4	52.9
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	29.3	24.8	20.9	20.4	18.5	16.0
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	47.5	43.6	38.3	18.3	28.5	20.0
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	22.0	22.0	22.0	22.0	24.7	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	18.1	14.5	14.4	13.9	14.7	20.3
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	29.3	24.8	20.9	20.4	18.5	16.0
C/N Downlink (dB)	18.1	14.5	14.4	13.9	14.7	20.3
C/I Intermodulation (dB)	N/A	N/A	16.9	16.5	14.6	12.0
C/I Uplink Co-Channel (dB)*	24.5	24.0	22.5	22.6	21.2	18.3
C/I Downlink Co-Channel (dB)*	24.5	24.0	22.5	22.6	21.2	18.3
C/I Uplink Adjacent Satellite 1 (dB)	32.3	27.8	23.9	23.4	21.5	19.0
C/I Downlink Adjacent Satellite 1 (dB)	19.6	15.9	15.9	15.4	16.5	22.5
C/I Uplink Adjacent Satellite 2 (dB)	32.3	27.8	23.9	23.4	21.5	19.0
C/I Downlink Adjacent Satellite 2 (dB)	21.7	18.0	18.0	17.5	18.1	23.1
C/(N+I) Composite (dB)	13.7	10.4	9.0	8.6	8.3	7.9
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	12.7	9.4	8.0	7.6	7.3	6.9
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	2.7	6.0	4.1	4.6	3.9	3.5
Number of Carriers	1	1.0	2.6	270.0	18.6	67.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.5	-50.1	-54.0	-54.4	-56.3	-50.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.5	-26.0	-26.1	-26.5	-28.4	-30.9

EXHIBIT 13: ADJACENT SATELLITE (56° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-80.8	-73.8	-78.8	-78.8	-78.8	-78.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
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)	47.5	47.5	47.5	47.5	47.5	47.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	54.0W	54.0W	54.0W	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	7.0	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	58.0	56.8	56.8	56.8	56.8	46.3
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	47.2	44.5	44.5	44.5	44.5	55.2
Earth Station G/T (dB/K)	24.7	22.0	22.0	22.0	22.0	32.8
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)	82.1	80.6	70.1	50.1	62.1	51.2
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	24.5	23.8	19.8	19.3	19.2	14.3
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	47.5	44.7	38.2	18.2	30.1	19.3
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	24.7	22.0	22.0	22.0	22.0	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.1	14.4	14.3	13.8	13.7	19.7
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	24.5	23.8	19.8	19.3	19.2	14.3
C/N Downlink (dB)	19.1	14.4	14.3	13.8	13.7	19.7
C/I Intermodulation (dB)	N/A	N/A	18.1	17.6	17.5	12.6
C/I Uplink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.1	18.9
C/I Downlink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.1	18.9
C/I Uplink Adjacent Satellite 1 (dB)	27.5	26.8	22.8	22.3	22.2	17.3
C/I Downlink Adjacent Satellite 1 (dB)	20.9	15.9	15.8	15.3	15.2	21.8
C/I Uplink Adjacent Satellite 2 (dB)	27.5	26.8	22.8	22.3	22.2	17.3
C/I Downlink Adjacent Satellite 2 (dB)	22.4	18.0	17.9	17.4	17.3	22.5
C/(N+I) Composite (dB)	13.8	10.2	9.1	8.6	8.5	7.5
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	12.8	9.2	8.1	7.6	7.5	6.5
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	2.8	5.9	4.2	4.6	4.1	3.1
Number of Carriers	1	1.0	3.5	360.0	24.2	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-41.9	-51.0	-55.0	-55.5	-55.7	-50.0
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.5	-26.1	-26.1	-26.6	-26.8	-31.6

EXHIBIT 14: ADJACENT SATELLITE (60° W.L) LINK BUDGETS

UPLINK BEAM INFORMATION				
Uplink Beam Name	W HEMI	W HEMI	W HEMI	W HEMI
Uplink Frequency (GHz)	6.175	6.175	6.175	6.175
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0
Uplink Contour G/T (dB/K)	-5.5	-5.5	-5.5	-5.5
Uplink SFD (dBW/m2)	-83.5	-90.5	-83.5	-83.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	W HEMI	W HEMI	W HEMI	W HEMI
Downlink Frequency (GHz)	3.950	3.950	3.950	3.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0
Downlink Contour EIRP (dBW)	35.6	35.6	35.6	35.6
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W
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)	-39.2	-39.2	-39.2	-39.2
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	62.0W	62.0W	62.0W	62.0W
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)	-39.2	-39.2	-39.2	-39.2
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)	13.0	6.1	6.1	6.1
Earth Station Gain (dBi)	56.4	49.4	49.4	49.4
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	6.1	3.0	3.0	3.0
Earth Station Gain (dBi)	46.5	39.7	39.7	39.7
Earth Station G/T (dB/K)	26.2	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)	79.4	72.4	67.6	47.1
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	-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)	26.7	20.5	22.2	21.3
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	35.6	35.6	28.5	8.0
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)	26.2	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)	18.0	11.8	11.1	10.2
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	26.7	20.5	22.2	21.3
C/N Downlink (dB)	18.0	11.8	11.1	10.2
C/I Intermodulation (dB)	N/A	N/A	20.2	19.4
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.8	25.5
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.8	25.5
C/I Uplink Adjacent Satellite 1 (dB)	16.5	10.3	12.0	11.1
C/I Downlink Adjacent Satellite 1 (dB)	23.3	11.2	10.5	9.6
C/I Uplink Adjacent Satellite 2 (dB)	16.5	10.3	12.0	11.1
C/I Downlink Adjacent Satellite 2 (dB)	25.1	19.9	19.3	18.4
C/(N+I) Composite (dB)	11.1	4.5	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.1	3.5	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.1	.1	0.0	0.0
Number of Carriers	1	1.0	2.3	254.2
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-43.0	-51.8	-50.1	-51.0
Downlink EIRP Density At Beam Peak (dBW/Hz)	-22.4	-31.2	-31.9	-32.7

EXHIBIT 14: ADJACENT SATELLITE (60° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO
Uplink Frequency (GHz)	14.250	14.250	14.250	14.250	14.250	14.250
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	4.5	4.5	4.5	4.5	4.5	4.5
Uplink SFD (dBW/m2)	-86.5	-74.5	-77.5	-77.5	-77.5	-77.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO	MEXICO
Downlink Frequency (GHz)	11.950	11.950	11.950	11.950	11.950	11.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	49.9	49.9	49.9	49.9	49.9	49.9
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.9	-24.9	-24.9	-24.9	-24.9	-24.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	62.0W	62.0W	62.0W	62.0W	62.0W	62.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.9	-24.9	-24.9	-24.9	-24.9	-24.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100K67W	1M45G7W	400K67W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	49.0
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	2.4	3.0	2.4	2.4	6.1
Earth Station Gain (dBi)	47.5	47.5	49.2	47.5	47.5	55.5
Earth Station G/T (dB/K)	25.0	25.0	26.7	25.0	25.0	33.1
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)	76.4	75.4	67.1	47.6	59.6	51.5
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	4.5	4.5	4.5	4.5	4.5	4.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	26.5	26.2	24.5	24.4	24.4	22.2
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	49.9	42.8	36.3	16.8	28.8	20.6
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	25.0	25.0	26.7	25.0	25.0	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	21.5	15.1	16.8	15.1	15.0	21.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	26.5	26.2	24.5	24.4	24.4	22.2
C/N Downlink (dB)	21.5	15.1	16.8	15.1	15.0	21.0
C/I Intermodulation (dB)	N/A	N/A	13.8	13.8	13.7	11.6
C/I Uplink Co-Channel (dB)*	24.0	24.0	19.4	20.0	20.4	17.8
C/I Downlink Co-Channel (dB)*	24.0	24.0	19.4	20.0	20.4	17.8
C/I Uplink Adjacent Satellite 1 (dB)	21.8	21.6	19.8	19.8	19.7	17.6
C/I Downlink Adjacent Satellite 1 (dB)	24.4	18.1	20.0	18.1	18.0	24.4
C/I Uplink Adjacent Satellite 2 (dB)	21.8	21.6	19.8	19.8	19.7	17.6
C/I Downlink Adjacent Satellite 2 (dB)	26.0	19.7	21.2	19.7	19.6	25.0
C/(N+I) Composite (dB)	14.4	10.9	9.0	8.4	8.4	8.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.4	9.9	8.0	7.4	7.4	7.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.4	6.5	4.1	4.4	4.0	3.6
Number of Carriers	1	1.0	3.5	360.0	24.8	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-46.5	-56.3	-58.1	-58.1	-58.2	-52.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-10.1	-26.0	-26.0	-26.0	-26.1	-28.2

EXHIBIT 14: ADJACENT SATELLITE (60° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Uplink Frequency (GHz)	14.250	14.250	14.250	14.250	14.250	14.250
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Uplink SFD (dBW/m2)	-82.5	-75.5	-81.5	-81.5	-81.5	-81.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Downlink Frequency (GHz)	11.950	11.950	11.950	11.950	11.950	11.950
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)	47.5	47.5	47.5	47.5	47.5	47.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	62.0W	62.0W	62.0W	62.0W	62.0W	62.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	46.4
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	47.5	44.8	44.8	44.8	44.8	55.5
Earth Station G/T (dB/K)	25.0	22.3	22.3	22.3	22.3	33.1
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)	80.4	79.0	67.5	47.4	59.4	48.8
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.5	26.8	21.8	21.3	21.1	16.6
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	47.5	44.8	38.2	18.2	30.2	19.6
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	25.0	22.3	22.3	22.3	22.3	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.1	14.5	14.4	13.9	13.7	20.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.5	26.8	21.8	21.3	21.1	16.6
C/N Downlink (dB)	19.1	14.5	14.4	13.9	13.7	20.0
C/I Intermodulation (dB)	N/A	N/A	18.1	17.7	17.5	13.0
C/I Uplink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.2	19.2
C/I Downlink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.2	19.2
C/I Uplink Adjacent Satellite 1 (dB)	27.8	27.2	22.2	21.7	21.5	17.0
C/I Downlink Adjacent Satellite 1 (dB)	21.1	16.2	16.1	15.7	15.5	22.4
C/I Uplink Adjacent Satellite 2 (dB)	27.8	27.2	22.2	21.7	21.5	17.0
C/I Downlink Adjacent Satellite 2 (dB)	22.7	18.3	18.2	17.8	17.6	23.1
C/(N+I) Composite (dB)	14.1	10.5	9.3	8.8	8.7	8.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.1	9.5	8.3	7.8	7.7	7.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.1	6.2	4.4	4.8	4.3	3.6
Number of Carriers	1	1.0	3.5	360.0	24.0	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.5	-52.7	-57.7	-58.2	-58.4	-52.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.5	-26.0	-26.1	-26.5	-26.7	-31.2

EXHIBIT 14: ADJACENT SATELLITE (60° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-79.8	-83.8	-83.8	-83.8	-83.8	-83.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	62.0W	62.0W	62.0W	62.0W	62.0W	62.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	27M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	18431	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	22600	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	27000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	9.0	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	60.1	56.8	56.8	56.8	56.8	48.9
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	4.6	1.8	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	53.2	44.5	47.2	47.2	47.2	55.2
Earth Station G/T (dB/K)	30.7	22.0	24.7	24.7	24.7	32.8
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)	83.1	79.1	67.8	47.9	59.9	50.4
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.3	23.6	17.5	17.2	17.0	13.5
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.5	41.5	34.9	15.0	27.0	17.5
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	30.7	22.0	24.7	24.7	24.7	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	20.8	12.4	13.7	13.4	13.2	17.9
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.3	23.6	17.5	17.2	17.0	13.5
C/N Downlink (dB)	20.8	12.4	13.7	13.4	13.2	17.9
C/I Intermodulation (dB)	N/A	N/A	19.6	19.2	19.0	15.6
C/I Uplink Co-Channel (dB)*	24.5	24.0	25.1	25.4	25.7	21.8
C/I Downlink Co-Channel (dB)*	24.5	24.0	25.1	25.4	25.7	21.8
C/I Uplink Adjacent Satellite 1 (dB)	30.3	26.6	20.5	20.2	20.0	16.5
C/I Downlink Adjacent Satellite 1 (dB)	25.0	15.9	17.5	17.2	17.0	22.0
C/I Uplink Adjacent Satellite 2 (dB)	30.3	26.6	20.5	20.2	20.0	16.5
C/I Downlink Adjacent Satellite 2 (dB)	25.8	18.0	19.1	18.7	18.6	22.6
C/(N+I) Composite (dB)	16.0	9.4	9.0	8.7	8.6	8.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	15.0	8.4	8.0	7.7	7.6	7.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	5.0	5.0	4.2	4.7	4.2	3.6
Number of Carriers	1	1.0	2.0	197.2	12.6	67.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-43.0	-51.3	-57.3	-57.6	-57.8	-53.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.5	-26.0	-27.4	-27.7	-27.9	-31.4

EXHIBIT 14: ADJACENT SATELLITE (60° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-70.8	-82.8	-77.8	-77.8	-77.8	-77.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	62.0W	62.0W	62.0W	62.0W	62.0W	62.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	54M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	36862	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	45200	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	54000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	3.7
Earth Station Gain (dBi)	56.8	56.8	56.8	56.8	56.8	52.6
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	9.0	2.4	3.0	3.0	3.7	6.1
Earth Station Gain (dBi)	58.7	47.2	48.9	48.9	50.8	55.2
Earth Station G/T (dB/K)	36.3	24.7	26.4	26.4	28.3	32.8
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)	80.9	80.1	71.5	51.4	61.9	53.6
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-76.6	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	25.1	21.5	21.2	20.6	19.0	16.7
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	35.3	41.5	32.5	12.5	23.0	14.7
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	36.3	24.7	26.4	26.4	28.3	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-76.6	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	20.3	12.1	13.1	12.6	12.9	15.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	25.1	21.5	21.2	20.6	19.0	16.7
C/N Downlink (dB)	20.3	12.1	13.1	12.6	12.9	15.0
C/I Intermodulation (dB)	N/A	N/A	20.2	19.7	18.1	15.8
C/I Uplink Co-Channel (dB)*	24.5	24.0	25.8	25.8	24.7	22.0
C/I Downlink Co-Channel (dB)*	24.5	24.0	25.8	25.8	24.7	22.0
C/I Uplink Adjacent Satellite 1 (dB)	28.1	24.6	24.2	23.7	22.0	19.7
C/I Downlink Adjacent Satellite 1 (dB)	24.6	15.9	17.0	16.5	16.9	17.2
C/I Uplink Adjacent Satellite 2 (dB)	28.1	24.6	24.2	23.7	22.0	19.7
C/I Downlink Adjacent Satellite 2 (dB)	25.0	17.4	18.3	17.8	18.0	17.8
C/(N+I) Composite (dB)	15.3	8.9	9.4	8.9	8.7	8.3
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	14.3	7.9	8.4	7.9	7.7	7.3
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.3	4.6	4.5	4.9	4.3	3.9
Number of Carriers	2	1.0	3.5	353.0	31.4	135.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-41.9	-53.3	-53.7	-54.2	-55.8	-53.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-24.7	-29.1	-29.8	-30.3	-31.9	-34.2

EXHIBIT 14: ADJACENT SATELLITE (60° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Uplink Frequency (GHz)	14.360	14.360	14.360	14.360	14.360	14.360
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Uplink SFD (dBW/m2)	-82.5	-82.5	-85.5	-85.5	-85.5	-85.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	12.060	12.060	12.060	12.060	12.060	12.060
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	62.0W	62.0W	62.0W	62.0W	62.0W	62.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	27M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	18431	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	22600	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	27000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	57.0	57.0	57.0	57.0	57.0	49.1
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	3.7	1.8	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	51.2	44.9	47.6	47.6	47.6	55.6
Earth Station G/T (dB/K)	28.7	22.4	25.1	25.1	25.1	33.2
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)	80.4	80.4	66.0	46.2	58.1	48.2
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	29.2	29.4	20.3	20.0	19.8	15.9
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.5	41.5	34.8	15.0	26.9	17.0
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-206.0	-206.0	-206.0	-206.0	-206.0	-206.0
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	28.7	22.4	25.1	25.1	25.1	33.2
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	18.4	12.4	13.7	13.3	13.1	17.4
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	29.2	29.4	20.3	20.0	19.8	15.9
C/N Downlink (dB)	18.4	12.4	13.7	13.3	13.1	17.4
C/I Intermodulation (dB)	N/A	N/A	19.5	19.1	19.0	15.1
C/I Uplink Co-Channel (dB)*	24.5	24.0	25.0	25.3	25.6	21.3
C/I Downlink Co-Channel (dB)*	24.5	24.0	25.0	25.3	25.6	21.3
C/I Uplink Adjacent Satellite 1 (dB)	29.6	29.9	20.7	20.4	20.2	16.4
C/I Downlink Adjacent Satellite 1 (dB)	22.8	16.2	17.8	17.5	17.3	21.9
C/I Uplink Adjacent Satellite 2 (dB)	29.6	29.9	20.7	20.4	20.2	16.4
C/I Downlink Adjacent Satellite 2 (dB)	23.9	18.3	19.4	19.0	18.9	22.5
C/(N+I) Composite (dB)	14.7	9.7	9.4	9.1	8.9	8.3
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.7	8.7	8.4	8.1	7.9	7.3
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.7	5.3	4.5	5.1	4.5	3.9
Number of Carriers	1	1.0	2.1	200.1	12.8	67.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.6	-50.1	-59.2	-59.6	-59.7	-55.7
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.5	-26.0	-27.5	-27.8	-28.0	-31.9

EXHIBIT 14: ADJACENT SATELLITE (60° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Uplink Frequency (GHz)	14.360	14.360	14.360	14.360	14.360	14.360
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Uplink SFD (dBW/m2)	-82.5	-82.5	-80.5	-80.5	-80.5	-80.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Downlink Frequency (GHz)	12.060	12.060	12.060	12.060	12.060	12.060
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	41.5	41.5	41.5	41.5	41.5	41.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	62.0W	62.0W	62.0W	62.0W	62.0W	62.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	3.0
Earth Station Gain (dBi)	57.0	57.0	57.0	57.0	57.0	49.8
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	4.6	1.8	2.4	2.4	3.0	6.1
Earth Station Gain (dBi)	53.6	44.9	47.6	47.6	49.3	55.6
Earth Station G/T (dB/K)	31.1	22.4	25.1	25.1	26.8	33.2
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)	80.4	80.4	70.4	50.5	61.1	51.2
Uplink Path Loss, Clear Sky (dB)	-207.5	-207.5	-207.5	-207.5	-207.5	-207.5
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	1.5	1.5	1.5	1.5	1.5	1.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.4	28.2	24.6	24.3	22.7	18.8
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.5	41.5	34.2	14.3	24.8	14.9
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-206.0	-206.0	-206.0	-206.0	-206.0	-206.0
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	31.1	22.4	25.1	25.1	26.8	33.2
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.1	11.1	13.0	12.6	12.8	15.3
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.4	28.2	24.6	24.3	22.7	18.8
C/N Downlink (dB)	19.1	11.1	13.0	12.6	12.8	15.3
C/I Intermodulation (dB)	N/A	N/A	20.1	19.7	18.2	14.3
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.6	25.8	24.8	20.5
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.6	25.8	24.8	20.5
C/I Uplink Adjacent Satellite 1 (dB)	27.8	28.6	25.1	24.7	23.2	19.3
C/I Downlink Adjacent Satellite 1 (dB)	23.6	15.0	17.1	16.8	17.1	19.8
C/I Uplink Adjacent Satellite 2 (dB)	27.8	28.6	25.1	24.7	23.2	19.3
C/I Downlink Adjacent Satellite 2 (dB)	24.4	17.1	18.7	18.3	18.3	20.5
C/(N+I) Composite (dB)	14.8	8.5	9.7	9.3	9.1	8.5
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.8	7.5	8.7	8.3	8.1	7.5
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.8	4.2	4.8	5.3	4.7	4.1
Number of Carriers	1	1.0	2.4	235.5	20.6	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.6	-51.4	-54.9	-55.3	-56.8	-53.5
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.5	-27.3	-28.1	-28.5	-30.0	-33.9

EXHIBIT 14: ADJACENT SATELLITE (60° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-77.8	-72.8	-77.8	-77.8	-77.8	-77.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
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)	47.5	47.5	47.5	47.5	47.5	47.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	62.0W	62.0W	62.0W	62.0W	62.0W	62.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	24M0F3F	27M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	18431	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	24000	22600	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	24000	27000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	11.0	6.1	6.1	6.1	6.1	2.4
Earth Station Gain (dBi)	61.6	56.8	56.8	56.8	56.8	48.9
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	1.8	1.8	1.8	1.8	2.4	6.1
Earth Station Gain (dBi)	44.5	44.5	44.5	44.5	47.2	55.2
Earth Station G/T (dB/K)	22.0	22.0	22.0	22.0	24.7	32.8
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)	85.1	80.3	71.2	51.2	61.4	52.9
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	29.3	24.8	20.9	20.4	18.5	16.0
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	47.5	43.6	38.3	18.3	28.5	20.0
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	22.0	22.0	22.0	22.0	24.7	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-73.8	-73.5	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	18.1	14.5	14.4	13.9	14.7	20.3
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	29.3	24.8	20.9	20.4	18.5	16.0
C/N Downlink (dB)	18.1	14.5	14.4	13.9	14.7	20.3
C/I Intermodulation (dB)	N/A	N/A	16.9	16.5	14.6	12.0
C/I Uplink Co-Channel (dB)*	24.5	24.0	22.5	22.6	21.2	18.3
C/I Downlink Co-Channel (dB)*	24.5	24.0	22.5	22.6	21.2	18.3
C/I Uplink Adjacent Satellite 1 (dB)	32.3	27.8	23.9	23.4	21.5	19.0
C/I Downlink Adjacent Satellite 1 (dB)	19.6	15.9	15.9	15.4	16.5	22.5
C/I Uplink Adjacent Satellite 2 (dB)	32.3	27.8	23.9	23.4	21.5	19.0
C/I Downlink Adjacent Satellite 2 (dB)	21.7	18.0	18.0	17.5	18.1	23.1
C/(N+I) Composite (dB)	13.7	10.4	9.0	8.6	8.3	7.9
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	12.7	9.4	8.0	7.6	7.3	6.9
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	2.7	6.0	4.1	4.6	3.9	3.5
Number of Carriers	1	1.0	2.6	270.0	18.6	67.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.5	-50.1	-54.0	-54.4	-56.3	-50.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.5	-26.0	-26.1	-26.5	-28.4	-30.9

EXHIBIT 14: ADJACENT SATELLITE (60° W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY	MOBILITY
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Uplink SFD (dBW/m2)	-80.8	-73.8	-78.8	-78.8	-78.8	-78.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL	BRAZIL
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
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)	47.5	47.5	47.5	47.5	47.5	47.5
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	58.0W	58.0W	58.0W	58.0W	58.0W	58.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	62.0W	62.0W	62.0W	62.0W	62.0W	62.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-24.0	-24.0	-24.0	-24.0	-24.0	-24.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	7.0	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	58.0	56.8	56.8	56.8	56.8	46.3
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	47.2	44.5	44.5	44.5	44.5	55.2
Earth Station G/T (dB/K)	24.7	22.0	22.0	22.0	22.0	32.8
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)	82.1	80.6	70.1	50.1	62.1	51.2
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	24.5	23.8	19.8	19.3	19.2	14.3
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	47.5	44.7	38.2	18.2	30.1	19.3
Antenna Pointing Error (dB)	-5	-5	-5	-5	-5	-5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	24.7	22.0	22.0	22.0	22.0	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.1	14.4	14.3	13.8	13.7	19.7
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	24.5	23.8	19.8	19.3	19.2	14.3
C/N Downlink (dB)	19.1	14.4	14.3	13.8	13.7	19.7
C/I Intermodulation (dB)	N/A	N/A	18.1	17.6	17.5	12.6
C/I Uplink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.1	18.9
C/I Downlink Co-Channel (dB)*	24.0	24.0	23.7	23.8	24.1	18.9
C/I Uplink Adjacent Satellite 1 (dB)	27.5	26.8	22.8	22.3	22.2	17.3
C/I Downlink Adjacent Satellite 1 (dB)	20.9	15.9	15.8	15.3	15.2	21.8
C/I Uplink Adjacent Satellite 2 (dB)	27.5	26.8	22.8	22.3	22.2	17.3
C/I Downlink Adjacent Satellite 2 (dB)	22.4	18.0	17.9	17.4	17.3	22.5
C/(N+I) Composite (dB)	13.8	10.2	9.1	8.6	8.5	7.5
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	12.8	9.2	8.1	7.6	7.5	6.5
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	2.8	5.9	4.2	4.6	4.1	3.1
Number of Carriers	1	1.0	3.5	360.0	24.2	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-41.9	-51.0	-55.0	-55.5	-55.7	-50.0
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.5	-26.1	-26.1	-26.6	-26.8	-31.6