Engineering Statement

1) Introduction

Intelsat License LLC ("Intelsat") seeks authority in this application to launch and operate a new satellite designated as Intelsat 27. This spacecraft will operate from 55.5° W.L and, after traffic transition, the Intelsat 805 spacecraft currently located at 55.5º W.L. will be deployed at another orbital location. The characteristics of the Intelsat 27 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 27 is a Boeing model 702 spacecraft that operates on the C-band frequencies of 5925 – 6425 MHz, 3700 – 4200 MHz; and Ku-band frequencies of 14000 – 14500 MHz, 11450 – 11700 MHz, 11700 – 12200 MHz and 12500 – 12750 MHz; and UHF-band frequencies of 292.835 – 317.33 MHz and 243.520 – 268.160 MHz. The spacecraft utilizes 20 C-band channels to provide service to North and South America and Europe; 20 Ku-band channels to provide service to Mexico, the Andean region, Brazil, the Caribbean, Europe and the southern portion of the United States; and 9 UHF-band channels to provide global service.

2.1) Structure

Intelsat 27 is a 3-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 27 utilizes two three-panel deployable solar array wings and four deployable antennas.

The structural design of Intelsat 27 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 27 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 27 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 three 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 27 utilizes two 24-cell Lithium ion batteries.

The Intelsat 27 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 27 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, 4-for-3 scalable space inertial reference unit, 4-for-3 redundant reaction wheels, bipropellant 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 bipropellant 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 455-N thruster, 5) six 22-N dual mode thrusters, 6) four 22-N monopropellant thrusters, 7) twelve 4-N monopropellant thrusters, 8) associated pressure regulators, filters, flow control components, and pressure transducers.

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

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

The architecture of the bi-propellant 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 27 provides 20 active communication channels at C-band frequencies, 20 active channels at Ku-band frequencies and 9 active channels at UHF-band frequencies. The C-band payload employs channels having bandwidths of 36 MHz and 72 MHz. The Ku-band payload employs channels having bandwidths of 27 MHz, 36 MHz, 54 MHz, 72 MHz and 77 MHz. The UHF-band payload employs channels with bandwidths of 340 kHz, 380 kHz, 700 kHz, 720 kHz, 728 kHz, 1.425 MHz, 2.065 MHz and 2.39 MHz. The Intelsat 27 frequency and polarization plans are provided in Exhibits 4A and 4B.

At C-band, the Intelsat 27 receive and transmit beams provide coverage of North and South America and Europe. At Ku-band, the spacecraft provides coverage of Mexico, the Andean region, Brazil, the Caribbean, Europe and the southern portion of the United States. At UHF-band, the spacecraft provides global coverage.

At C- and Ku-band frequencies, Intelsat 27 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 27 is compliant with the provisions of Section 25.210(f) of the Commission's rules.

Intelsat 27 is not compliant with Section 25.210(a)(3) of the Commission's rules, which requires a space station that provides domestic service using the frequency bands 3700 – 4200 MHz and 5925 – 6425 MHz bands to be capable of switching polarization upon ground command. Accordingly, Intelsat requests a waiver of Section 25.210(a)(3). The nearest co-frequency satellites adjacent to Intelsat 27 are Intelsat 707, located at 53.0º W.L., Intelsat 9, located at 58.0º W.L, and Intelsat 16, located at 58.1º W.L. Intelsat 707, Intelsat 16, and Intelsat 9 are licensed to Intelsat. Intelsat will internally coordinate the transmissions to/from these spacecraft and Intelsat 27 in order to ensure that excessive levels of interference are not generated. Hence, Intelsat believes that its request for 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). Accordingly, for earth station in the United States receiving in the 11450 – 11700 MHz band, the associated uplinking earth station will be located outside of United States.

Intelsat 27 is compliant with the provisions of 25.210(a)(1) and (2). Additionally, Intelsat shall ensure that the placement of analog video carriers in the 3700 – 4200 MHz is compliant with the provisions of 25.211(a) of the Commission's rules.

In accordance with note G100 of Section 2.106 of the Commission's rules, the Intelsat 27 UHF frequency bands will be limited for use by the United States military for mobile satellite service ("MSS").

In the 12500 – 12700 MHz band, Intelsat 27 will operate in accordance with the technical conditions associated with the ITU Appendix 30 Plan satellite network INTELSAT KUEXT 304.5 filed with the ITU by the administration of the United Kingdom. The satellite network INTELSAT KUEXT 304.5 is included in the List of the ITU Appendix 30 Region 2 Plan and has also been notified.

Operation in the band 12700-12750 MHz will be conducted under the same non-harmful interference basis associated with the Commission's authorization for the operation of Intelsat 805.[1] In particular, Intelsat also requests a waiver of Section 25.202(a)(1) and accepts the conditions in the Intelsat 805 grant with the exception that for Intelsat 27 the service area should be limited to the countries of Peru, Ecuador, Colombia, Venezuela, Panama, Costa Rica, Nicaragua, El Salvador, Honduras, Guatemala, Belize and Mexico instead of only those associated with Intelsat 805's operation.

2.6.2) Antennas and Beam Coverages

Intelsat 27 utilizes one deployable C-band transmit/receive reflector antenna, three deployable Ku-band transmit/receive reflector antennas, and a four helix element array UHF-band antenna. The coverage beams of the Intelsat

[1] *See Intelsat LLC, Application to Modify Authorization for INTELSAT 805 to Allow the Provision of Fixed-Satellite Service Between Non-U.S. Points in the 12.7-12.75 GHz Frequency Band*, Order and Authorization, 19 FCC Rcd 2775 (2004).

27 antennas are shown in Exhibits 5A-1 through 5A-14, 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-14. For the uplink beams, the SFD at any G/T contour may be determined using the following formula:

$$SFD_D = SFD_P + [(G/T)_P - (G/T)_D] + A$$

where

SFD_D: SFD at desired G/T level (dBW/m^2)
SFD_P: Minimum SFD at peak G/T (dBW/m^2)
$(G/T)_D$: 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 for C-band channels, from 0 to 28 dB for the Ku-band channels. Variable attenuators are not incorporated with the UHF channels .

Exhibit 6 provides a detailed calculation of the EIRP, G/T and SFD of the Intelsat 27 uplink and downlink beams.

The Intelsat 27 communication C-, Ku-band and UHF antennas will be designed to have a cross-polarization isolation such that the ratio of the on axis co-polar gain to cross-polar gain of the antenna in the assigned frequency band to be at least 30 dB within its primary coverage. Accordingly, Intelsat 27 would be compliant with the provisions of Section 25.210(i)(1) of the Commission's rules.

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 Orthomode Transducer ("OMT"). Each receive signal is then sent to a diplexer which filters or separates the receive signals from the transmit signals. The (receive) input signal is fed through 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

one of four redundant Low Noise Amplifiers ("LNAs"), which are arranged in a 4-for-2 redundancy ring. For transmissions received through the horizontally polarized receive beam, the signal is sent to a directional filter prior to going to the LNA, whereby the command carrier is extracted.

From the LNA the signal is sent to a band-pass filter and then to one of four frequency down-converters which convert the uplink frequency to the appropriate downlink frequency. The C-band frequency down-converters are arranged in a 4-for-2 redundancy ring.

Given that the down-converter converts the received signal to the necessary frequency required for transmission, the frequency stability of the transmitted signal is due entirely to the down-converter. The Intelsat 27 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 27 is compliant with the provisions of Section 25.202(e) of the Commission's rules.

The output of each down-converter is routed to a set 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 10-for-14. 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, and is compliant with 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, the diplexer and the OMT mentioned above, 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 two of the receive beams, the input receive signal is fed through a diplexer, 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 other two receive beams, a diplexer is not used and the input signal is fed directly to the input test coupler.

The output of the transmit reject filter is connected to a Low Noise Amplifier ("LNA"). Intelsat 27 utilizes two 2-for-1 redundant and one 4-for-2 redundant Ku-band LNAs.

From the LNA, the signal is sent to a band-pass filter or to a band-pass filter/hybrid combination, as appropriate, and then to a frequency down-converter, which converts the uplink frequency to the appropriate downlink frequency. Intelsat 27 utilizes three sets of frequency down-converters. One set, which is arranged in a 2-for-1 redundancy ring, down-converts the signal by 1495 MHz. The second set is configured in a 5-for-3 redundancy scheme and down-converts the signal by 2300 MHz. The third set is configured in a 2-for-1 redundancy ring and down-converts the signal by 2800 MHz.

Given that the down-converter converts the received signal to the necessary frequency required for transmission, the frequency stability of the transmitted signal is due entirely to the down-converter. The Intelsat 27 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 27 is compliant with the provisions of Section 25.202(e) of the Commission's rules.

The output of the down-converter is routed through a set of power dividers/hybrids and then sent to an IMUX. 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. The LCAMP/TWTAs are arranged into two interconnected 14-for-10 redundancy rings. Intelsat 27 utilizes 150 Watt radiation cooled Ku-band TWTAs.

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 (nominal) 1 dB increments and is compliant with 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 downlink beam. From the switch bank, the signal is directed to the appropriate OMUX. The output of each OMUX is fed to a receive reject filter, a test coupler, and then to the diplexer and/or OMT mentioned above. From there the signal is sent to the antenna feed for transmission to Earth.

2.6.3.3) UHF-Band

The signal is received by the four helix array elements and fed to a receive beam forming network. The signal is then sent to an input transmit reject filter assembly that is comprised of an input test coupler, a diplexer, a transmit band-pass filter and a transmit reject filter. The output of the input transmit reject filter assembly is connected to a triple LNA assembly. From the LNA, the signal is sent to a set of hybrids and then to two Digital Receiver Units ("DRUs").

The DRU provides frequency down conversion of the input signal to the appropriate downlink frequency The Intelsat 27 DRU is 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.

The DRU also provides frequency band separation for each of the nine UHF channels, hereinafter referred to as UHF macro channels. Furthermore, the DRU is able to subdivide each of UHF macro channels into a number of 5

kHz and/or 25 kHz sub-channels. For each UHF macro channel, the DRU can accommodate twenty 25 kHz wide sub-channels with no 5 KHz sub-channels, or forty two 5 kHz sub-channels with no 25 kHz sub-channels, or a combination of ten 25 kHz sub-channels and twenty three 5 kHz sub-channels.

The output of each DRU is routed in sequence to a hybrid, a switch bank and then to a Solid State Power Amplifier ("SSPA"). The UHF SSPAs have a maximum output power of 50 Watts and are arranged in a 12-for-9 redundancy ring.

The output of each SSPA is routed in succession to an OMUX, a test coupler, the transmit beam forming network unit and then to the four UHF helix element array, mentioned above, for transmission to Earth.

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.
3) Reception, processing and distribution of telecommands.

The TC&R subsystem consists of the following elements: 1) one omni-directional pipe command antenna located on the nadir side of the spacecraft, 2) one omni-directional pipe command antenna located on the aft side of the spacecraft, 3) one omni-directional pipe telemetry antenna located on the nadir side of the spacecraft, 4) one omni-directional pipe telemetry antenna located on the aft side of the spacecraft, 5) one bicone command antenna, 6) one bicone telemetry antenna, 7) West Hemi beam transmit/receive reflector 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 Intelsat 27's main C-band West Hemi beam antenna. The coverage pattern of the on-station command and telemetry beams are shown in Exhibits 5B-1 and 5B-4, respectively.

During emergencies and transfer orbit operations, command and telemetry signals are received and transmitted through the bicone antenna or through the pipe antennas. Intelsat 27 utilizes 2 pipe antennas for command and 2 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.

Representative receive and transmit gain graphs for the bicone antenna are provided in Exhibits 5B-2 and 5B-5, respectively. Representative receive and transmit gain graphs for the pipe antennas are provided in Exhibits 5B-3 and 5B-6, respectively.

2.7.2) Command

The Intelsat 27 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 5925.5 MHz and 6424.5 MHz. The command frequencies are compliant with the provisions of Section 25.202(g) of the Commission's rules. The 5925.5 MHz command signal is received through the main C-band West Hemi beam antenna, and the 6424.5 MHz signal is received by the pipe antennas. The coverage pattern of the West Hemi beam antenna and the pipe antenna is provided in Exhibits 5B-1 and 5B-3. 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.

2.7.3) Telemetry

The Intelsat 27 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 one of two frequency pairs: 3701.25/3702.25 MHz or 3701.75/3702.75 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 27 utilizes two dual frequency transmitters. One transmitter can operate on the frequencies of 3701.25 MHz and 3702.25 MHz; and the other transmitter can operate at 3701.75 MHz and 3702.75 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 or 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 appropriate C-band payload OMUX for transmission back to Earth through the West Hemi transmit beam antenna.

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 27 command, telemetry and ranging subsystems are provided in Exhibit 7.

2.8) Uplink Power Control Subsystem ("ULPC")

2.8.1 Antennas

Intelsat 27 utilizes a dedicated global horn antenna to generate the C-band global ULPC beam. Similarly, at Ku-band, a dedicated Ku-band global horn antenna is utilized to generate the Ku-band global ULPC beam. The coverage pattern of the C-band and Ku-band ULPC beam are provided in Exhibits 5C-1 through 5C-3.

2.8.2 ULPC System Description

Intelsat 27 provides two 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 3700.25 MHz. The Ku-Band ULPC beacons are circularly polarized and operate on the frequencies of 11696.5 MHz and 12500.5 MHz. Detailed calculation of the EIRP for each ULPC beam is provided in Exhibit 6.

The Intelsat 27 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 27 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.

2.9) Satellite Station-Keeping

The spacecraft will be maintained within 0.05° of its nominal longitudinal position in the east-west direction as well as in the north-south direction. Accordingly, it is in compliance with the provisions of 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 27 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-, Ku- and UHF-band payloads are 97.5% 96.2% and 97.1%, respectively. The projected reliability of the bus system is 86.00%. The overall reliability of the Intelsat 27 spacecraft is projected to

be 78.3%. The subsystem reliability assessments were based upon the use of failure rates, modeling assumptions from previous spacecraft programs and those specific to Intelsat 27. Failure rates for spacecraft equipment have been calculated using actual electrical stress and operating temperature conditions for each part. Failure rate for standby un-powered electronic items were assessed at one-tenth of the failure rates for active units. Failure rate for standby non-operating mechanical items were assessed at one hundredth of their operating failure rate.

3.0) Services and Emission Designators

Intelsat 27 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 27 can accommodate television, radio, voice or data communications. Typical types of 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. With respect to the 12500 – 12750 MHz band, the PFD limits are specified in No. 21.16 of the ITU Radio Regulations. For the 11700 – 12200 MHz and 243.520 – 268.160 MHz bands, there are no PFD limits specified in the Commission's rules or the Radio Regulations for the fixed satellite service.

The maximum PFD levels for the Intelsat 27 transmissions were calculated for a number of TV/FM and/or digital carriers listed in Exhibit 9 operating in the 3700 – 4200 MHz, 11450 – 11700 MHz and 12500 – 12750 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 27 telemetry and ULPC carriers. The results are provided in Exhibit 10 and

show that the downlink power flux density levels of the Intelsat 27 carriers do not exceed limits specified in Section 25.208 of the Commission's rules or the limits specified in No. 21.16 of the ITU Radio Regulations.

5.0) Emission Limitations

The Intelsat 27 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 shall comply with the provisions of Section 25.202(f) of the Commission's rules with regard to Intelsat 27 emissions.

6.0) Service Area

At C-band, the primary service area of Intelsat 27 is Europe, North and South America. At Ku-band, the primary service area is Mexico, the Andean region, Brazil, the Caribbean, Europe and the southern portion of the United States. At UHF, the primary service area is the visible Earth.

7.0) Orbital Location

Intelsat requests that it be assigned the 55.5° W.L orbital location for Intelsat 27. After transfer of traffic to Intelsat 27, the Intelsat 805 spacecraft, which currently operates from 55.5º W.L., will be deployed at another orbital location. Intelsat 27 includes the frequency bands 14250 – 14500 MHz, 11450 – 12200 MHz and UHF, which are not on Intelsat 805. The 55.5° W.L location satisfies Intelsat 27 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 27 is intended to provide video, audio and data services to satellite users within its coverage area. The 55.5° W.L position affords reasonable earth station angles to the region. The attractiveness of Intelsat 27 to this market would be severely diminished if service to this area is not possible.

9.0) Intelsat 27 Link Budgets and Interference Analysis

Link analysis for Intelsat 27 was conducted for a number of representative carriers, at C- and Ku-band.

At C-band, it was assumed that the nearest co-frequency satellites to Intelsat 27 were two hypothetical satellites – one located at 53.5º W.L and the other located at 57.5º W.L. The hypothetical satellites were assumed to have same operational parameters as Intelsat 27. It was further assumed that each of the hypothetical satellites utilized digital carriers having a maximum uplink power density and downlink (beam peak) EIRP density of -38.7 dBW/Hz, as specified in Section 25.212(d) of the Commission's rules, and -32 dBW/Hz, respectively.

At Ku-band, excluding the 12500 – 12750 MHz band, it was assumed that the nearest co-frequency satellites to Intelsat 27 were two hypothetical satellites – one located at 53.5º W.L and the other located at 57.5º W.L. The hypothetical satellites were assumed to have the same operational parameters as Intelsat 27. 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 -20 dBW/Hz.

In accordance with note G100 of Section 2.106 of the Commission's rules, the Intelsat 27 UHF frequency bands will be limited for use by the United States military for mobile satellite service, and the service rules pertaining to the use of the 292.835 – 317.33 MHz and 243.845 – 268.1 MHz bands fall under the purview of NTIA. Consequently, there are no FCC rules pertaining to the use of these bands by the mobile satellite service. Accordingly, no link analysis was conducted for the Intelsat 27 UHF channels. Intelsat shall ensure that all Intelsat 27 UHF transmissions will be compliant with any limits specified by NTIA.

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 lobe.
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 53.5° W.L and 57.5° W.L on the transmissions of Intelsat 27 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.

As shown in Exhibits 4A and 4B, Intelsat 27 employs with each beam channels having varying bandwidths. In an effort to keep the number of link calculations to a manageable level, link calculations were not performed for each channel size, but rather for only one channel size. The channel size chosen for each beam was based upon the level of adjacent satellite downlink interference. As an example, if a channel having a bandwidth of 77 MHz and a channel having a bandwidth of 27 MHz have the same associated adjacent satellite downlink interfering EIRP density, then link budgets were performed only for emissions that were transmitted through the 77 MHz channel, since power density levels would typically be smaller (uplink and downlink) in comparison to those which would be transmitted through the 27 MHz channel; and thus the impact of the adjacent satellite interference would be greater on the former. As a second example, if the level of downlink interfering EIRP density to which the 27 MHz channel was subjected was larger than that for the 77 MHz channel, and if this additional level of interference was larger than ten times the logarithmic ratio of the two channel bandwidths (i.e. 10log[77/27]), then link calculations were performed only for the emissions of the 27 MHz channel, since the impact of adjacent satellite interference is greater on emissions of this channel (in comparison to those being transmitted through the 77 MHz channel).

The results of the C-band and Ku-band analysis are shown in Exhibit 12 and demonstrate that operation of the Intelsat 27 satellite from 55.5° 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, excluding the 12500 – 12750 MHz band, the impact of the proposed Intelsat 27 emissions on the transmissions of hypothetical adjacent satellites located at 53.5º W.L and 57.5º W.L was analyzed. It was assumed that each of these satellites had the same operating characteristics as the proposed Intelsat 27 spacecraft.

For the satellite located at 53.5º W.L, it was assumed that the adjacent satellites were Intelsat 27, located at 55.5º W.L, and a hypothetical satellite having the same operating characteristics as Intelsat 27 located at 51.5º W.L. For the satellite located at 57.5º W.L, it was assumed that the adjacent satellites were Intelsat 27, located at 55.5º W.L, and a hypothetical satellite having the same operating characteristics as Intelsat 27 located at 59.5º W.L.

For the reasons specified in section 9.0, above, no link budget analysis was conducted for the UHF band channels.

In the 12500 – 12700 MHz band, Intelsat 27 will operate under the satellite network INTELSAT KUEXT 304.5 filed with the ITU by the administration of the United Kingdom. As indicated before, this satellite network is included in the List of the ITU Appendix 30 Region 2 Plan and has also been notified.. Accordingly, no link budget analysis was conducted for this frequency band.

Also, no link budgets have been developed for operation in the band 12700-12750 MHz because, as indicated before, operation in this band will be conducted on a non-interference basis. Moreover, there is no current or planned use of the frequency band 12700-12750 MHz for downlink from any space station within +/- 6 degrees of 55.5ºW.

The impact of Intelsat 27 emissions on the TV/FM carriers of the adjacent satellites at 53.5º W.L and 57.5º 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 listed in Exhibits 13 and 14. The Intelsat 27 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 27 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 27 digital carriers will not exceed -32 dBW/Hz; and within the 11450 – 12200 MHz band the downlink EIRP density of the Intelsat 27 digital carriers will not exceed -20 dBW/Hz.

11.0) Schedule S Submission

Intelsat is providing with its application a Schedule S for the operations of Intelsat 27 from 55.5º 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 805 during the transition of traffic period, Intelsat 27 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 805, Intelsat will take all the necessary steps, e.g., "pass-in-the-night maneuver" or slight relocation of Intelsat 805 and/or Intelsat 27, to minimize the risk of collision between Intelsat 27 and Intelsat 805.

With the exception of Intelsat Intelsat 805, 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 stationkeeping volume with Intelsat 27. Intelsat is also not aware of any system with an overlapping stationkeeping volume with Intelsat 27 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 300 kilometers above the geostationary arc. This exceeds the minimum altitude established by the IADC formula. Intelsat has reserved 120.4 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*A/M) of the Intelsat 27 spacecraft is 0.045 m^2/kg, resulting in a minimum perigee disposal altitude under the IADC formula of at most 235 kilometers above the geostationary arc, which is lower than the 300 kilometer above geostationary disposal altitude specified by Intelsat in this filing. Accordingly, the Intelsat 27 planned disposal orbit complies with the FCC's rules.

13) ITU Filing

Intelsat currently has no filing with the ITU for a satellite network within mobile satellite service ("MSS") that specifies operation on the frequency bands of 292.835 – 317.33 MHz and 243.520 – 268.160 MHz. Intelsat will submit to the Commission the API for a new MSS satellite network that utilizes these frequency bands at the nominal orbital location of 55.5º W.L.

Certification Statement

I hereby certify that I am a technically qualified person and am familiar with Part 25 of the Commission's Rules and Regulations. 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	May 27, 2011
Jose Albuquerque Intelsat Senior Director Spectrum Strategy	Date

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS

GENERAL	
Spacecraft Name	Intelsat 27
Orbital Location	55.5° W.L.
Spacecraft Manufacturer	Boeing
Spacecraft Model	702
Spacecraft Type	3-axis stabilized
Spacecraft Dimensions	
Length	36.4 meters
Width	9.2 meters
Depth	7.0 meters
Spacecraft Mass	
Mass w/o fuel	2821 kg
Mass w/ fuel	6484 kg
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 (C and Ku-band channels)	0.07°, 0.08º, 0.18º
North-South, East-West, Rotational (UHF-band channels)	0.09°, 0.26º, 0.10º
Spacecraft Reliability	78.3%
Payload Reliability	91.1%
C-Band	97.5%
Ku-Band	96.2%
UHF-Band	97.1%
Bus Reliability	86.0%
Propulsion Type	Bi-propellant
Maximum Solar Array Power	
Beginning of Life	13279 Watts
End of Life	11579 Watts
Deployed Area of Solar Array	52.8 sq. meters
Ranging Accuracy	30 meters

EXHIBIT 2: SPACECRAFT MASS BUDGET

Mass of Spacecraft without Fuel (kg)	2821
Mass of Fuel and Disposables (kg)	3663
Launch Mass (kg)	6484
Mass of Fuel, in orbit, at Beginning of Life (kg)	607

EXHIBIT 3: SPACECRAFT POWER BUDGET

	BEGINNING OF LIFE		END OF LIFE	
	AUTUMN EQUINOX	SUMMER SOLSTICE	AUTUMN EQUINOX	SUMMER SOLSTICE
PAYLOAD (WATTS)	8416	8416	8416	8416
BUS (WATTS)	1991	1153	2083	1013
TOTAL POWER (WATTS)	10407	9569	10499	9429
SOLAR ARRAY POWER (WATTS)	13279	11662	11579	10323
DEPTH OF BATTERY DISCHARGE (%)	64.9%	N/A	73.7%	N/A

EXHIBIT 4A: FREQUENCY PLAN

C-Band Frequency Plan

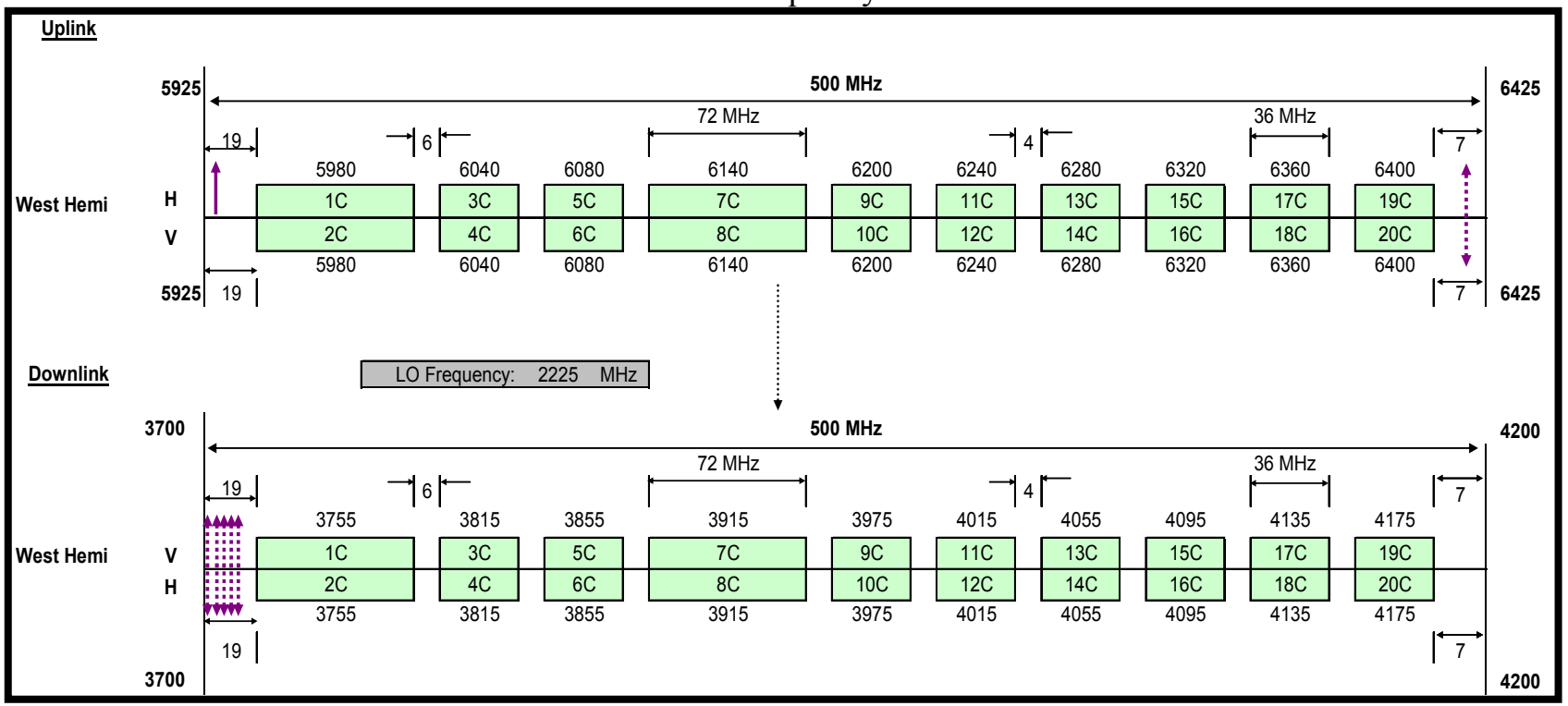


EXHIBIT 4A: FREQUENCY PLAN (continued)

Ku-Band Frequency Plan

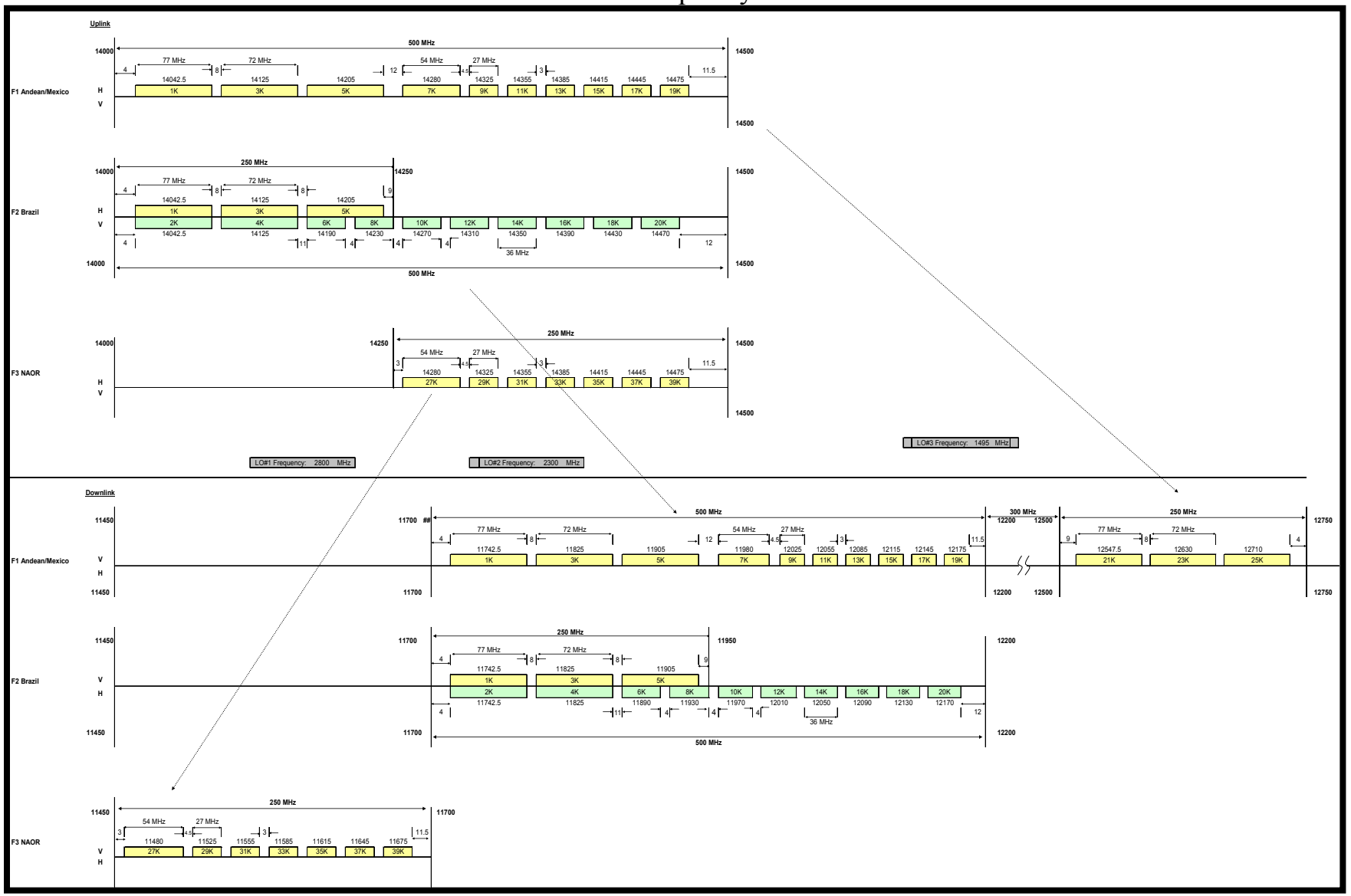
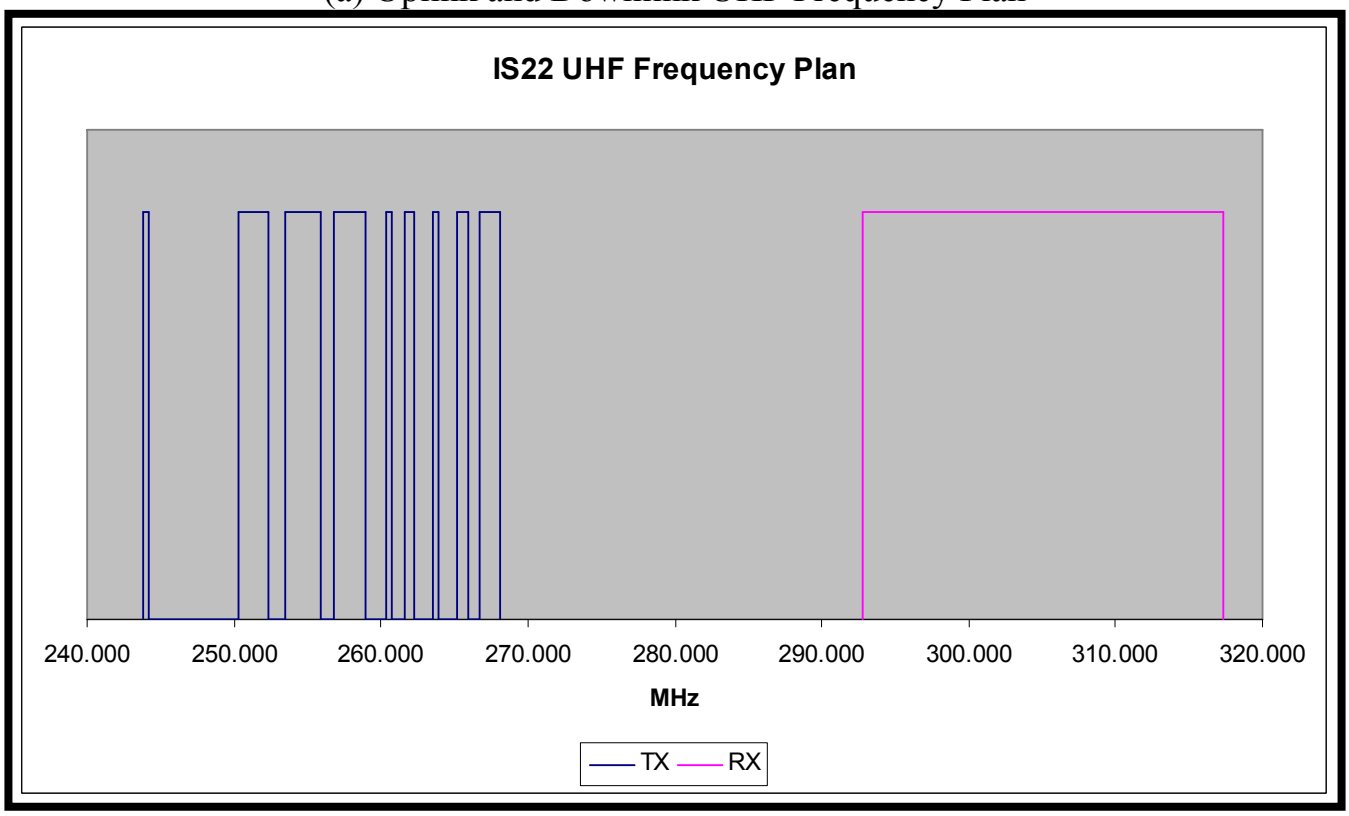


EXHIBIT 4A: FREQUENCY PLAN (continued)

(a) Uplink and Downlink UHF Frequency Plan



(b) Magnified Downlink UHF Frequency Plan

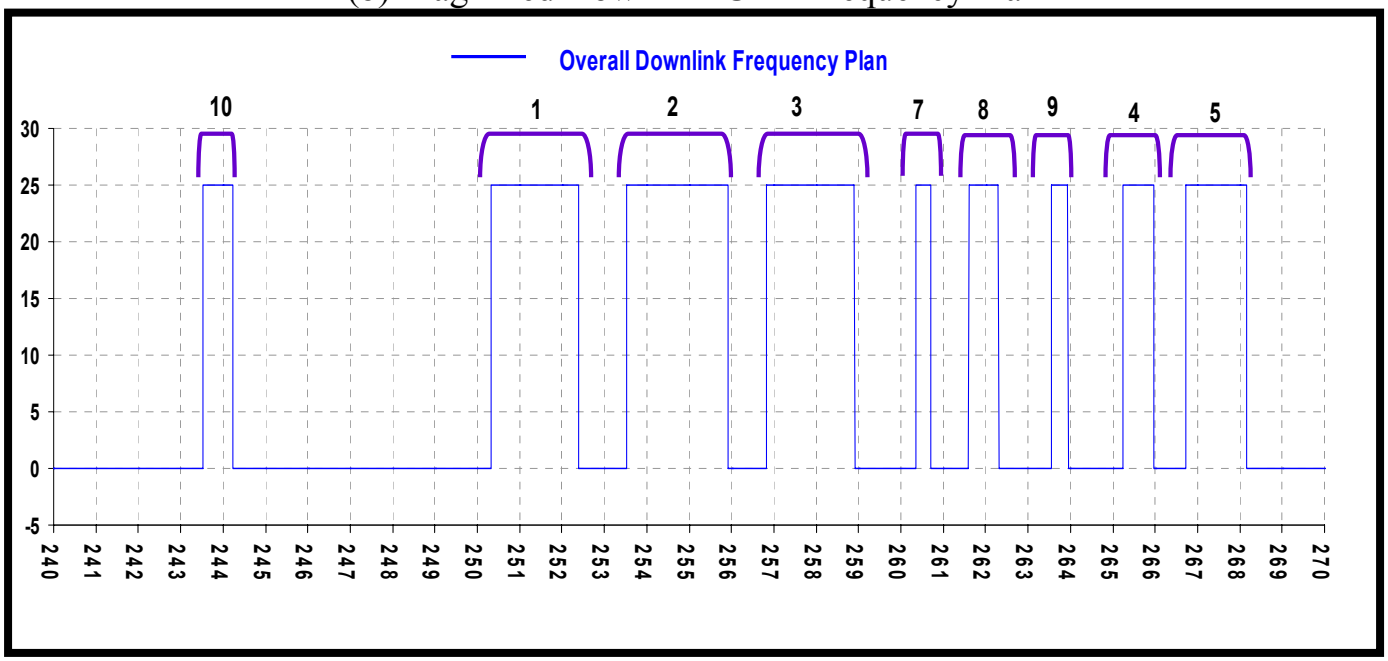


EXHIBIT 4B: FREQUENCY ASSIGNMENTS

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	5980	1C	West Hemi	Vertical	3755	72	134.7
3C	West Hemi	Horizontal	6040	3C	West Hemi	Vertical	3815	36	134.7
5C	West Hemi	Horizontal	6080	5C	West Hemi	Vertical	3855	36	134.7
7C	West Hemi	Horizontal	6140	7C	West Hemi	Vertical	3915	72	134.7
9C	West Hemi	Horizontal	6200	9C	West Hemi	Vertical	3975	36	134.7
11C	West Hemi	Horizontal	6240	11C	West Hemi	Vertical	4015	36	134.7
13C	West Hemi	Horizontal	6280	13C	West Hemi	Vertical	4055	36	134.7
15C	West Hemi	Horizontal	6320	15C	West Hemi	Vertical	4095	36	134.7
17C	West Hemi	Horizontal	6360	17C	West Hemi	Vertical	4135	36	134.7
19C	West Hemi	Horizontal	6400	19C	West Hemi	Vertical	4175	36	134.7
2C	West Hemi	Vertical	5980	2C	West Hemi	Horizontal	3755	72	134.7
4C	West Hemi	Vertical	6040	4C	West Hemi	Horizontal	3815	36	134.7
6C	West Hemi	Vertical	6080	6C	West Hemi	Horizontal	3855	36	134.7
8C	West Hemi	Vertical	6140	8C	West Hemi	Horizontal	3915	72	134.7
10C	West Hemi	Vertical	6200	10C	West Hemi	Horizontal	3975	36	134.7
12C	West Hemi	Vertical	6240	12C	West Hemi	Horizontal	4015	36	134.7
14C	West Hemi	Vertical	6280	14C	West Hemi	Horizontal	4055	36	134.7
16C	West Hemi	Vertical	6320	16C	West Hemi	Horizontal	4095	36	134.7
18C	West Hemi	Vertical	6360	18C	West Hemi	Horizontal	4135	36	134.7
20C	West Hemi	Vertical	6400	20C	West Hemi	Horizontal	4175	36	134.7
CMD1	West Hemi	Horizontal	5925.5					1.0	
CMD2	Global (Bicone)	Horizontal	5925.5					1.0	
CMD3	Global (Pipe)	Left Hand Circular	6424.5					1.0	
				TM1	West Hemi	Vertical	3701.25	0.5	
				TM2	West Hemi	Vertical	3701.75	0.5	
				TM3	West Hemi	Vertical	3702.25	0.5	
				TM4	West Hemi	Vertical	3702.75	0.5	
				TM5	Global (Bicone)	Vertical	3701.25	0.5	
				TM6	Global (Bicone)	Vertical	3701.75	0.5	
				TM7	Global (Bicone)	Vertical	3702.25	0.5	
				TM8	Global (Bicone)	Vertical	3702.75	0.5	
				TM9	Global (Pipe)	Left Hand Circular	3701.25	0.5	
				TM10	Global (Pipe)	Left Hand Circular	3701.75	0.5	
				TM11	Global (Pipe)	Left Hand Circular	3702.25	0.5	
				TM12	Global (Pipe)	Left Hand Circular	3702.75	0.5	
				UPC1	Global	Right Hand Circular	3700.25	0.025	

EXHIBIT 4B: 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)
1K	Andean/Mexico	Horizontal	14042.5	1K	Andean/Mexico	Vertical	11742.5	77	138.9
3K	Andean/Mexico	Horizontal	14125	3K	Andean/Mexico	Vertical	11825	72	138.9
5K	Andean/Mexico	Horizontal	14205	5K	Andean/Mexico	Vertical	11905	72	138.9
1K	Andean/Mexico	Horizontal	14042.5	21K	Andean/Mexico	Vertical	12547.5	77	138.9
3K	Andean/Mexico	Horizontal	14125	23K	Andean/Mexico	Vertical	12630	72	138.9
5K	Andean/Mexico	Horizontal	14205	25K	Andean/Mexico	Vertical	12710	72	138.9
1K	Brazil	Horizontal	14042.5	1K	Brazil	Vertical	11742.5	77	139.8
3K	Brazil	Horizontal	14125	3K	Brazil	Vertical	11825	72	139.8
5K	Brazil	Horizontal	14205	5K	Brazil	Vertical	11905	72	139.8
7K	Andean/Mexico	Horizontal	14280	7K	Andean/Mexico	Vertical	11980	54	139.0
9K	Andean/Mexico	Horizontal	14325	9K	Andean/Mexico	Vertical	12025	27	139.0
11K	Andean/Mexico	Horizontal	14355	11K	Andean/Mexico	Vertical	12055	27	139.0
13K	Andean/Mexico	Horizontal	14385	13K	Andean/Mexico	Vertical	12085	27	139.0
15K	Andean/Mexico	Horizontal	14415	15K	Andean/Mexico	Vertical	12115	27	139.0
17K	Andean/Mexico	Horizontal	14445	17K	Andean/Mexico	Vertical	12145	27	139.0
19K	Andean/Mexico	Horizontal	14475	19K	Andean/Mexico	Vertical	12175	27	139.0
27K	NAOR	Horizontal	14280	27K	NAOR	Vertical	11480	54	139.8
29K	NAOR	Horizontal	14325	29K	NAOR	Vertical	11525	27	139.8
31K	NAOR	Horizontal	14355	31K	NAOR	Vertical	11555	27	139.8
33K	NAOR	Horizontal	14385	33K	NAOR	Vertical	11585	27	139.8
35K	NAOR	Horizontal	14415	35K	NAOR	Vertical	11615	27	139.8
37K	NAOR	Horizontal	14445	37K	NAOR	Vertical	11645	27	139.8
39K	NAOR	Horizontal	14475	39K	NAOR	Vertical	11675	27	139.8
2K	Brazil	Vertical	14042.5	2K	Brazil	Horizontal	11742.5	77	139.8
4K	Brazil	Vertical	14125	4K	Brazil	Horizontal	11825	72	139.8
6K	Brazil	Vertical	14190	6K	Brazil	Horizontal	11890	36	139.8
8K	Brazil	Vertical	14230	8K	Brazil	Horizontal	11930	36	139.8
10K	Brazil	Vertical	14270	10K	Brazil	Horizontal	11970	36	139.8
12K	Brazil	Vertical	14310	12K	Brazil	Horizontal	12010	36	139.8
14K	Brazil	Vertical	14350	14K	Brazil	Horizontal	12050	36	139.8
16K	Brazil	Vertical	14390	16K	Brazil	Horizontal	12090	36	139.8
18K	Brazil	Vertical	14430	18K	Brazil	Horizontal	12130	36	139.8
20K	Brazil	Vertical	14470	20K	Brazil	Horizontal	12170	36	139.8
				UPK1	Global	Right Hand Circular	11696.5	0.025	
				UPK2	Global	Left Hand Circular	12500.5	0.025	
1*	Global	Right Hand Circular	292.835 to 317.330	1	Global	Right Hand Circular	251.3675	2.065	163.5
				2	Global	Right Hand Circular	254.73	2.390	163.5
				3	Global	Right Hand Circular	257.8675	2.065	163.5
				4	Global	Right Hand Circular	265.599	0.728	163.5
				5	Global	Right Hand Circular	267.4475	1.425	163.5
				7	Global	Right Hand Circular	260.53	0.340	163.5
				8	Global	Right Hand Circular	261.95	0.700	163.5
				9	Global	Right Hand Circular	263.75	0.380	163.5
				10	Global	Right Hand Circular	243.88	0.720	163.5

***Note**: The uplink frequency of a UHF carrier can be placed anywhere within the uplink frequency band of 292.835 MHz to 317.330 MHz. The downlink frequency of a UHF carrier will be placed within the pass-band of the specific UHF downlink channels listed. Each UHF downlink channel can be subdivided into 5 kHz or 25 kHz sub-channels or a combination of the two. When transmitting only 5 kHz wide sub-channels, the total number of sub-channels is limited to 42. When transmitting only 25 kHz wide sub-channels, the total number of sub-channels is limited to 20. When transmitting a mix of 5 kHz and 25 kHz wide sub-channels, the total number of sub-channels is limited to 33.

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

Beam Polarization: Horizontal
Peak Beam Gain: 27.6 dBi
Peak Beam G/T: 1.5 dB/K
Saturated Flux Density @ Peak Beam G/T: -79.5 to -107.5 dBW/m^2

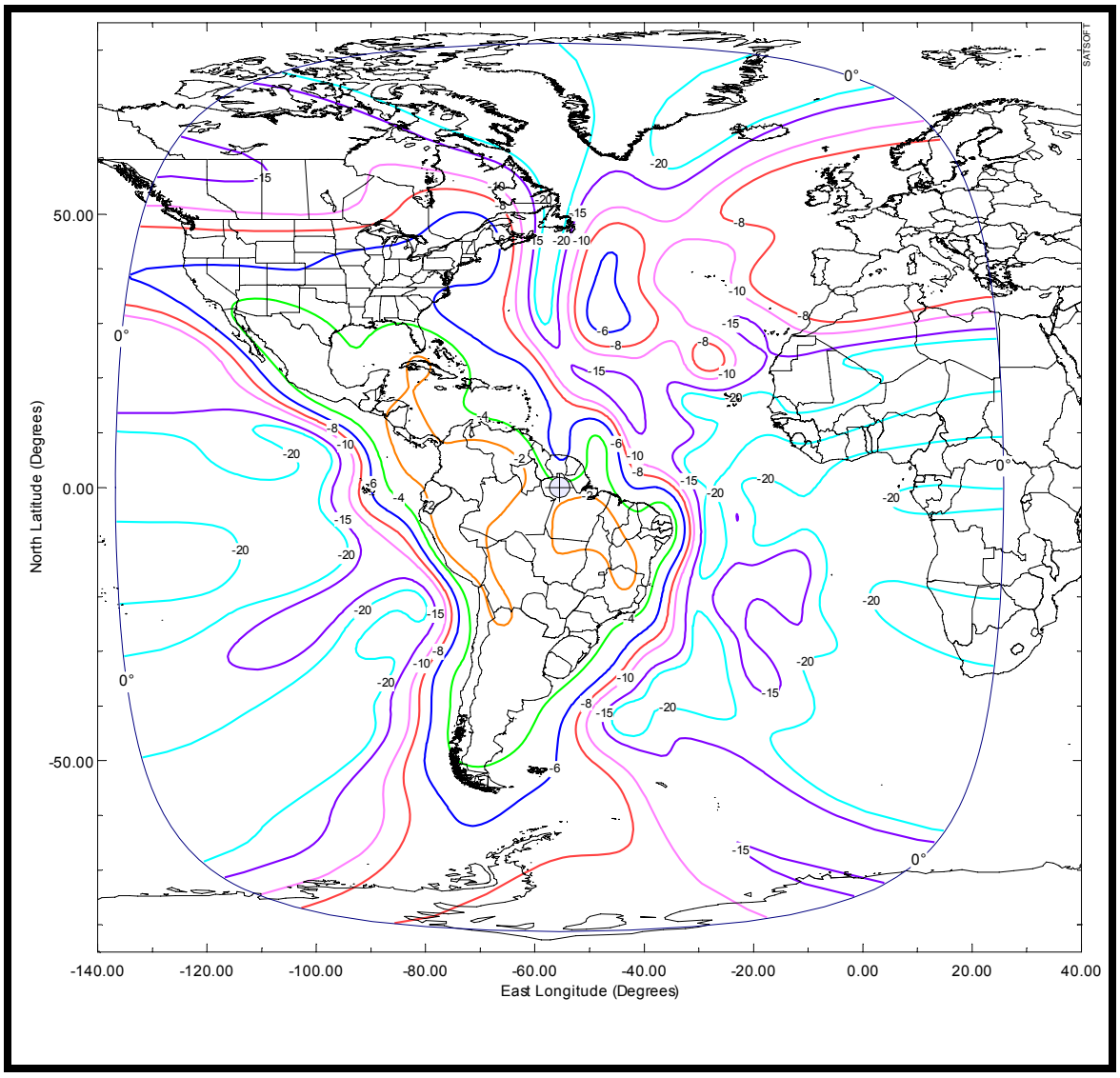


EXHIBIT 5A-2: WEST HEMI RECEIVE BEAM
(Schedule S Beam ID: HVUL)

Beam Polarization: Vertical
Peak Beam Gain: 27.6 dBi
Peak Beam G/T: 1.5 dB/K
Saturated Flux Density @ Peak Beam G/T: -79.5 to -107.5 dBW/m^2

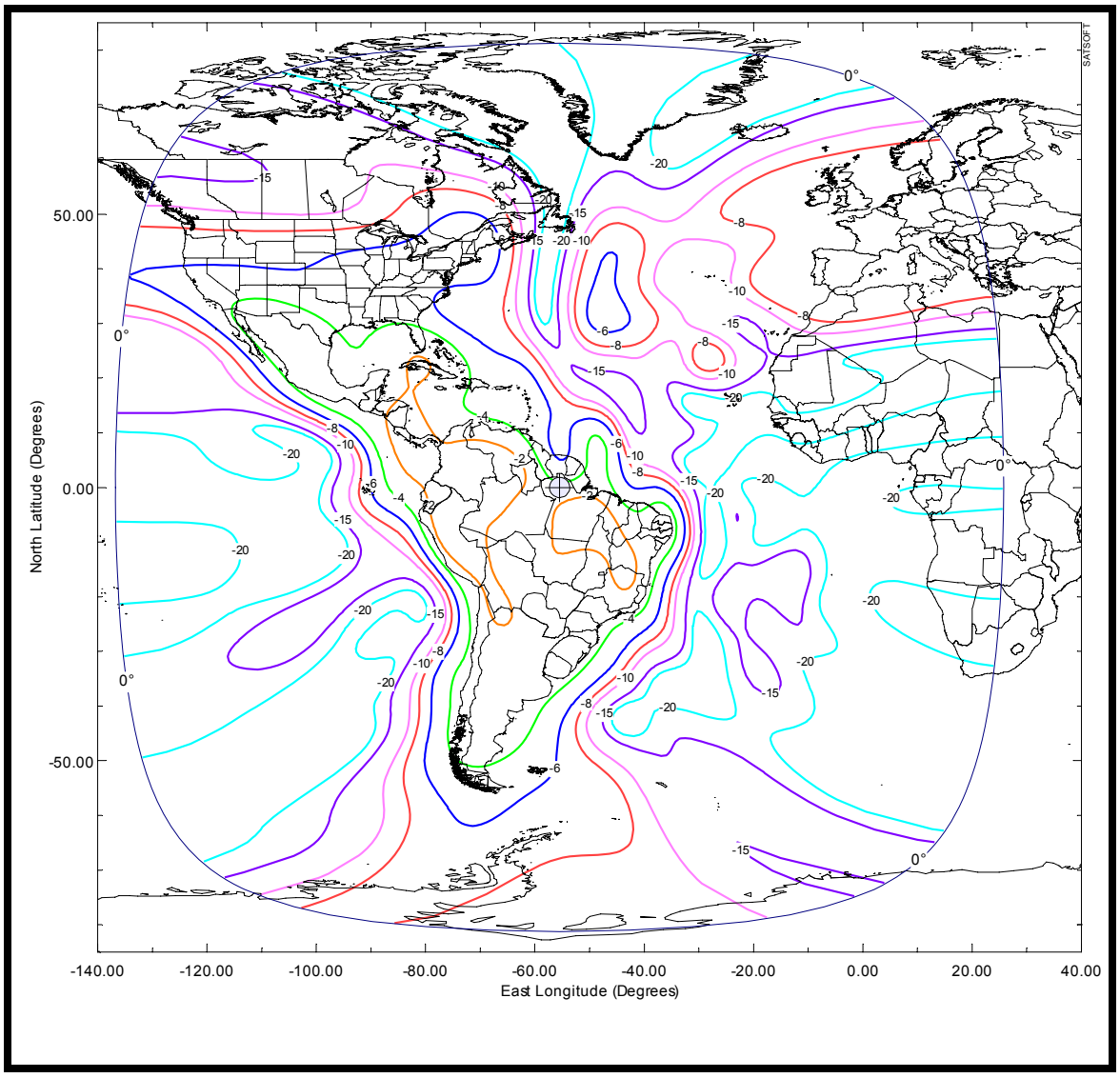


EXHIBIT 5A-3: ANDEAN/MEXICO RECEIVE BEAM
(Schedule S Beam ID: AHUL)

Beam Polarization: Horizontal
Peak Beam Gain: 33.9 dBi
Peak Beam G/T: 7.8 dB/K
Saturated Flux Density @ Peak Beam G/T: -79.8 to -107.8 dBW/m^2

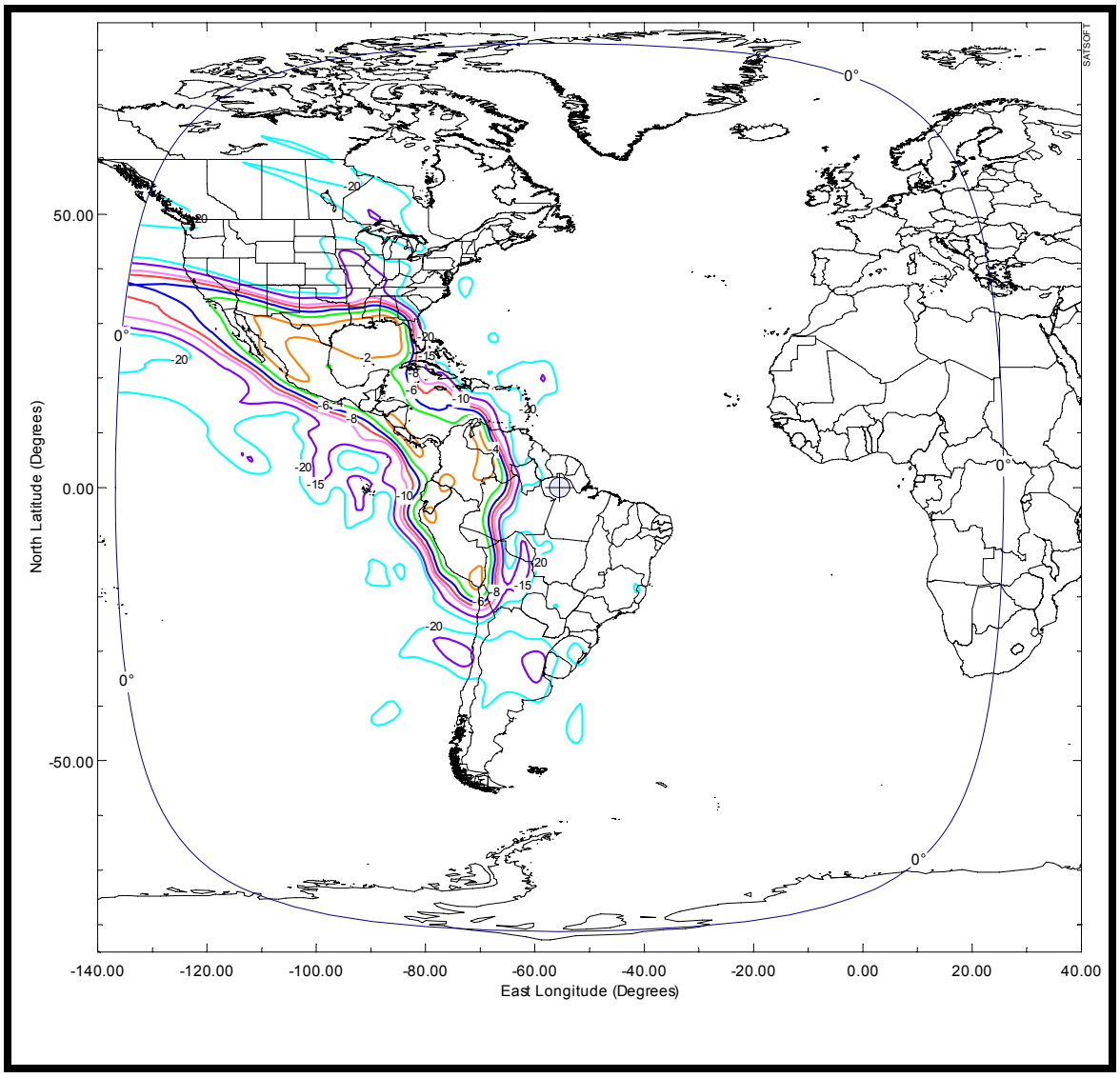


EXHIBIT 5A-4: BRAZIL RECEIVE BEAM
(Schedule S Beam ID: BHUL)

Beam Polarization: Horizontal
Peak Beam Gain: 35.8 dBi
Peak Beam G/T: 9.5 dB/K
Saturated Flux Density @ Peak Beam G/T: -82.5 to -110.5 dBW/m^2

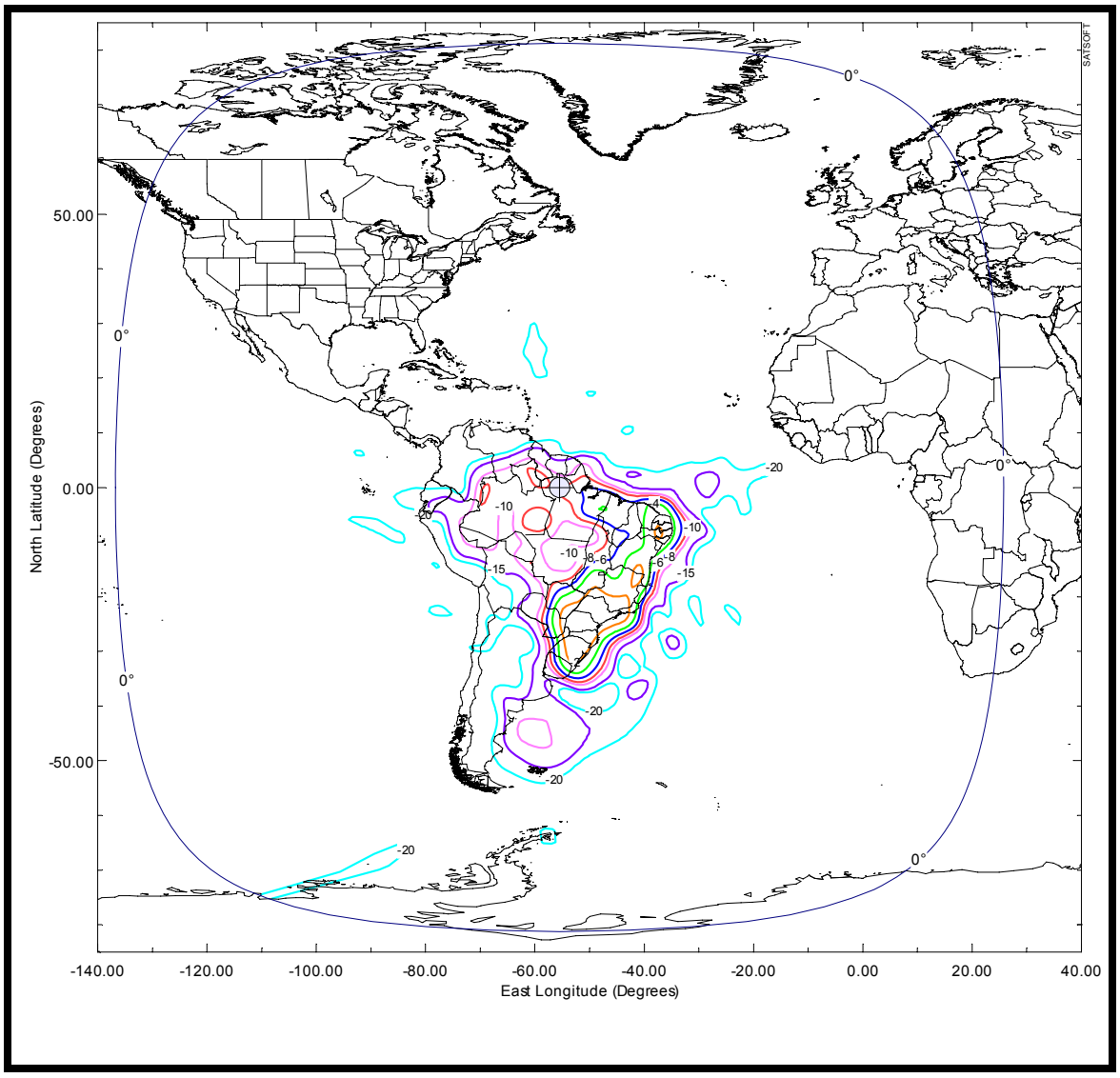


EXHIBIT 5A-5: BRAZIL RECEIVE BEAM
(Schedule S Beam ID: BVUL)

Beam Polarization: Vertical
Peak Beam Gain: 35.8 dBi
Peak Beam G/T: 9.5 dB/K
Saturated Flux Density @ Peak Beam G/T: -82.5 to -110.5 dBW/m^2

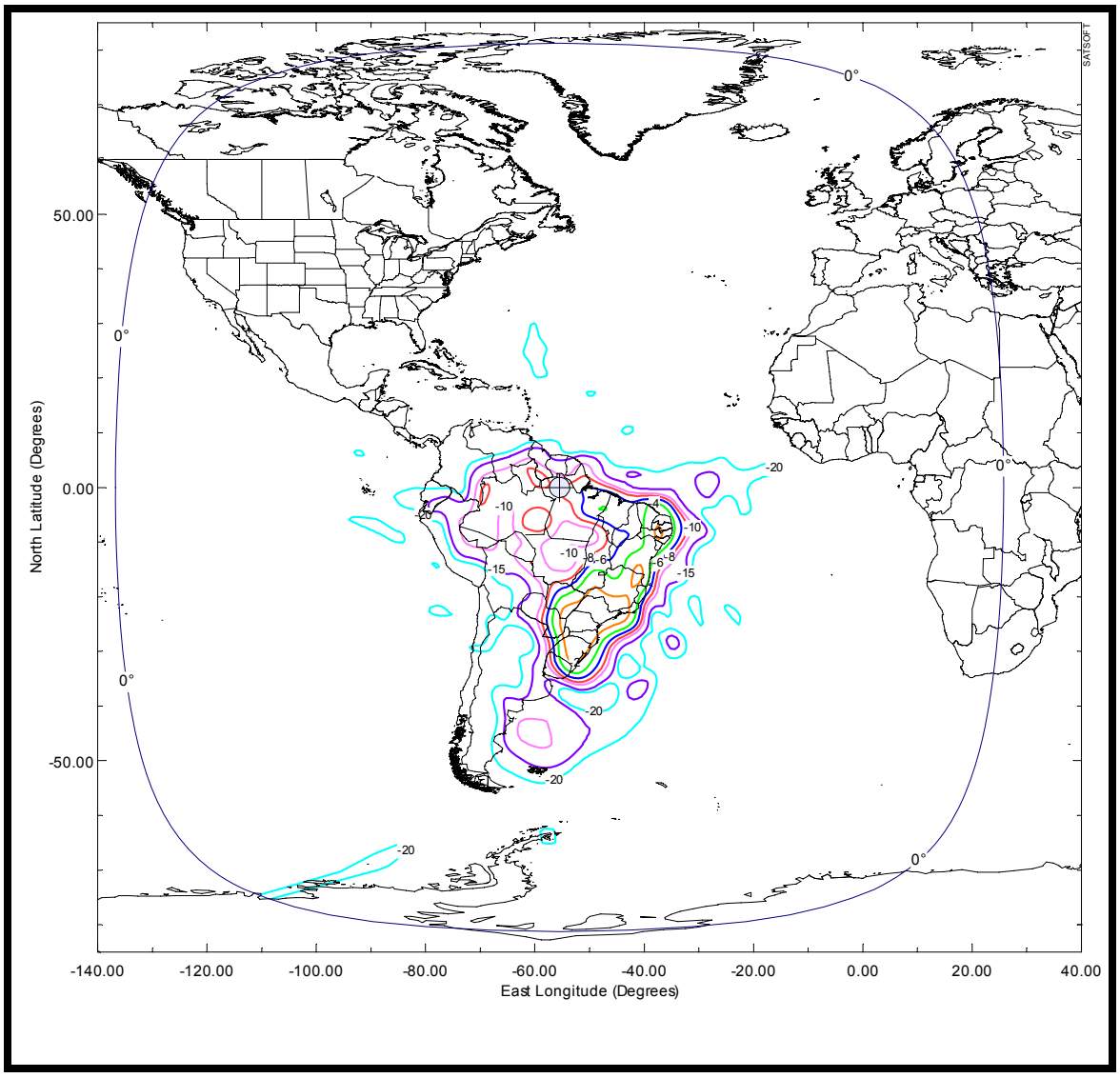


EXHIBIT 5A-6: NAOR RECEIVE BEAM
(Schedule S Beam ID: NHUL)

Beam Polarization: Horizontal
Peak Beam Gain: 29.6 dBi
Peak Beam G/T: 4.4 dB/K
Saturated Flux Density @ Peak Beam G/T: -78.4 to -106.4 dBW/m^2

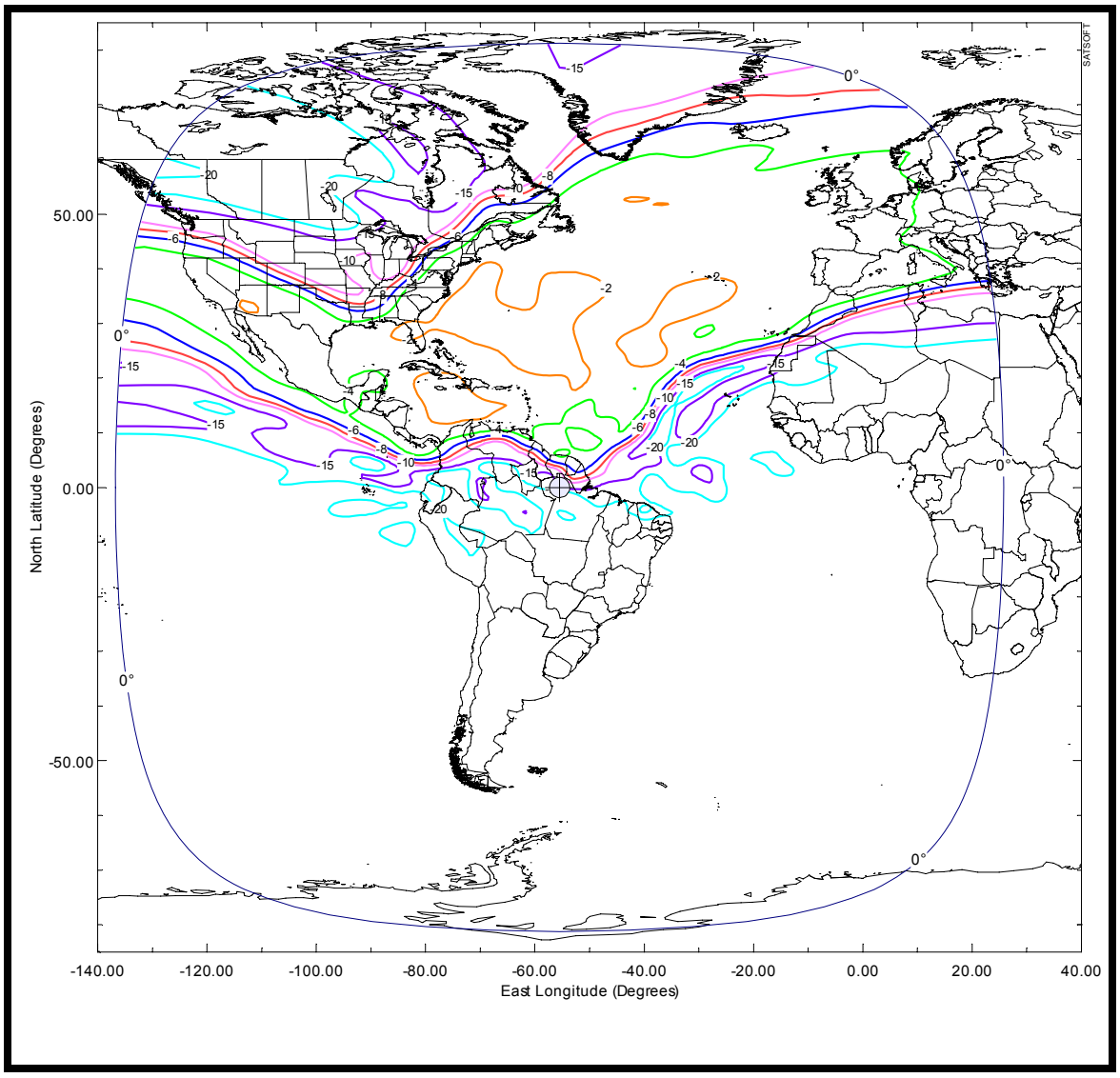


EXHIBIT 5A-7: UHF RECEIVE BEAM
(Schedule S Beam ID: URUL)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 15.5 dBi
Peak Beam G/T: -11.7 dB/K
Saturated Flux Density @ Peak Beam G/T: -155 to -118 dBW/m^2

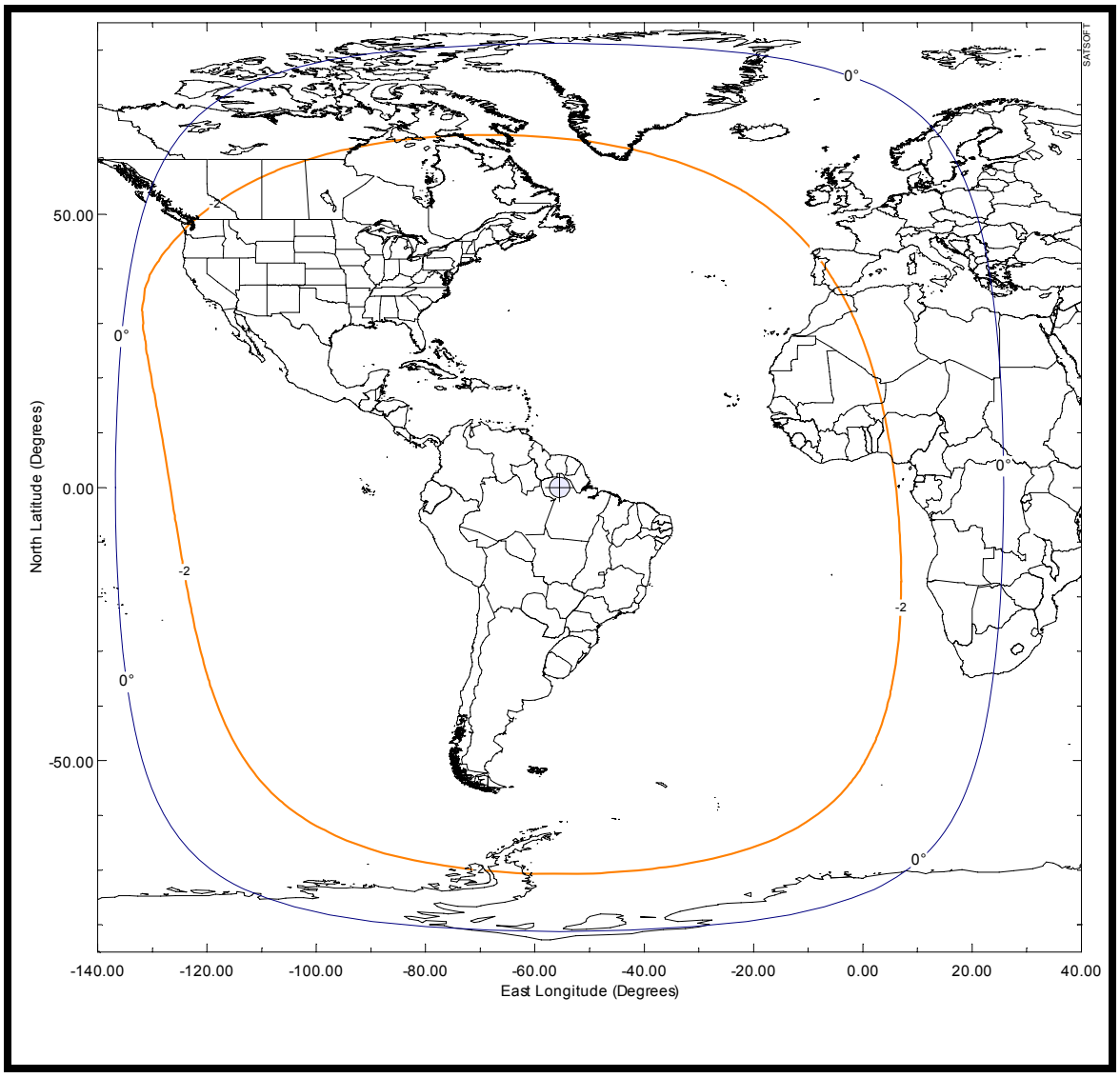


EXHIBIT 5A-8: WEST HEMI TRANSMIT BEAM
(Schedule S Beam ID: HHDL)

Beam Polarization: Horizontal
Peak Beam Gain: 24.7 dBi
Peak Beam EIRP: 42.2 dBW

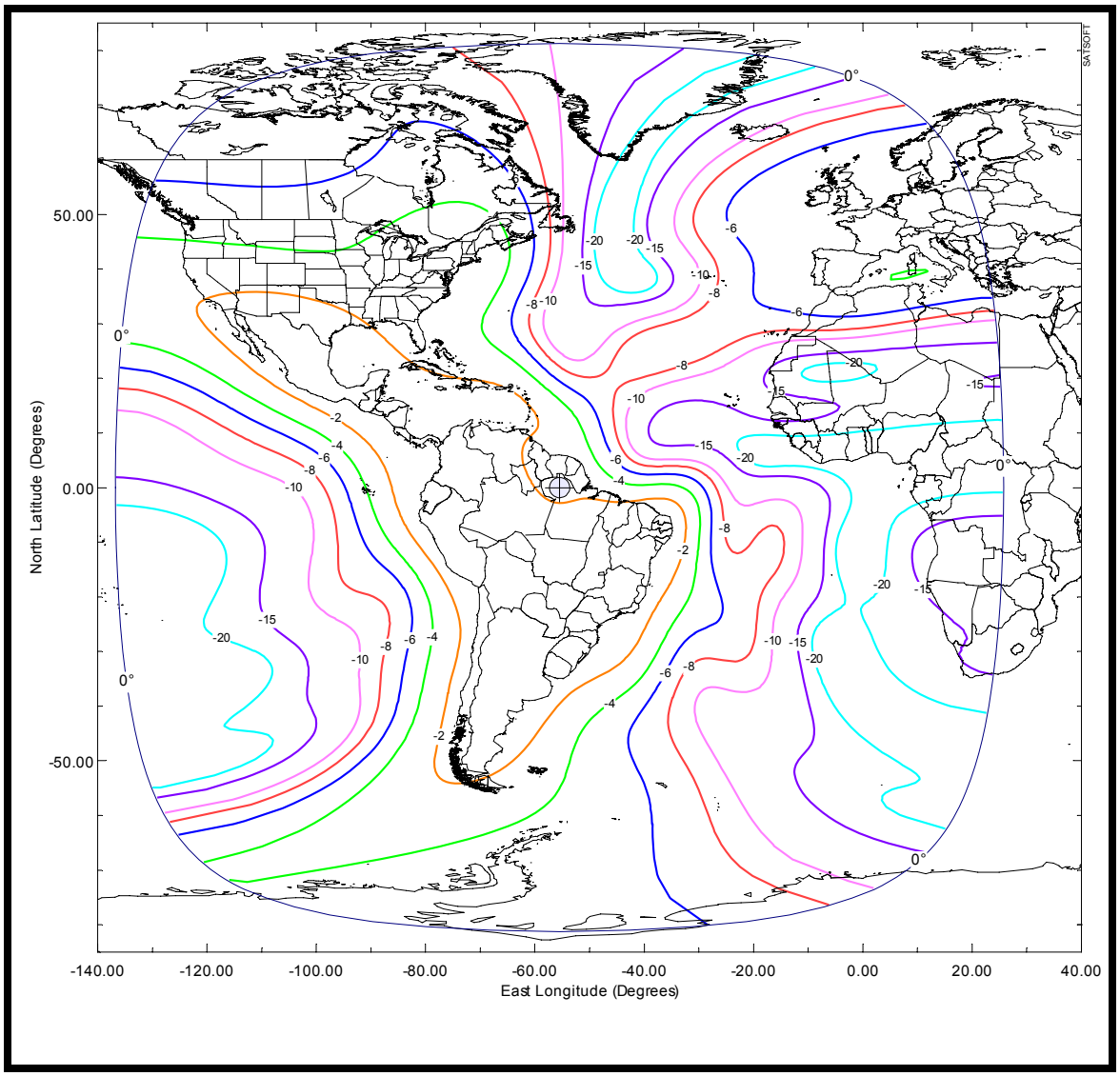


EXHIBIT 5A-9: WEST HEMI TRANSMIT BEAM
(Schedule S Beam ID: HVDL)

Beam Polarization: Vertical
Peak Beam Gain: 24.7 dBi
Peak Beam EIRP: 42.2 dBW

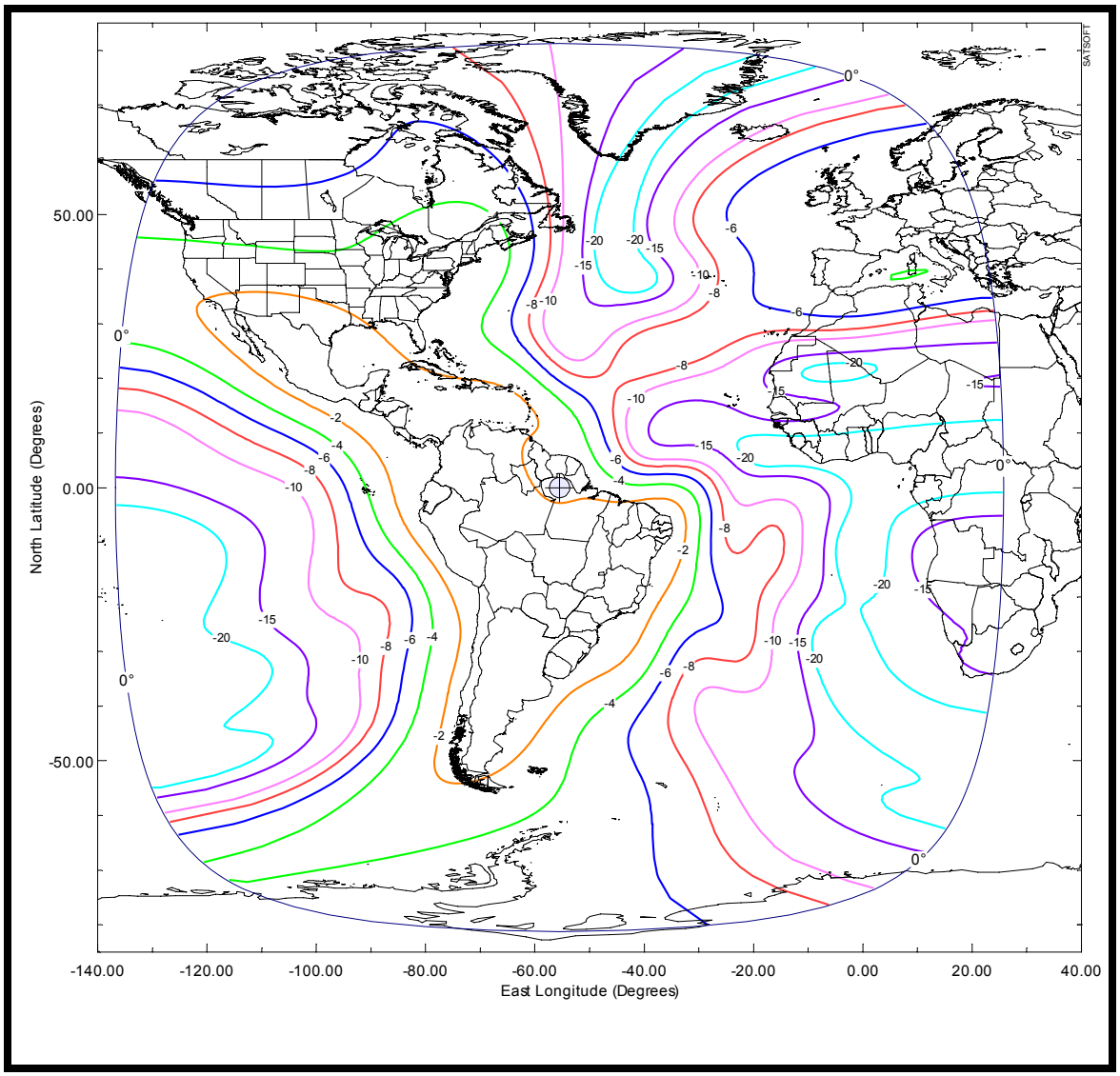


EXHIBIT 5A-10: ANDEAN/MEXICO TRANSMIT BEAM
(Schedule S Beam ID: AVDL)

Beam Polarization: Vertical
Peak Beam Gain: 32.3 dBi
Peak Beam EIRP: 52.9 dBW

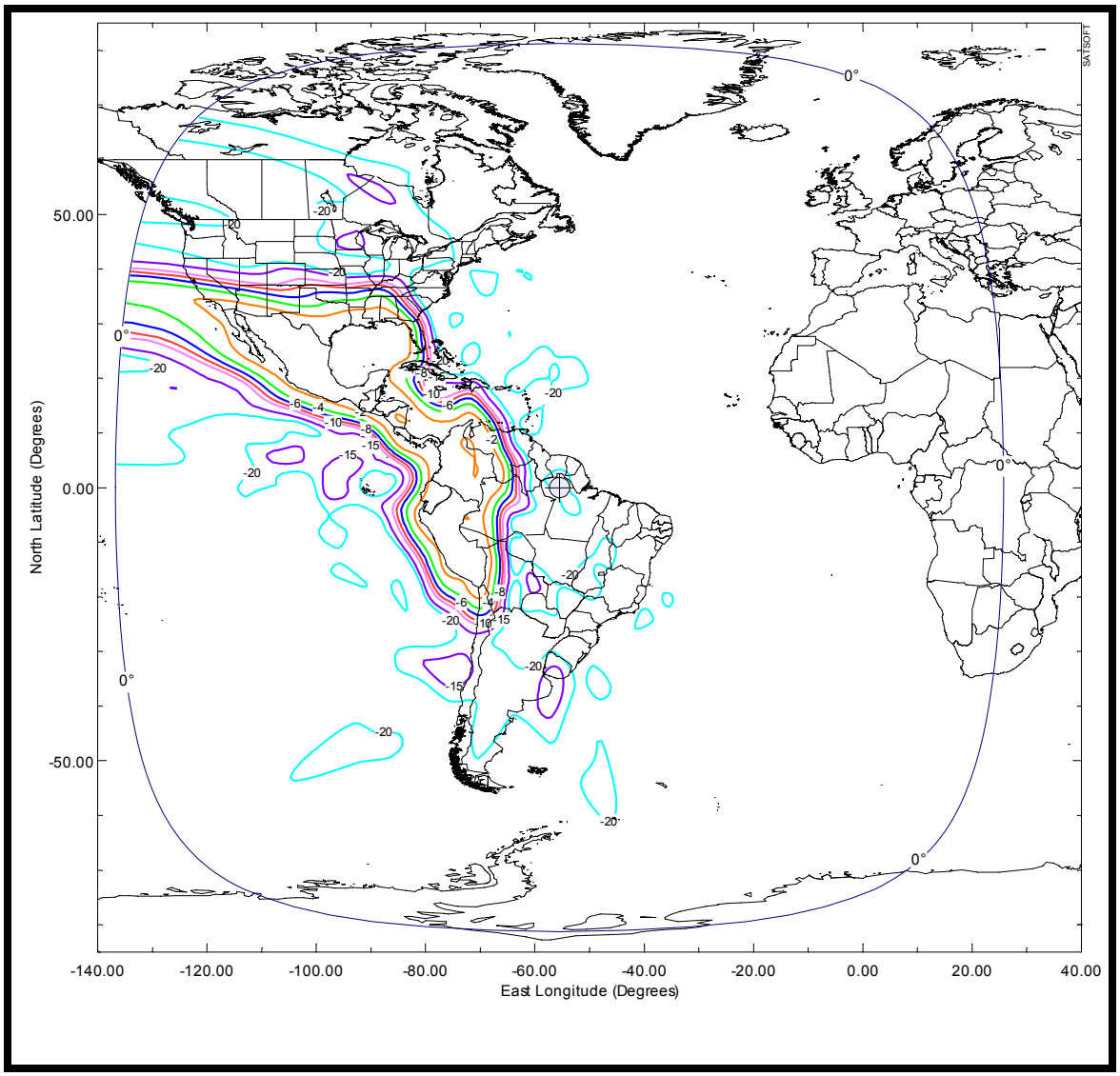


EXHIBIT 5A-11: BRAZIL TRANSMIT BEAM
(Schedule S Beam ID: BHDL)

Beam Polarization: Horizontal
Peak Beam Gain: 33.9 dBi
Peak Beam EIRP: 54.6 dBW

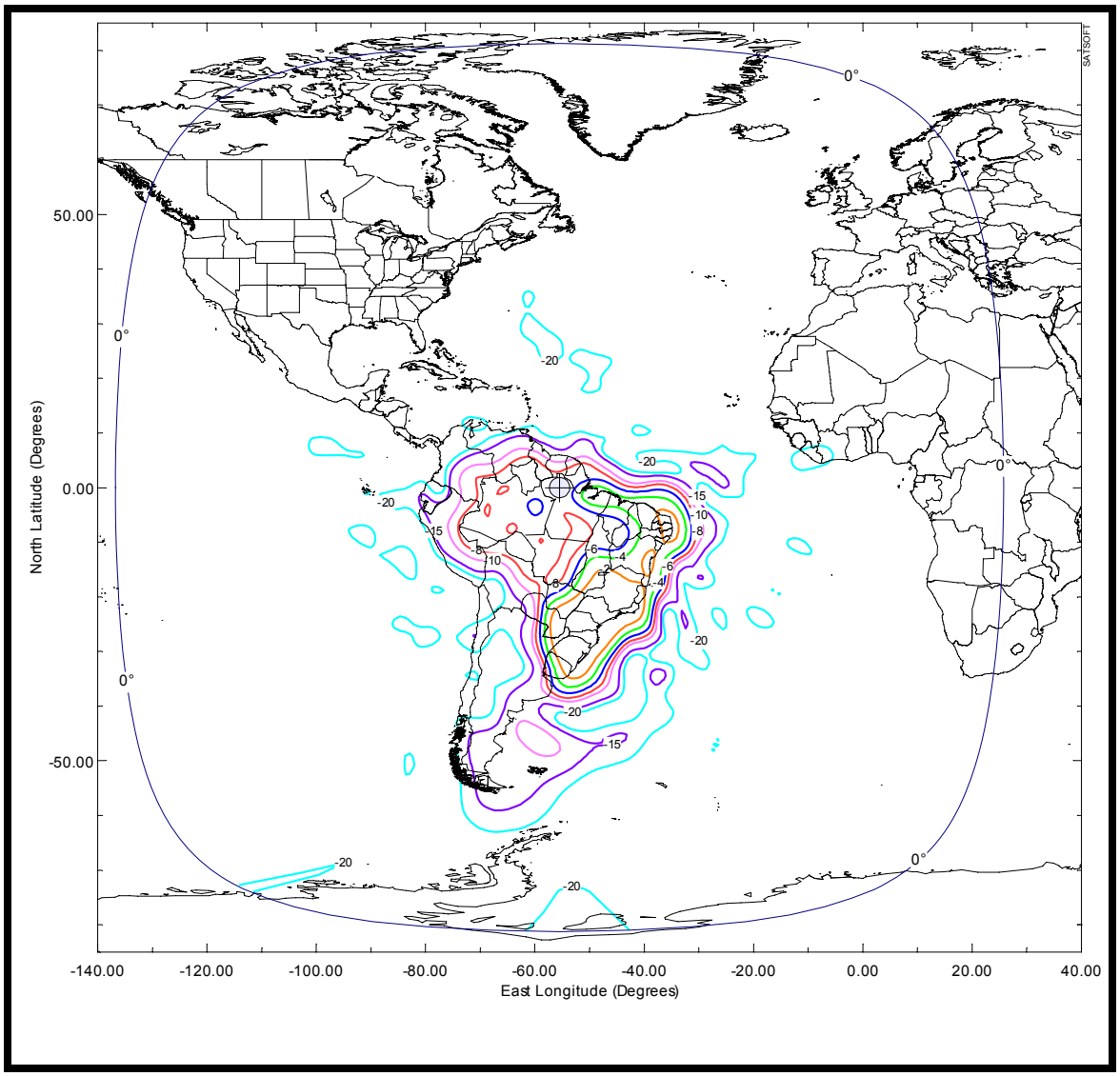


EXHIBIT 5A-12: BRAZIL TRANSMIT BEAM
(Schedule S Beam ID: BVDL)

Beam Polarization: Vertical
Peak Beam Gain: 33.9 dBi
Peak Beam EIRP: 54.6 dBW

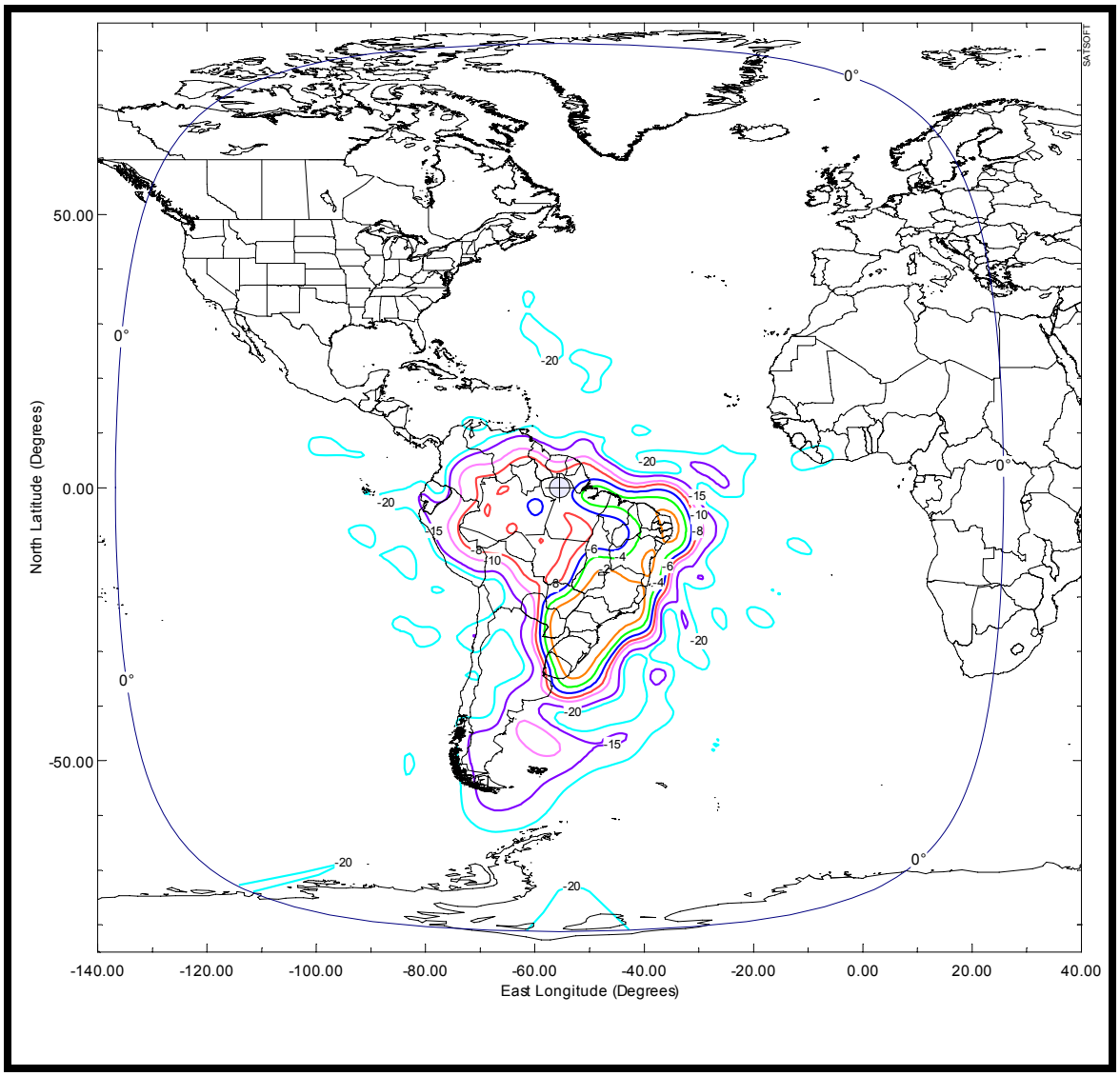


EXHIBIT 5A-13: NAOR TRANSMIT BEAM
(Schedule S Beam ID: NVDL)

Beam Polarization: Vertical
Peak Beam Gain: 27.2 dBi
Peak Beam EIRP: 47.7 dBW

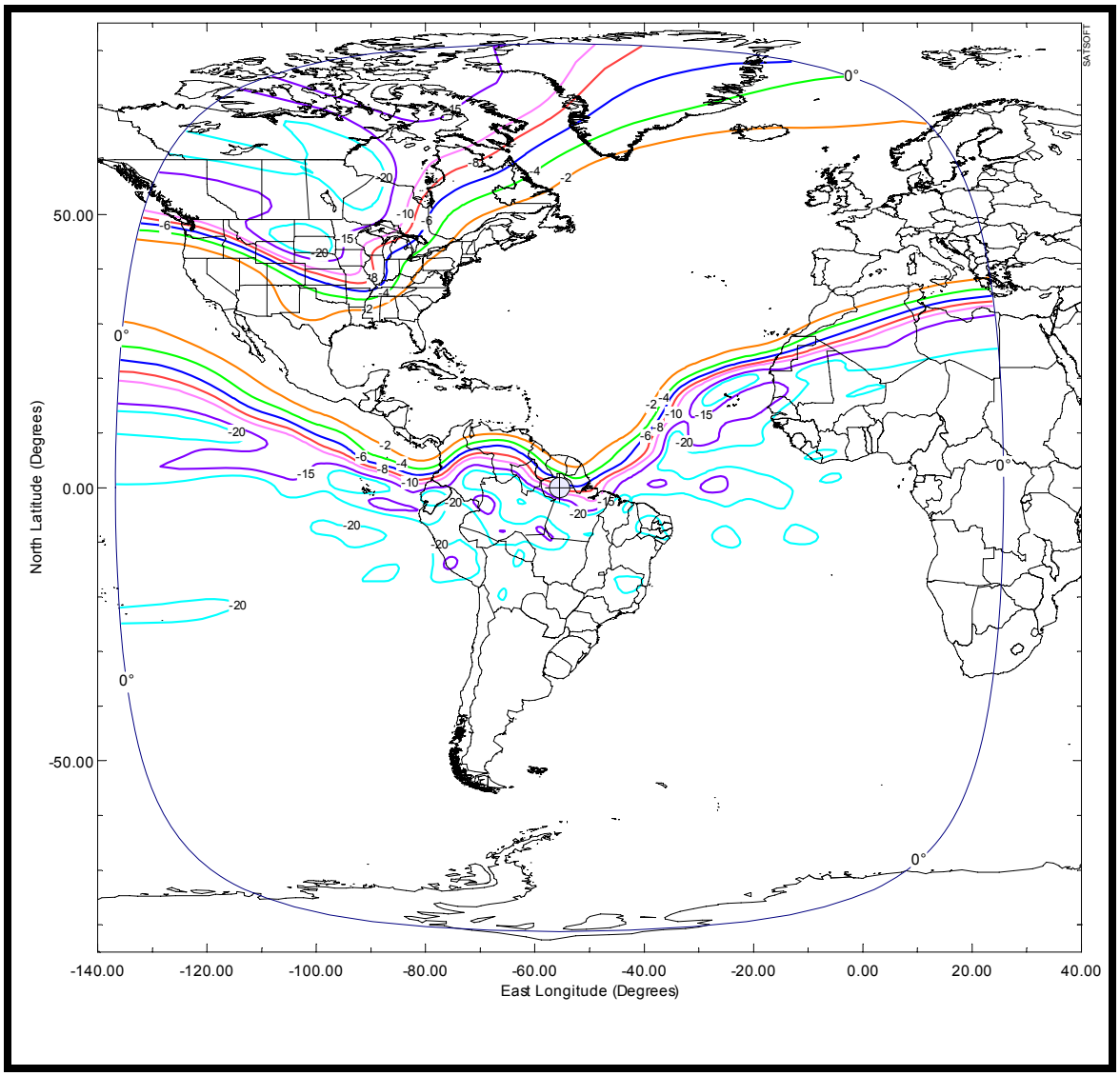


EXHIBIT 5A-14: UHF TRANSMIT BEAM
(Schedule S Beam ID: URDL)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 16.0 dBi
Peak Beam EIRP: 28.9 dBW

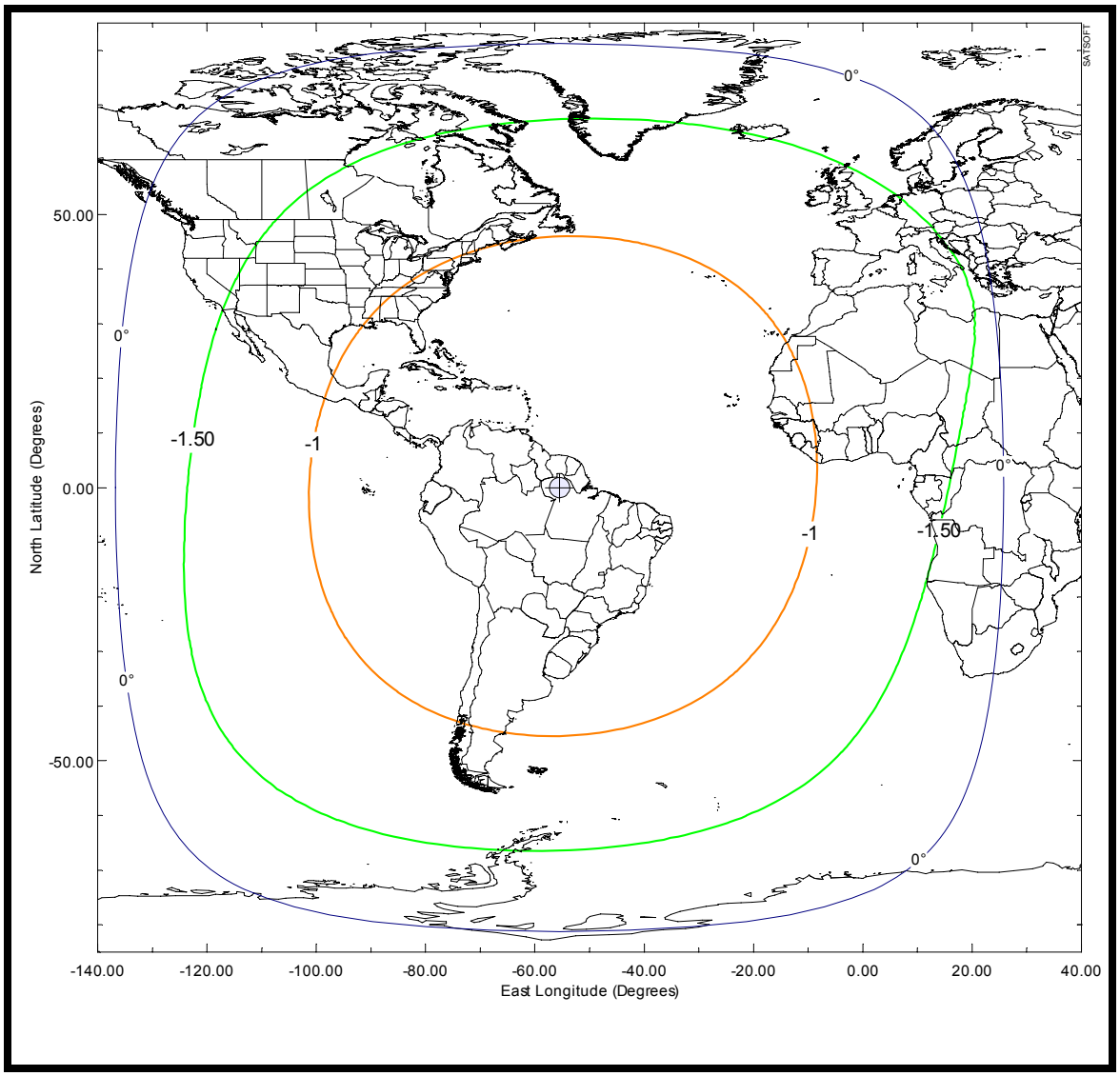


EXHIBIT 5B-1: COMMAND RECEIVE BEAM (on-station)
(Schedule S Beam ID: CMDR)

Beam Polarization: Horizontal
Peak Beam Gain: 27.6 dBi
Peak Beam G/T: -8.5 dB/K
Command Threshold Flux Density @ Peak Beam G/T: -117.9 dBW/m^2

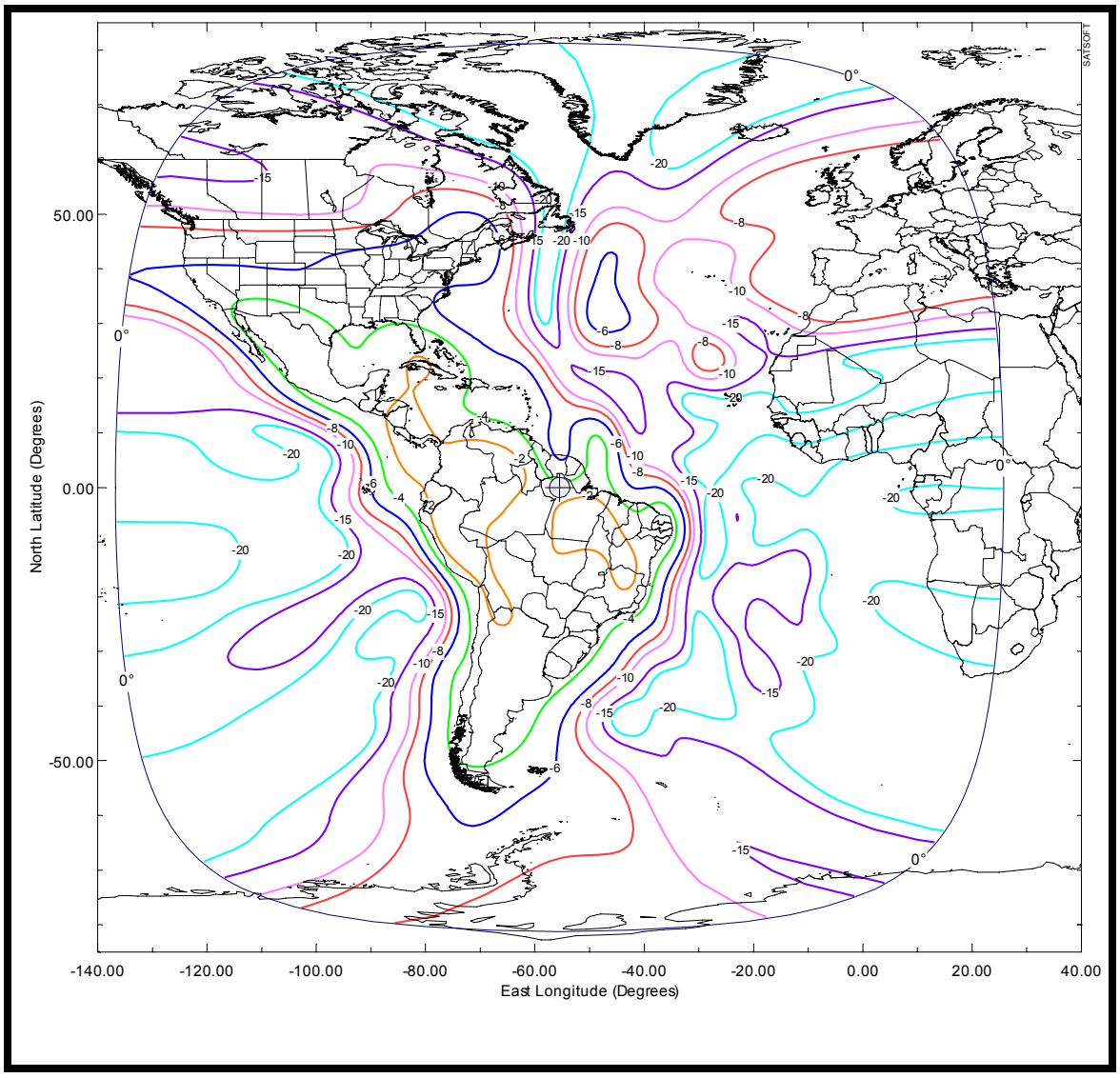


EXHIBIT 5B-2: COMMAND RECEIVE BEAM (back-up)
(Bicone Antenna)
(Schedule S Beam ID: CMDB)

Beam Polarization: Horizontal
Peak Beam Gain: 0 dBi
Peak Beam G/T: -33.8 dB/K
Command Threshold Flux Density @ Peak Beam G/T: -92.7 dBW/m^2

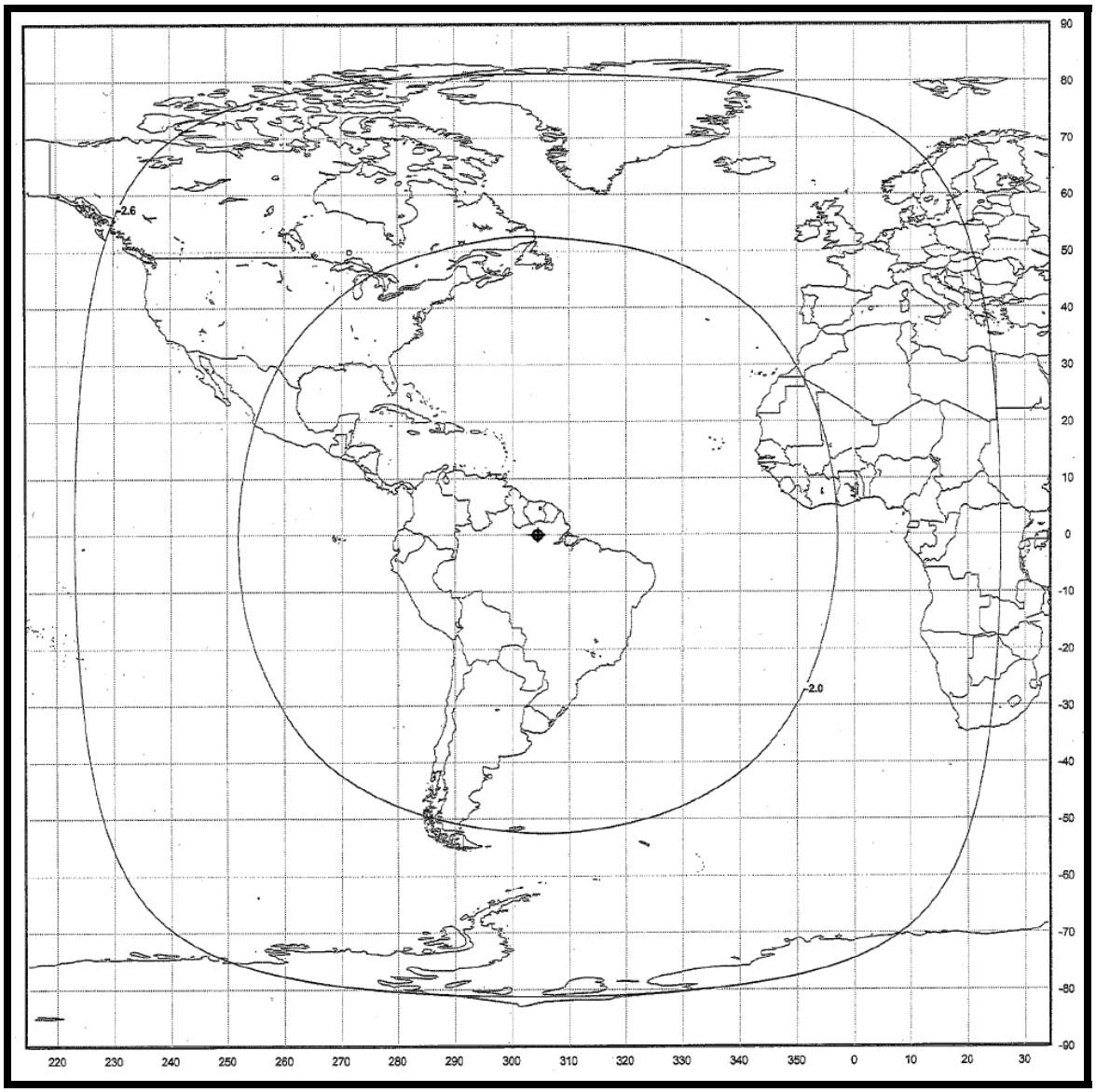


EXHIBIT 5B-3: COMMAND RECEIVE BEAM (back-up)
(Pipe Antennas)
(Schedule S Beam ID: CMDP)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 1.5 dBi
Peak Beam G/T: -32.3 dB/K
Command Threshold Flux Density @ Peak Beam G/T: -93.5 dBW/m^2

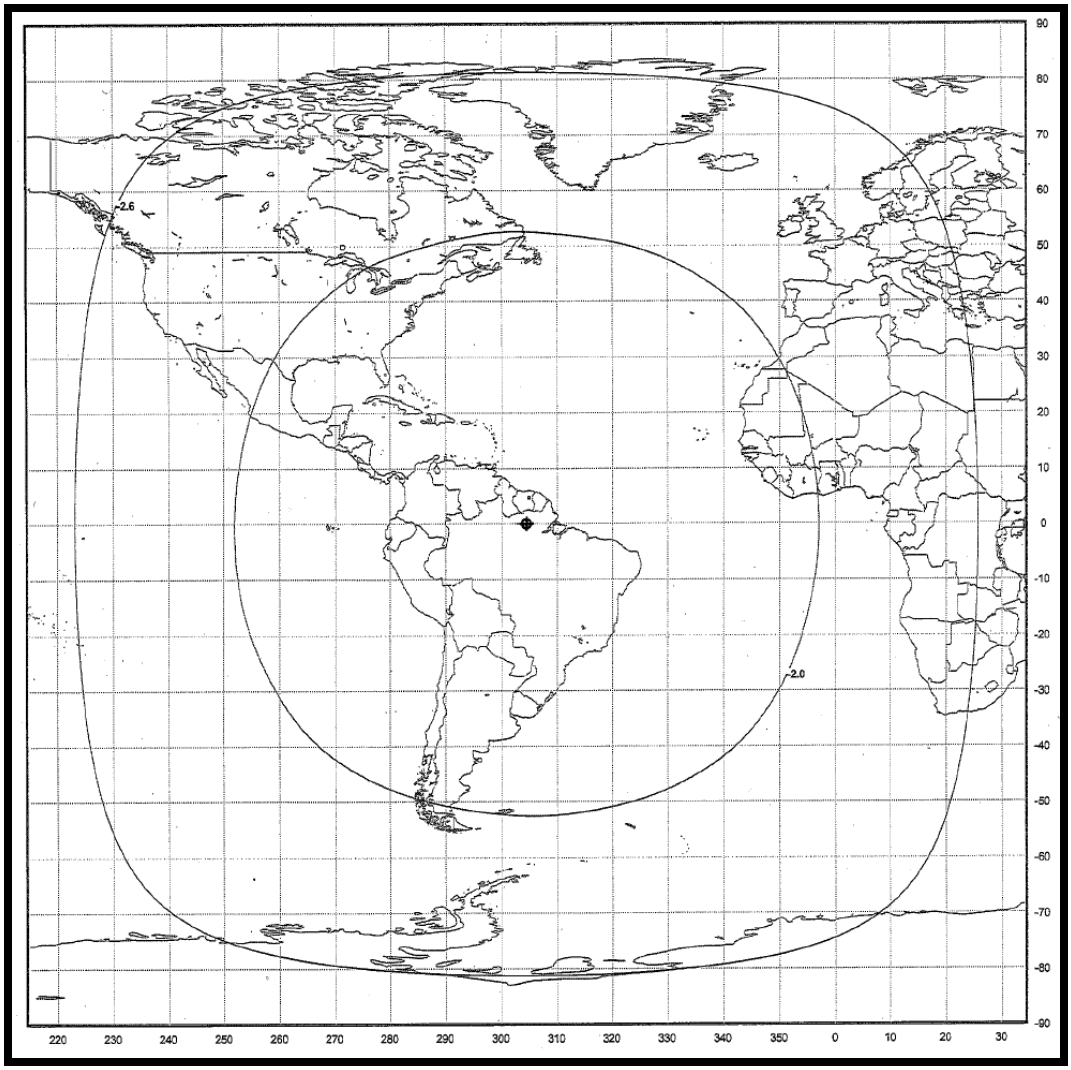


EXHIBIT 5B-4: TELEMETRY TRANSMIT BEAM (on-station)
(Schedule S Beam ID: TLMR)

Beam Polarization: Vertical
Peak Beam Gain: 24.7 dBi
Peak Beam EIRP: 15.8 dBW

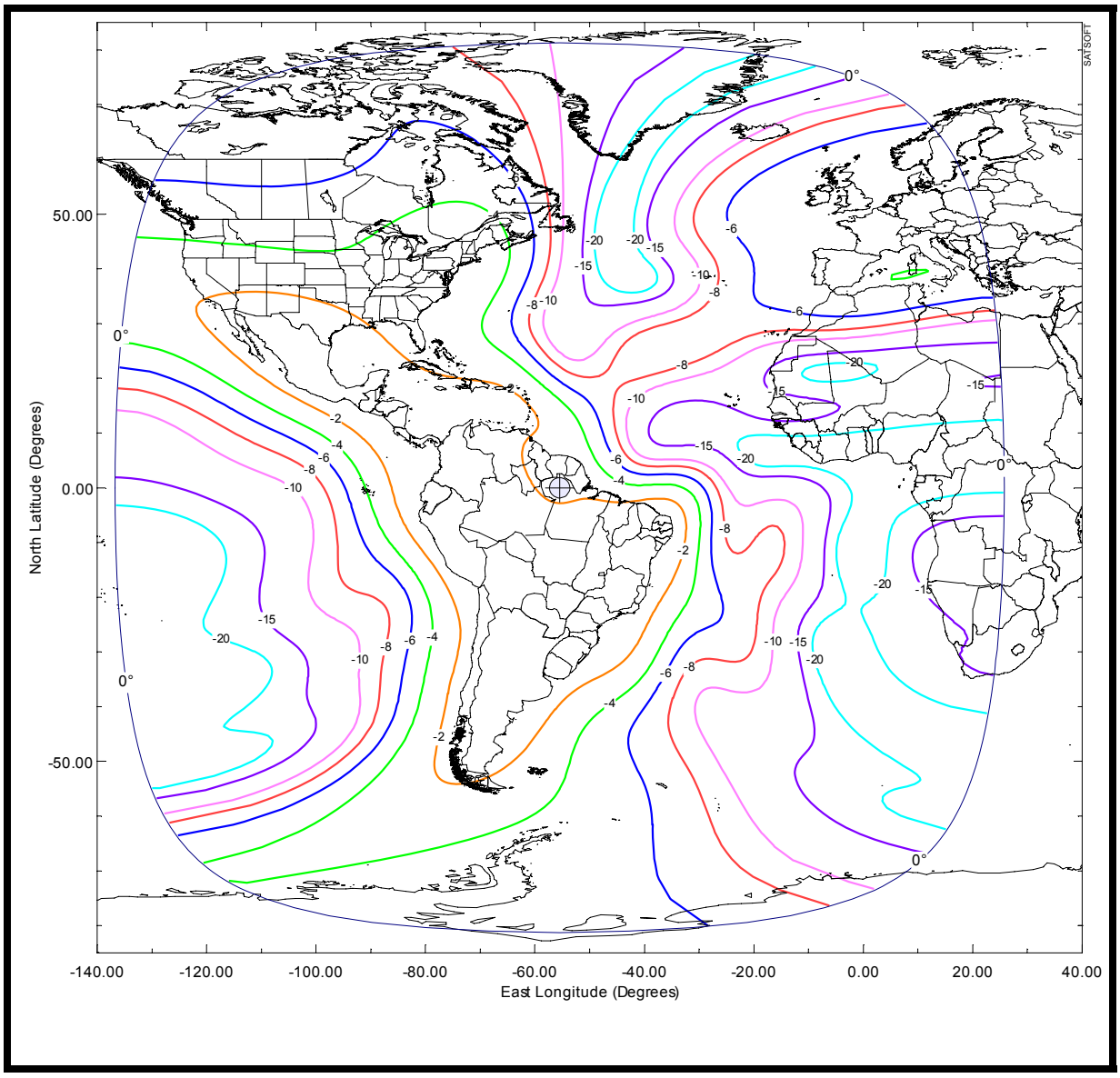


EXHIBIT 5B-5: TELEMETRY TRANSMIT BEAM (back-up)
(Bicone Antenna)
(Schedule S Beam ID: TLMB)

Beam Polarization: Vertical
Peak Beam Gain: 0 dBi
Peak Beam EIRP: 6.0 dBW

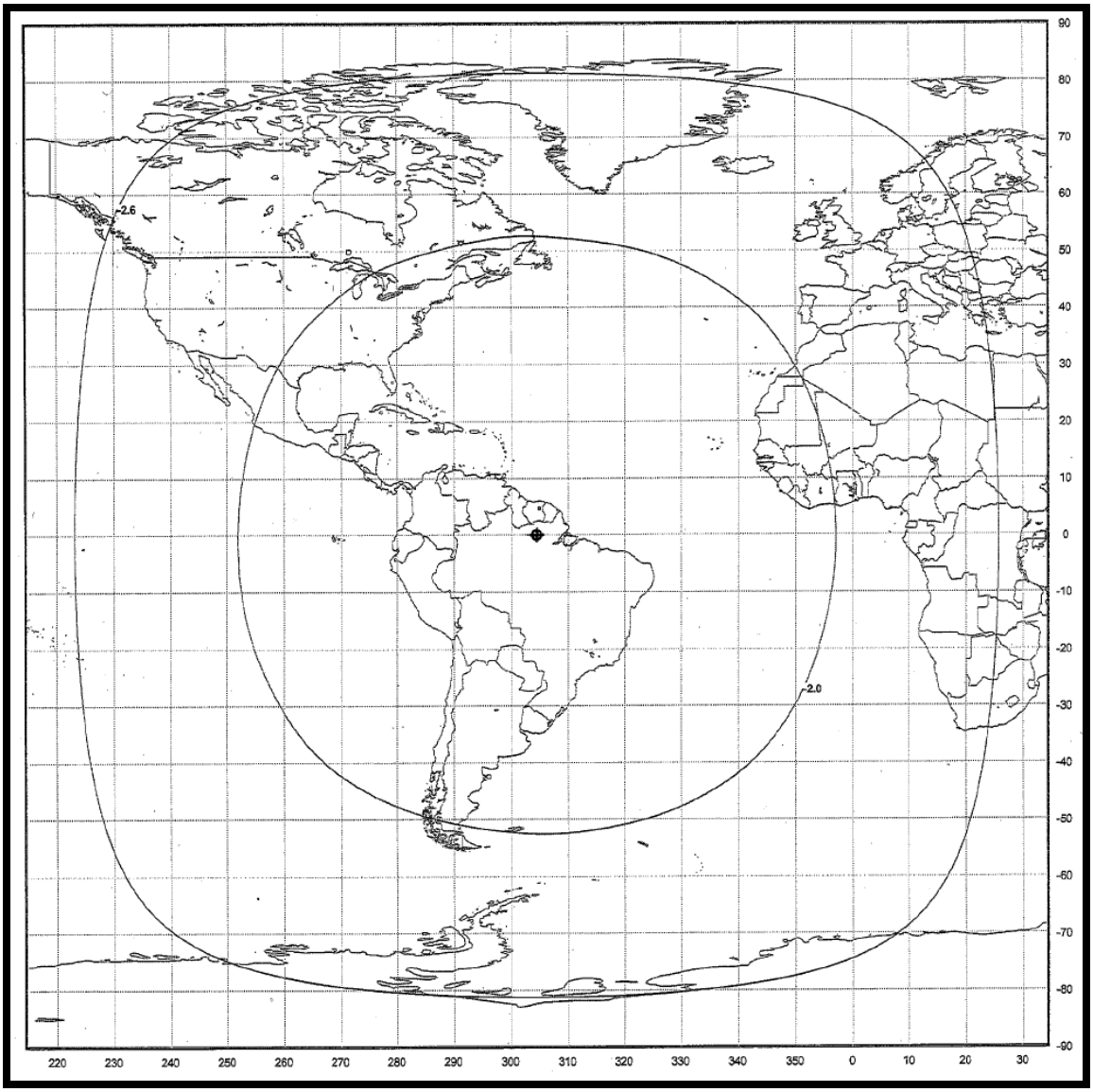


EXHIBIT 5B-6: TELEMETRY TRANSMIT BEAM (back-up)
(Pipe Antennas)
(Schedule S Beam ID: TLMP)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 1.5 dBi
Peak Beam EIRP: 5.0 dBW

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

Beam Polarization: Right Hand Circular
Peak Beam Gain: 12.3 dBi
Peak Beam EIRP: 10.0 dBW

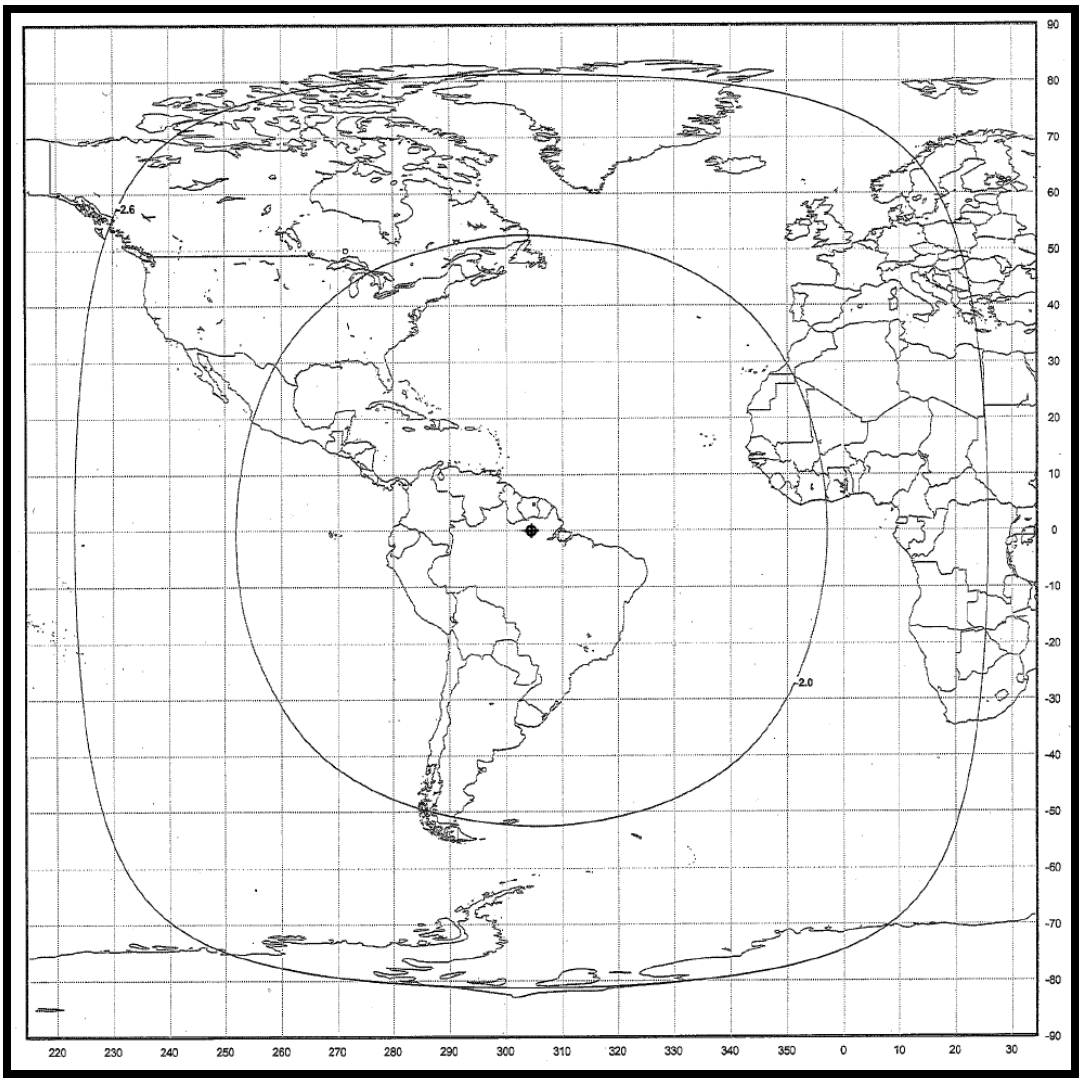


EXHIBIT 5C-2: Ku-BAND ULPC TRANSMIT BEAM
(Schedule S Beam ID: UPKR)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 17.7 dBi
Peak Beam EIRP: 15.8 dBW

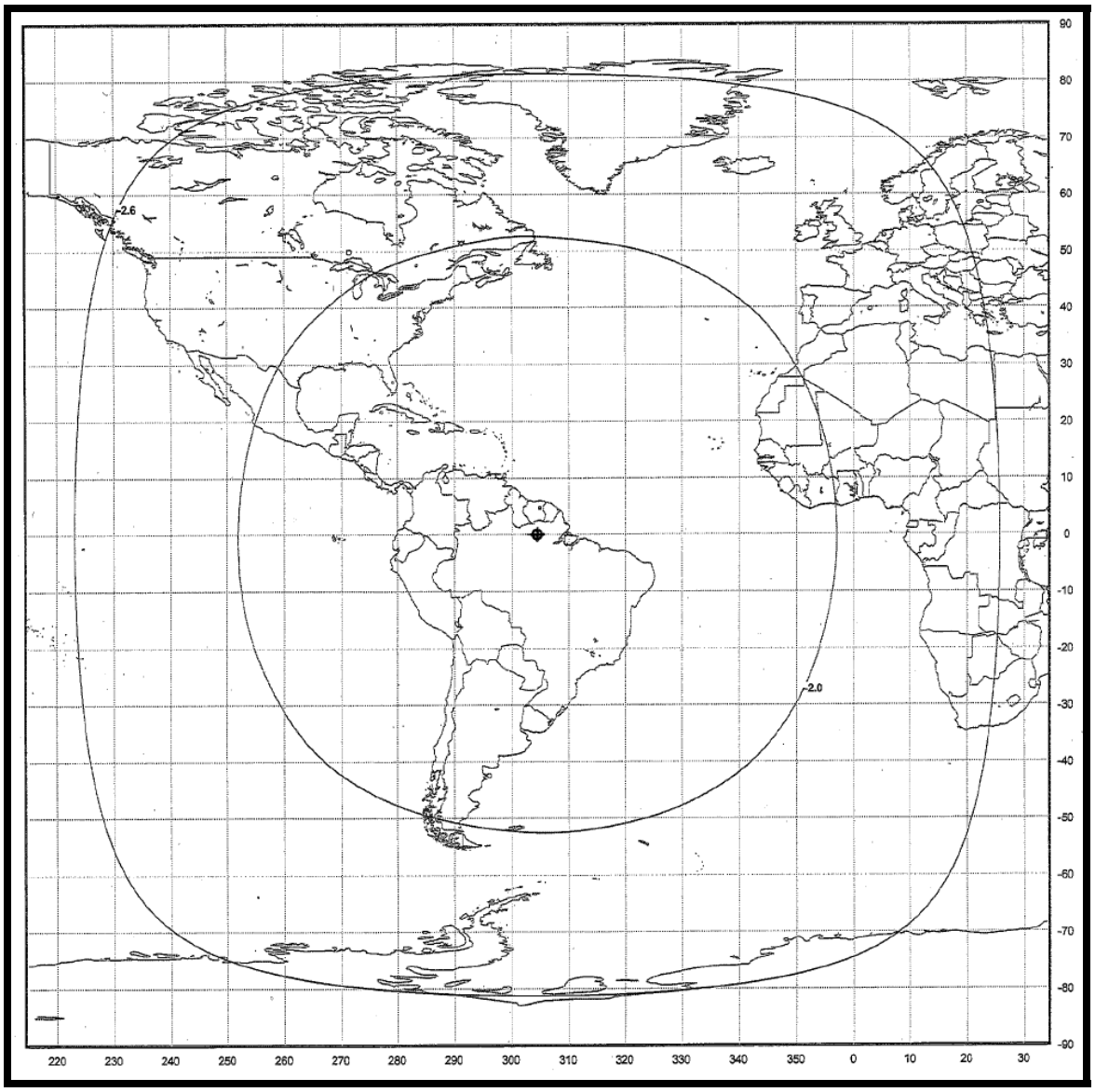


EXHIBIT 5C-3: Ku-BAND ULPC TRANSMIT BEAM
(Schedule S Beam ID: UPKL)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 17.7 dBi
Peak Beam EIRP: 15.8 dBW

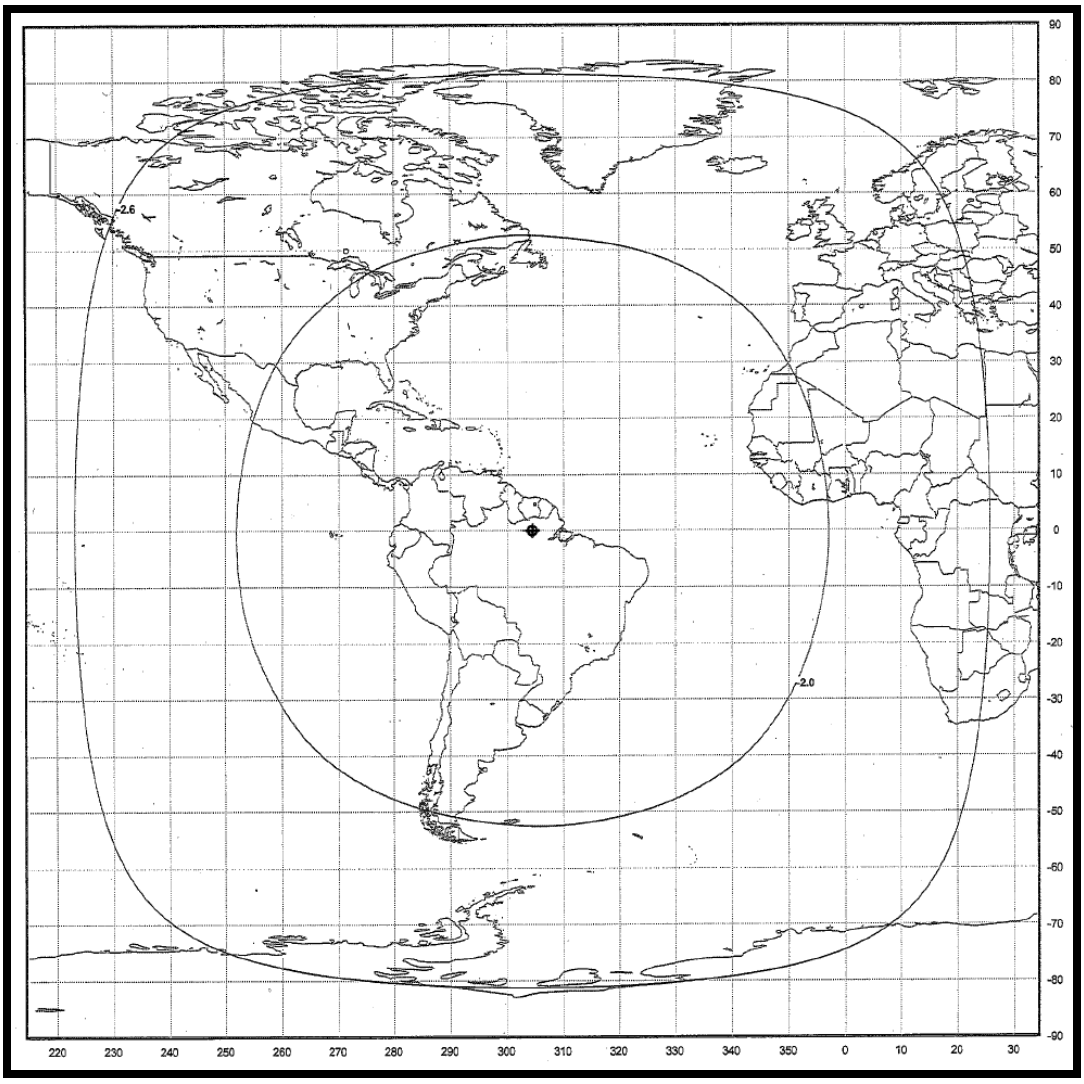


EXHIBIT 6: COMMUNICATION SUBSYSTEM
EIRP AND G/T BUDGETS

Beam Name	West Hemi	West Hemi		
Frequency Band (MHz)	5925 - 6425	5925 – 6425		
Polarization	Horizontal	Vertical		
Channel Bandwidth (MHz)	36 / 72	36 / 72		
Antenna Noise Temperature (°Kelvin)	195	195		
Receiver Noise Temperature (°Kelvin)	215	215		
Total System Noise Temperature (°Kelvin)	410	410		
Total System Noise Temperature (dB/K)	26.1	26.1		
Peak Gain of Satellite Receive Antenna (dBi)	27.6	27.6		
Peak G/T (dB/K)	1.5	1.5		
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-107.5	-107.5		
Beam Name	Andean/Mexico	Brazil	Brazil	NAOR
Polarization	14000 – 14500	Horizontal	Vertical	Horizontal
Polarization	Horizontal	14000 - 14250	14000 – 14500	14250 – 14500
Channel Bandwidth (MHz)	27 / 72 / 77	72 / 77	36 / 72 / 77	27 / 54
Antenna Noise Temperature (°Kelvin)	230	255	255	175
Receiver Noise Temperature (°Kelvin)	181	179	179	159
Total System Noise Temperature (°Kelvin)	411	434	434	334
Total System Noise Temperature (dB/K)	26.1	26.3	26.3	25.2
Peak Gain of Satellite Receive Antenna (dBi)	33.9	35.8	35.8	29.6
Peak G/T (dB/K)	7.8	9.5	9.5	4.4
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-107.8	-110.5	-110.5	-106.4
Beam Name	UHF			
Frequency Band (MHz)	292.385 – 317.330			
Polarization	Right Hand Circular			
Channel Bandwidth (MHz)	5 / 25			
Antenna Noise Temperature (°Kelvin)	266			
Receiver Noise Temperature (°Kelvin)	259			
Total System Noise Temperature (°Kelvin)	525			
Total System Noise Temperature (dB/K)	27.2			
Peak Gain of Satellite Receive Antenna (dBi)	15.5			
Peak G/T (dB/K)	-11.7			
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-155			

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

Beam Name	West Hemi	West Hemi		
Frequency Band (MHz)	3700 – 4200	3700 – 4200		
Polarization	Horizontal	Vertical		
Channel Bandwidth (MHz)	36 / 72	36 / 72		
Maximum Power At The Output of Last Stage Amplifier (dBW)	18.7	18.7		
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	1.2	1.2		
Power Into Transmit Antenna (dBW)	17.5	17.5		
Peak Gain of Satellite Transmit Antenna (dBi)	24.7	24.7		
Maximum Downlink EIRP (dBW)	42.2	42.2		
Beam Name	Andean/Mexico	Brazil	Brazil	NAOR
Frequency Band (MHz)	Vertical	Horizontal	Vertical	Vertical
Polarization	11700 – 12200 12500 – 12750	11700 - 12200	11700 - 11950	11450 - 11700
Channel Bandwidth (MHz)	27 / 54 / 72 / 77	36 / 72 / 77	72 / 77	27 / 54
Maximum Power At The Output of Last Stage Amplifier (dBW)	21.8	21.8	21.8	21.8
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	1.2	1.1	1.1	1.3
Power Into Transmit Antenna (dBW)	20.6	20.7	20.7	20.5
Peak Gain of Satellite Transmit Antenna (dBi)	32.3	33.9	33.9	27.2
Maximum Downlink EIRP (dBW)	52.9	54.6	54.6	47.7
Beam Name	UHF			
Frequency Band (MHz)	243.845 – 268.100			
Polarization	Right Hand Circular			
Channel Bandwidth (MHz)	5 / 25			
Maximum Power At The Output of Last Stage Amplifier (dBW)	17.1			
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	4.2			
Power Into Transmit Antenna (dBW)	12.9			
Peak Gain of Satellite Transmit Antenna (dBi)	16.0			
Maximum Downlink EIRP (dBW)	28.9			
Beam Name	C-Band ULPC	Ku-Band ULPC	Ku-Band ULPC	
Frequency Band (MHz)	3700.25	11696.5	12500.5	
Polarization	Right Hand Circular	Right Hand Circular	Left Hand Circular	
Channel Bandwidth (MHz)	0.025	0.025	0.025	
Maximum Power At The Output of Last Stage Amplifier (dBW)	1.0	1.0	1.0	
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	1.3	0.9	0.9	
Power Into Transmit Antenna (dBW)	-2.3	-1.9	-1.9	
Peak Gain of Satellite Transmit Antenna (dBi)	12.3	17.7	17.7	
Maximum Downlink EIRP (dBW)	10.0	15.8	15.8	

EXHIBIT 7: TC&R SUBSYSTEM CHARACTERISTICS

	Spacecraft Antenna		
	West Hemi	**Bicone**	**Pipe**
Command Frequency (MHz) / Polarization (see note)			
Transfer Orbit / Emergency	n/a	5925.5 (H)	6424.5 (LHCP)
On-Station	5925.5 (H)	n/a	n/a
Command Modulation	FM	FM	FM
Bandwidth of Command Carrier (kHz)			
Occupied Bandwidth	560	560	560
Allocated Bandwidth	1000	1000	1000
Command Threshold (dBW/m^2)			
Beam Peak	-117.9	-92.7	-93.5
Edge of Coverage	-113.0	-90.1	-92.0
Command G/T (dB/K)			
Beam Peak	-8.5	-33.8	-32.3
Edge of Coverage	-13.4	-36.4	-33.8
Telemetry Frequency (MHz) / Polarization (see note)			
Transfer Orbit / Emergency	n/a	3701.25 (V) 3701.75 (V) 3702.25 (V) 3702.75 (V)	3701.25 (LHCP) 3701.75 (LHCP) 3702.25 (LHCP) 3702.75 (LHCP)
On-Station	3701.25 (V) 3701.75 (V) 3702.25 (V) 3702.75 (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	15.8	6.0	5.0
Edge of Coverage	11.2	3.3	4.7
On-Station Ranging Accuracy (meters)	30	30	30

Note:
H: Linear Horizontal Polarization
V: Linear 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	West Hemi	Bicone	Pipe
Frequency (MHz)	5925.5	5925.5	6424.5
Polarization	Horizontal	Horizontal	Left Hand Circular
Antenna Noise Temperature (°Kelvin)	195	290	290
Receiver Noise Temperature (°Kelvin)	3902	2122	2122
Total System Noise Temperature (°Kelvin)	4097	2412	2412
Total System Noise Temperature (dB/K)	36.1	33.8	33.8
Peak Gain of Satellite Receive Antenna (dBi)	27.6	0	1.5
Peak G/T (dB/K)	-8.5	-33.8	-32.3
SFD Threshold at Peak G/T (dBW/m^2)	-117.9	-92.7	-93.5
Operating Mode	On-Station	Back-up	Back-up
Antenna Type	West Hemi	Bicone	Pipe
Frequency (MHz)	3701.25 3701.75 3702.25 3702.75	3701.25 3701.75 3702.25 3702.75	3701.25 3701.75 3702.25 3702.75
Polarization	Vertical	Vertical	Left Hand Circular
Maximum Power At The Output of Last Stage Amplifier (dBW)	-3.0	8.4	8.4
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	5.9	2.4	4.9
Power Into The Transmit Antenna (dBW)	-8.9	6.0	3.5
Power Into The Transmit Antenna (Watts)	0.1	4.0	2.2
Peak Gain of Satellite Transmit Antenna (dBi)	24.7	0	1.5
Maximum Downlink EIRP (dBW)	15.8	6.0	5.0

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
49150 kbps Carrier	72M0G7W	72000
52563 kbps Carrier	77M0G7W	77000

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS

FREQUENCY BAND : 3700 - 4200 MHz							
West Hemi Beam (H-Pol.) - 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	41.4*	41.3*	42.2	42.2	42.2	42.2	42.2
Carrier Occupied Bandwidth (kHz)	4000	4000	4000	4000	4000	4000	4000
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-152.0	-152.0	-151.0	-150.8	-150.7	-150.6	-149.9
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	1.5	3.8	6.2	8.6	7.9
West Hemi Beam (H-Pol.) - 36M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	42.2	42.2	42.2	42.2	42.2	42.2	42.2
Carrier Occupied Bandwidth (kHz)	30133	30133	30133	30133	30133	30133	30133
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-160.0	-159.8	-159.7	-159.6	-159.5	-159.4	-158.6
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	8.0	7.8	10.2	12.6	15.0	17.4	16.6

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 3700 – 4200 MHz							
West Hemi Beam (V-Pol.) – 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	41.4*	41.3*	42.2	42.2	42.2	42.2	42.2
Carrier Occupied Bandwidth (kHz)	4000	4000	4000	4000	4000	4000	4000
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-152.0	-152.0	-151.0	-150.8	-150.7	-150.6	-149.9
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	1.5	3.8	6.2	8.6	7.9
West Hemi Beam (V-Pol.) – 36M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	42.2	42.2	42.2	42.2	42.2	42.2	42.2
Carrier Occupied Bandwidth (kHz)	30133	30133	30133	30133	30133	30133	30133
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-160.0	-159.8	-159.7	-159.6	-159.5	-159.4	-158.6
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	8.0	7.8	10.2	12.6	15.0	17.4	16.6

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 3700 – 4200 MHz							
ULPC (RHCP-Pol.) - 25K0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Carrier Occupied Bandwidth (kHz)	25	25	25	25	25	25	25
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)	-161.3	-161.2	-161.1	-161.0	-160.9	-160.8	-160.0
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	9.3	9.2	11.6	14.0	16.4	18.8	18.0
Telemetry (V-Pol.) - 500KG7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Carrier Occupied Bandwidth (kHz)	300	300	300	300	300	300	300
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)	-166.3	-166.2	-166.1	-166.0	-165.9	-165.8	-165.0
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	14.3	14.2	16.6	19.0	21.4	23.8	23.0

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 3700 – 4200 MHz							
Telemetry (V-Pol.) - 500KG7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Carrier Occupied Bandwidth (kHz)	300	300	300	300	300	300	300
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)	-176.1	-176.0	-175.9	-175.8	-175.7	-175.6	-174.8
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	24.1	24.0	26.4	28.8	31.2	33.6	32.8
Telemetry (LHCP-Pol.) - 500KG7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Carrier Occupied Bandwidth (kHz)	300	300	300	300	300	300	300
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)	-177.1	-177.0	-176.9	-176.8	-176.7	-176.6	-175.8
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	25.1	25.0	27.4	29.8	32.2	34.6	33.8

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11450 - 11700 MHz							
NAOR Beam (V-Pol.) - 24M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	43.4*	43.3*	45.7*	47.7	47.7	47.7	47.7
Carrier Occupied Bandwidth (kHz)	4000	4000	4000	4000	4000	4000	4000
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-150.0	-150.0	-147.5	-145.3	-145.2	-145.1	-144.4
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	0.3	2.7	5.1	4.4
NAOR Beam (V-Pol.) - 27M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	47.7	47.7	47.7	47.7	47.7	47.7	47.7
Carrier Occupied Bandwidth (kHz)	22600	22600	22600	22600	22600	22600	22600
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)	-153.2	-153.1	-153.0	-152.9	-152.8	-152.6	-151.9
FCC Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	3.2	3.1	5.5	7.9	10.3	12.6	11.9

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11450 - 11700 MHz							
ULPC Beam (RHCP-Pol.) - 25K0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Carrier Occupied Bandwidth (kHz)	25	25	25	25	25	25	25
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)	-155.5	-155.4	-155.3	-155.2	-155.1	-155.0	-154.2
FCC Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	5.5	5.4	7.8	10.2	12.6	15.0	14.2
FREQUENCY BAND : 12500 - 12750 MHz							
Andean-Mexico Beam (V-Pol.) - 72M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	52.9	52.9	52.9	52.9	52.9	52.9	52.9
Carrier Occupied Bandwidth (kHz)	60266	60266	60266	60266	60266	60266	60266
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)	-152.3	-152.2	-152.0	-151.9	-151.8	-151.7	-150.9
ITU Limit (dBW/m^2/4Hz)	-148.0	-148.0	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	4.3	4.2	6.5	8.9	11.3	13.7	12.9

EXHIBIT 10: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 12500 - 12750 MHz							
ULPC Beam (RHCP-Pol.) - 25K0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Carrier Occupied Bandwidth (kHz)	25	25	25	25	25	25	25
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)	-155.5	-155.4	-155.3	-155.2	-155.1	-155.0	-154.2
ITU Limit (dBW/m^2/4Hz)	-148.0	-148.0	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	7.5	7.4	9.8	12.2	14.6	17.0	16.2

* 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 and/or restriction on the movement/placement of the beam.

EXHIBIT 11: RECEIVE AND TRANSMIT SECTION FILTER RESPONSE CHARACTERISTICS

	Attenuation Relative To Peak Level (dB)		
Frequency Offset Relative to Channel Center Frequency (MHz)	Input Section	Output Section	Total
C-Band: 36 MHz Channel			
±8	0.20	0.18	0.31
±12	0.27	0.30	0.47
±14	0.33	0.40	0.60
±16	0.49	0.59	0.93
±18	0.81	1.48	2.12
C-Band: 72 MHz Channel			
±16	0.29	0.26	0.44
±24	0.39	0.38	0.61
±28	0.46	0.47	0.75
±32	0.56	0.67	1.02
±36	0.71	1.67	2.12
Ku-Band: 27 MHz Channel			
±6	0.27	0.24	0.45
±9	0.34	0.49	0.75
±10.5	0.46	0.76	1.12
±12	0.94	1.31	2.14
±13.5	2.30	3.16	5.34
Ku-Band: 36 MHz Channel			
±8	0.23	0.23	0.39
±12	0.32	0.42	0.64
±14	0.43	0.60	0.90
±16	0.78	1.00	1.64
±18	1.72	2.48	4.05
Ku-Band: 54 MHz Channel			
±12	0.28	0.20	0.40
±18	0.38	0.39	0.65
±21	0.44	0.53	0.82
±24	0.64	0.88	1.36
±27	1.12	2.51	3.45

EXHIBIT 11: RECEIVE AND TRANSMIT SECTION FILTER RESPONSE CHARACTERISTICS (continued)

	Attenuation Relative To Peak Level (dB)		
Frequency Offset Relative to Channel Center Frequency (MHz)	Input Section	Output Section	Total
Ku-Band: 72 MHz Channel			
±16	0.30	0.26	0.45
±24	0.42	0.44	0.69
±28	0.48	0.58	0.86
±32	0.65	0.92	1.35
±36	1.05	2.62	3.42
Ku-Band: 77 MHz Channel			
±17	0.30	0.26	0.45
±26	0.41	0.45	0.70
±30	0.49	0.62	0.91
±34	0.66	1.18	1.62
±38.5	1.06	3.18	3.99
UHF-Band: 5 kHz Channel			
±2	0.28	0.30	0.48
±2.4	0.28	0.30	0.48
UHF-Band: 25 kHz Channel			
±10	0.28	0.30	0.48
±12	0.28	0.30	0.48

EXHIBIT 12: INTELSAT 27 LINK BUDGETS

UPLINK BEAM INFORMATION				
Uplink Beam Name	WEST_HEMI	WEST_HEMI	WEST_HEMI	WEST_HEMI
Uplink Frequency (GHz)	6.175	6.175	6.175	6.175
Uplink Beam Polarization	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-8.5	-8.5	-8.5	-8.5
Uplink SFD (dBW/m2)	-77.5	-78.5	-78.5	-78.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	WEST_HEMI	WEST_HEMI	WEST_HEMI	WEST_HEMI
Downlink Frequency (GHz)	3.950	3.950	3.950	3.950
Downlink Beam Polarization	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	36.2	36.2	36.2	36.2
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	53.5W	53.5W	53.5W	53.5W
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)	-38.0	-38.0	-38.0	-38.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	57.5W	57.5W	57.5W	57.5W
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)	-38.0	-38.0	-38.0	-38.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
CARRIER INFORMATION				
Carrier ID	36M0F3F	72M0G7W	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	49150	6000	64
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	36000	60266	6771.1	75.4
Allocated Bandwidth(kHz)	36000	72000	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)	15.2	18.3	6.1	6.1
Earth Station Gain (dBi)	58.4	60.2	49.4	49.4
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	8.1	3.0	3.5	3.5
Earth Station Gain (dBi)	49.3	39.7	41.1	41.1
Earth Station G/T (dB/K)	28.4	19.2	21.0	21.0
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)	82.4	84.4	69.5	49.1
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)	-8.5	-8.5	-8.5	-8.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8
Uplink C/N(dB)	26.7	26.5	21.1	20.2
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	32.0	36.2	26.0	5.6
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)	28.4	19.2	21.0	21.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8
Downlink C / N(dB)	16.6	9.4	10.4	9.5
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	26.7	26.5	21.1	20.2
C/N Downlink (dB)	16.6	9.4	10.4	9.5
C/I Intermodulation (dB)	N/A	N/A	20.2	19.3
C/I Uplink Co-Channel (dB)*	25.0	25.0	26.7	26.4
C/I Downlink Co-Channel (dB)*	25.0	25.0	26.7	26.4
C/I Uplink Adjacent Satellite 1 (dB)	17.5	17.3	11.9	11.0
C/I Downlink Adjacent Satellite 1 (dB)	21.5	7.4	12.0	11.1
C/I Uplink Adjacent Satellite 2 (dB)	17.5	17.3	11.9	11.0
C/I Downlink Adjacent Satellite 2 (dB)	22.9	16.2	16.8	15.9
C/(N+I) Composite (dB)	11.1	4.3	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.1	3.3	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.1	0.0	0.0	0.0
Number of Carriers	2	1.0	4.7	516.3
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-42.0	-53.6	-48.2	-49.1
Downlink EIRP Density At Beam Peak (dBW/Hz)	-28.0	-35.6	-36.3	-37.2

EXHIBIT 12: INTELSAT 27 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO
Uplink Frequency (GHz)	14.250	14.250	14.250	14.250	14.250	14.250
Uplink Beam Polarization	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	1.8	1.8	1.8	1.8	1.8	1.8
Uplink SFD (dBW/m2)	-73.8	-76.8	-81.8	-81.8	-81.8	-81.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO
Downlink Frequency (GHz)	11.950	11.950	11.950	11.950	11.950	11.950
Downlink Beam Polarization	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	46.9	46.9	46.9	46.9	46.9	46.9
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	53.5W	53.5W	53.5W	53.5W	53.5W	53.5W
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	57.5W	57.5W	57.5W	57.5W	57.5W	57.5W
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	77M0G7W	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	52563	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	64451	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	77000	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)	7.0	1.8	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	57.0	44.8	47.5	47.5	47.5	55.5
Earth Station G/T (dB/K)	34.6	22.3	25.0	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)	77.9	80.6	65.4	45.3	57.3	48.3
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)	1.8	1.8	1.8	1.8	1.8	1.8
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-78.1	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	25.3	25.4	20.1	19.4	19.3	16.4
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	40.7	46.1	35.9	15.8	27.8	18.8
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)	34.6	22.3	25.0	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	-78.1	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	21.9	12.4	14.8	14.1	14.0	19.2
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	25.3	25.4	20.1	19.4	19.3	16.4
C/N Downlink (dB)	21.9	12.4	14.8	14.1	14.0	19.2
C/I Intermodulation (dB)	N/A	N/A	19.7	19.1	19.0	16.0
C/I Uplink Co-Channel (dB)*	25.3	25.0	26.3	26.3	26.6	23.3
C/I Downlink Co-Channel (dB)*	25.3	25.0	26.3	26.3	26.6	23.3
C/I Uplink Adjacent Satellite 1 (dB)	23.3	23.5	18.1	17.5	17.4	14.5
C/I Downlink Adjacent Satellite 1 (dB)	26.4	16.2	18.8	18.2	18.1	23.6
C/I Uplink Adjacent Satellite 2 (dB)	23.3	23.5	18.1	17.5	17.4	14.5
C/I Downlink Adjacent Satellite 2 (dB)	26.9	18.3	20.4	19.8	19.6	24.3
C/(N+I) Composite (dB)	15.4	9.4	9.5	8.9	8.8	8.3
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	14.4	8.4	8.5	7.9	7.8	7.3
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.4	5.1	4.6	4.9	4.4	3.9
Number of Carriers	2	1.0	5.6	577.3	36.5	192.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-45.0	-54.4	-59.8	-60.4	-60.5	-55.5
Downlink EIRP Density At Beam Peak (dBW/Hz)	-19.3	-26.0	-26.4	-27.0	-27.1	-30.1

EXHIBIT 12: INTELSAT 27 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	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Uplink SFD (dBW/m2)	-76.5	-74.5	-76.5	-76.5	-76.5	-76.5
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	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Downlink Contour EIRP (dBW)	46.6	46.6	46.6	46.6	46.6	46.6
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	53.5W	53.5W	53.5W	53.5W	53.5W	53.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	57.5W	57.5W	57.5W	57.5W	57.5W	57.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	77M0G7W	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	52563	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	64451	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	77000	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)	9.0	2.4	3.0	2.4	2.4	6.1
Earth Station Gain (dBi)	59.0	47.5	49.2	47.5	47.5	55.5
Earth Station G/T (dB/K)	36.6	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)	78.2	80.2	69.1	49.9	61.9	52.5
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)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-78.1	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	23.3	22.7	21.4	21.8	21.7	18.3
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	44.1	44.1	34.0	14.8	26.8	17.4
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)	36.6	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	-78.1	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	27.3	13.1	14.5	13.2	13.0	17.8
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	23.3	22.7	21.4	21.8	21.7	18.3
C/N Downlink (dB)	27.3	13.1	14.5	13.2	13.0	17.8
C/I Intermodulation (dB)	N/A	N/A	18.1	18.4	18.3	14.9
C/I Uplink Co-Channel (dB)*	28.3	25.0	24.6	25.6	26.0	22.2
C/I Downlink Co-Channel (dB)*	28.3	25.0	24.6	25.6	26.0	22.2
C/I Uplink Adjacent Satellite 1 (dB)	19.6	19.1	17.8	18.2	18.0	14.6
C/I Downlink Adjacent Satellite 1 (dB)	33.8	19.2	20.7	19.2	19.1	24.2
C/I Uplink Adjacent Satellite 2 (dB)	19.6	19.1	17.8	18.2	18.0	14.6
C/I Downlink Adjacent Satellite 2 (dB)	34.2	20.7	22.0	20.8	20.7	24.8
C/(N+I) Composite (dB)	14.9	9.8	9.5	9.0	8.9	8.2
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.9	8.8	8.5	8.0	7.9	7.2
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.9	5.4	4.6	5.0	4.5	3.8
Number of Carriers	1	1.0	7.5	671.1	42.4	192.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-44.7	-54.8	-56.1	-55.7	-55.9	-51.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-13.9	-26.0	-26.3	-26.0	-26.1	-29.5

EXHIBIT 12: INTELSAT 27 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION							
Uplink Beam Name	NAOR	NAOR	NAOR	NAOR	NAOR	NAOR	ANDEAN/MEXICO
Uplink Frequency (GHz)	14.375	14.375	14.375	14.375	14.375	14.375	14.125
Uplink Beam Polarization	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal
Uplink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-6.0
Uplink Contour G/T (dB/K)	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6	1.8
Uplink SFD (dBW/m2)	-70.4	-82.4	-76.4	-76.4	-76.4	-76.4	-82.8
Rain Rate (mm/hr)	63.0	63.0	63.0	63.0	63.0	63.0	95.0
DOWNLINK BEAM INFORMATION							
Downlink Beam Name	NAOR	NAOR	NAOR	NAOR	NAOR	NAOR	ANDEAN/MEXICO
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575	12.625
Downlink Beam Polarization	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-6.0
Downlink Contour EIRP (dBW)	39.7	39.7	39.7	39.7	39.7	39.7	46.9
Rain Rate (mm/hr)	63.0	63.0	63.0	63.0	63.0	63.0	95.0
ADJACENT SATELLITE 1							ECHO-12
Satellite 1 Orbital Location	53.5W	53.5W	53.5W	53.5W	53.5W	53.5W	61.35W
Uplink Power Density (dBW/Hz)	-45.0	-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	0.0
Downlink EIRP Density (dBW/Hz)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0	-12.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2							
Satellite 1 Orbital Location	57.5W	57.5W	57.5W	57.5W	57.5W	57.5W	N/A
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	N/A
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0	N/A
Downlink EIRP Density (dBW/Hz)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0	N/A
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0	N/A
CARRIER INFORMATION							
Carrier ID	24M0F3F	54M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W	77M0G7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	36862	6000	64	512	128	52563
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2	1/2x188/204
Occupied Bandwidth(kHz)	24000	45200	6771.1	75.4	1229.0	307.0	64451
Allocated Bandwidth(kHz)	24000	54000	10300	100	1450.0	400.0	77000
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4	3.36
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7	3.36
UPLINK EARTH STATION							
Earth Station Diameter (meters)	9.0	6.1	6.1	6.1	6.1	3.7	6.1
Earth Station Gain (dBi)	60.3	57.0	57.0	57.0	57.0	52.8	56.8
Earth Station Elevation Angle	20	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	1.8
Earth Station Gain (dBi)	58.7	47.2	48.9	48.9	50.8	55.2	45.3
Earth Station G/T (dB/K)	36.3	24.7	26.4	26.4	28.3	32.8	22.8
Earth Station Elevation Angle	20	20	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE							
Uplink Earth Station EIRP (dBW)	81.3	80.5	72.8	52.7	63.2	54.2	80.1
Uplink Path Loss, Clear Sky (dB)	-207.6	-207.6	-207.6	-207.6	-207.6	-207.6	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6	1.8
Boltzman Constant(dBW/K-Hz)	228.6	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	-78.1
Uplink C/N(dB)	24.9	21.4	22.0	21.4	19.8	16.8	25.0
DOWNLINK PERFORMANCE							
Downlink EIRP per Carrier (dBW)	33.5	39.7	30.7	10.6	21.1	12.1	46.9
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7	-205.7	-206.4
Downlink Rain Attenuation	0.0	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	22.8
Boltzman Constant(dBW / K - Hz)	228.6	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	-78.1
Downlink C / N(dB)	18.5	10.3	11.2	10.7	10.9	12.5	13.2
COMPOSITE LINK PERFORMANCE							
C/N Uplink (dB)	24.9	21.4	22.0	21.4	19.8	16.8	25.0
C/N Downlink (dB)	18.5	10.3	11.2	10.7	10.9	12.5	13.2
C/I Intermodulation (dB)	N/A	N/A	20.2	19.6	18.0	15.0	N/A
C/I Uplink Co-Channel (dB)*	25.5	25.0	26.7	26.8	25.6	22.2	25.0
C/I Downlink Co-Channel (dB)*	25.5	25.0	26.7	26.8	25.6	22.2	25.0
C/I Uplink Adjacent Satellite 1 (dB)	26.5	23.0	23.5	23.0	21.3	18.4	35.0
C/I Downlink Adjacent Satellite 1 (dB)	24.8	16.3	17.2	16.6	17.0	18.7	17.2
C/I Uplink Adjacent Satellite 2 (dB)	26.5	23.0	23.5	23.0	21.3	18.4	N/A
C/I Downlink Adjacent Satellite 2 (dB)	25.2	17.9	18.4	17.9	18.0	19.3	N/A
C/(N+I) Composite (dB)	14.7	8.0	8.6	8.1	7.9	7.6	11.2
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.7	7.0	7.6	7.1	6.9	6.6	10.2
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4	-3.4
Excess Link Margin (dB)	3.7	3.7	3.7	4.1	3.5	3.2	6.8
Number of Carriers	2	1.0	3.5	358.9	32.3	135.0	1.0
CARRIER DENSITY LEVELS							
Uplink Power Density (dBW/Hz)	-45.0	-53.0	-52.5	-53.0	-54.7	-53.4	-54.8
Downlink EIRP Density At Beam Peak (dBW/Hz)	-24.5	-28.9	-29.6	-30.1	-31.8	-34.8	-25.2

EXHIBIT 13: ADJACENT SATELLITE (53.5º W.L) LINK BUDGETS

UPLINK BEAM INFORMATION				
Uplink Beam Name	WEST_HEMI	WEST_HEMI	WEST_HEMI	WEST_HEMI
Uplink Frequency (GHz)	6.175	6.175	6.175	6.175
Uplink Beam Polarization	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-8.5	-8.5	-8.5	-8.5
Uplink SFD (dBW/m2)	-77.5	-78.5	-78.5	-78.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	WEST_HEMI	WEST_HEMI	WEST_HEMI	WEST_HEMI
Downlink Frequency (GHz)	3.950	3.950	3.950	3.950
Downlink Beam Polarization	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	36.2	36.2	36.2	36.2
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	55.5W	55.5W	55.5W	55.5W
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)	-38.0	-38.0	-38.0	-38.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	51.5W	51.5W	51.5W	51.5W
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)	-38.0	-38.0	-38.0	-38.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
CARRIER INFORMATION				
Carrier ID	36M0F3F	72M0G7W	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	49150	6000	64
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	36000	60266	6771.1	75.4
Allocated Bandwidth(kHz)	36000	72000	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)	15.2	18.3	6.1	6.1
Earth Station Gain (dBi)	58.4	60.2	49.4	49.4
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	8.1	3.0	3.5	3.5
Earth Station Gain (dBi)	49.3	39.7	41.1	41.1
Earth Station G/T (dB/K)	28.4	19.2	21.0	21.0
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)	82.4	84.4	69.5	49.1
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)	-8.5	-8.5	-8.5	-8.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8
Uplink C/N(dB)	26.7	26.5	21.1	20.2
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	32.0	36.2	26.0	5.6
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)	28.4	19.2	21.0	21.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8
Downlink C / N(dB)	16.6	9.4	10.4	9.5
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	26.7	26.5	21.1	20.2
C/N Downlink (dB)	16.6	9.4	10.4	9.5
C/I Intermodulation (dB)	N/A	N/A	20.2	19.3
C/I Uplink Co-Channel (dB)*	25.0	25.0	26.7	26.4
C/I Downlink Co-Channel (dB)*	25.0	25.0	26.7	26.4
C/I Uplink Adjacent Satellite 1 (dB)	17.5	17.3	11.9	11.0
C/I Downlink Adjacent Satellite 1 (dB)	21.5	7.4	12.0	11.1
C/I Uplink Adjacent Satellite 2 (dB)	17.5	17.3	11.9	11.0
C/I Downlink Adjacent Satellite 2 (dB)	22.9	16.2	16.8	15.9
C/(N+I) Composite (dB)	11.1	4.3	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.1	3.3	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.1	0.0	0.0	0.0
Number of Carriers	2	1.0	4.7	516.3
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-42.0	-53.6	-48.2	-49.1
Downlink EIRP Density At Beam Peak (dBW/Hz)	-28.0	-35.6	-36.3	-37.2

EXHIBIT 13: ADJACENT SATELLITE (53.5º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO
Uplink Frequency (GHz)	14.250	14.250	14.250	14.250	14.250	14.250
Uplink Beam Polarization	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	1.8	1.8	1.8	1.8	1.8	1.8
Uplink SFD (dBW/m2)	-73.8	-76.8	-81.8	-81.8	-81.8	-81.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO
Downlink Frequency (GHz)	11.950	11.950	11.950	11.950	11.950	11.950
Downlink Beam Polarization	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	46.9	46.9	46.9	46.9	46.9	46.9
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	55.5W	55.5W	55.5W	55.5W	55.5W	55.5W
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	51.5W	51.5W	51.5W	51.5W	51.5W	51.5W
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	77M0G7W	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	52563	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	64451	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	77000	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)	7.0	1.8	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	57.0	44.8	47.5	47.5	47.5	55.5
Earth Station G/T (dB/K)	34.6	22.3	25.0	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)	77.9	80.6	65.4	45.3	57.3	48.3
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)	1.8	1.8	1.8	1.8	1.8	1.8
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-78.1	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	25.3	25.4	20.1	19.4	19.3	16.4
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	40.7	46.1	35.9	15.8	27.8	18.8
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)	34.6	22.3	25.0	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	-78.1	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	21.9	12.4	14.8	14.1	14.0	19.2
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	25.3	25.4	20.1	19.4	19.3	16.4
C/N Downlink (dB)	21.9	12.4	14.8	14.1	14.0	19.2
C/I Intermodulation (dB)	N/A	N/A	19.7	19.1	19.0	16.0
C/I Uplink Co-Channel (dB)*	25.3	25.0	26.3	26.3	26.6	23.3
C/I Downlink Co-Channel (dB)*	25.3	25.0	26.3	26.3	26.6	23.3
C/I Uplink Adjacent Satellite 1 (dB)	23.3	23.5	18.1	17.5	17.4	14.5
C/I Downlink Adjacent Satellite 1 (dB)	26.4	16.2	18.8	18.2	18.1	23.6
C/I Uplink Adjacent Satellite 2 (dB)	23.3	23.5	18.1	17.5	17.4	14.5
C/I Downlink Adjacent Satellite 2 (dB)	26.9	18.3	20.4	19.8	19.6	24.3
C/(N+I) Composite (dB)	15.4	9.4	9.5	8.9	8.8	8.3
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	14.4	8.4	8.5	7.9	7.8	7.3
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.4	5.1	4.6	4.9	4.4	3.9
Number of Carriers	2	1.0	5.6	577.3	36.5	192.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-45.0	-54.4	-59.8	-60.4	-60.5	-55.5
Downlink EIRP Density At Beam Peak (dBW/Hz)	-19.3	-26.0	-26.4	-27.0	-27.1	-30.1

EXHIBIT 13: ADJACENT SATELLITE (53.5º 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	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Uplink SFD (dBW/m2)	-76.5	-74.5	-76.5	-76.5	-76.5	-76.5
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	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Downlink Contour EIRP (dBW)	46.6	46.6	46.6	46.6	46.6	46.6
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	55.5W	55.5W	55.5W	55.5W	55.5W	55.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	51.5W	51.5W	51.5W	51.5W	51.5W	51.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	77M0G7W	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	52563	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	64451	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	77000	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)	9.0	2.4	3.0	2.4	2.4	6.1
Earth Station Gain (dBi)	59.0	47.5	49.2	47.5	47.5	55.5
Earth Station G/T (dB/K)	36.6	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)	78.2	80.2	69.1	49.9	61.9	52.5
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)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-78.1	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	23.3	22.7	21.4	21.8	21.7	18.3
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	44.1	44.1	34.0	14.8	26.8	17.4
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)	36.6	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	-78.1	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	27.3	13.1	14.5	13.2	13.0	17.8
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	23.3	22.7	21.4	21.8	21.7	18.3
C/N Downlink (dB)	27.3	13.1	14.5	13.2	13.0	17.8
C/I Intermodulation (dB)	N/A	N/A	18.1	18.4	18.3	14.9
C/I Uplink Co-Channel (dB)*	28.3	25.0	24.6	25.6	26.0	22.2
C/I Downlink Co-Channel (dB)*	28.3	25.0	24.6	25.6	26.0	22.2
C/I Uplink Adjacent Satellite 1 (dB)	19.6	19.1	17.8	18.2	18.0	14.6
C/I Downlink Adjacent Satellite 1 (dB)	33.8	19.2	20.7	19.2	19.1	24.2
C/I Uplink Adjacent Satellite 2 (dB)	19.6	19.1	17.8	18.2	18.0	14.6
C/I Downlink Adjacent Satellite 2 (dB)	34.2	20.7	22.0	20.8	20.7	24.8
C/(N+I) Composite (dB)	14.9	9.8	9.5	9.0	8.9	8.2
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.9	8.8	8.5	8.0	7.9	7.2
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.9	5.4	4.6	5.0	4.5	3.8
Number of Carriers	1	1.0	7.5	671.1	42.4	192.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-44.7	-54.8	-56.1	-55.7	-55.9	-51.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-13.9	-26.0	-26.3	-26.0	-26.1	-29.5

EXHIBIT 14: ADJACENT SATELLITE (53.5º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	NAOR	NAOR	NAOR	NAOR	NAOR	NAOR
Uplink Frequency (GHz)	14.375	14.375	14.375	14.375	14.375	14.375
Uplink Beam Polarization	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal
Uplink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Uplink Contour G/T (dB/K)	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6
Uplink SFD (dBW/m2)	-70.4	-82.4	-76.4	-76.4	-76.4	-76.4
Rain Rate (mm/hr)	63.0	63.0	63.0	63.0	63.0	63.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	NAOR	NAOR	NAOR	NAOR	NAOR	NAOR
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Downlink Contour EIRP (dBW)	39.7	39.7	39.7	39.7	39.7	39.7
Rain Rate (mm/hr)	63.0	63.0	63.0	63.0	63.0	63.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	55.5W	55.5W	55.5W	55.5W	55.5W	55.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	51.5W	51.5W	51.5W	51.5W	51.5W	51.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
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)	9.0	6.1	6.1	6.1	6.1	3.7
Earth Station Gain (dBi)	60.3	57.0	57.0	57.0	57.0	52.8
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)	81.3	80.5	72.8	52.7	63.2	54.2
Uplink Path Loss, Clear Sky (dB)	-207.6	-207.6	-207.6	-207.6	-207.6	-207.6
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6
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)	24.9	21.4	22.0	21.4	19.8	16.8
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	33.5	39.7	30.7	10.6	21.1	12.1
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)	18.5	10.3	11.2	10.7	10.9	12.5
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	24.9	21.4	22.0	21.4	19.8	16.8
C/N Downlink (dB)	18.5	10.3	11.2	10.7	10.9	12.5
C/I Intermodulation (dB)	N/A	N/A	20.2	19.6	18.0	15.0
C/I Uplink Co-Channel (dB)*	25.5	25.0	26.7	26.8	25.6	22.2
C/I Downlink Co-Channel (dB)*	25.5	25.0	26.7	26.8	25.6	22.2
C/I Uplink Adjacent Satellite 1 (dB)	26.5	23.0	23.5	23.0	21.3	18.4
C/I Downlink Adjacent Satellite 1 (dB)	24.8	16.3	17.2	16.6	17.0	18.7
C/I Uplink Adjacent Satellite 2 (dB)	26.5	23.0	23.5	23.0	21.3	18.4
C/I Downlink Adjacent Satellite 2 (dB)	25.2	17.9	18.4	17.9	18.0	19.3
C/(N+I) Composite (dB)	14.7	8.0	8.6	8.1	7.9	7.6
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.7	7.0	7.6	7.1	6.9	6.6
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.7	3.7	3.7	4.1	3.5	3.2
Number of Carriers	2	1.0	3.5	358.9	32.3	135.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-45.0	-53.0	-52.5	-53.0	-54.7	-53.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-24.5	-28.9	-29.6	-30.1	-31.8	-34.8

EXHIBIT 14: ADJACENT SATELLITE (57.5º W.L) LINK BUDGETS

UPLINK BEAM INFORMATION				
Uplink Beam Name	WEST_HEMI	WEST_HEMI	WEST_HEMI	WEST_HEMI
Uplink Frequency (GHz)	6.175	6.175	6.175	6.175
Uplink Beam Polarization	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-8.5	-8.5	-8.5	-8.5
Uplink SFD (dBW/m2)	-77.5	-78.5	-78.5	-78.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	WEST_HEMI	WEST_HEMI	WEST_HEMI	WEST_HEMI
Downlink Frequency (GHz)	3.950	3.950	3.950	3.950
Downlink Beam Polarization	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	36.2	36.2	36.2	36.2
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	55.5W	55.5W	55.5W	55.5W
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)	-38.0	-38.0	-38.0	-38.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	59.5W	59.5W	59.5W	59.5W
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)	-38.0	-38.0	-38.0	-38.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
CARRIER INFORMATION				
Carrier ID	36M0F3F	72M0G7W	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	49150	6000	64
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	36000	60266	6771.1	75.4
Allocated Bandwidth(kHz)	36000	72000	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)	15.2	18.3	6.1	6.1
Earth Station Gain (dBi)	58.4	60.2	49.4	49.4
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	8.1	3.0	3.5	3.5
Earth Station Gain (dBi)	49.3	39.7	41.1	41.1
Earth Station G/T (dB/K)	28.4	19.2	21.0	21.0
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)	82.4	84.4	69.5	49.1
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)	-8.5	-8.5	-8.5	-8.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8
Uplink C/N(dB)	26.7	26.5	21.1	20.2
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	32.0	36.2	26.0	5.6
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)	28.4	19.2	21.0	21.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8
Downlink C / N(dB)	16.6	9.4	10.4	9.5
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	26.7	26.5	21.1	20.2
C/N Downlink (dB)	16.6	9.4	10.4	9.5
C/I Intermodulation (dB)	N/A	N/A	20.2	19.3
C/I Uplink Co-Channel (dB)*	25.0	25.0	26.7	26.4
C/I Downlink Co-Channel (dB)*	25.0	25.0	26.7	26.4
C/I Uplink Adjacent Satellite 1 (dB)	17.5	17.3	11.9	11.0
C/I Downlink Adjacent Satellite 1 (dB)	21.5	7.4	12.0	11.1
C/I Uplink Adjacent Satellite 2 (dB)	17.5	17.3	11.9	11.0
C/I Downlink Adjacent Satellite 2 (dB)	22.9	16.2	16.8	15.9
C/(N+I) Composite (dB)	11.1	4.3	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.1	3.3	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.1	0.0	0.0	0.0
Number of Carriers	2	1.0	4.7	516.3
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-42.0	-53.6	-48.2	-49.1
Downlink EIRP Density At Beam Peak (dBW/Hz)	-28.0	-35.6	-36.3	-37.2

EXHIBIT 14: ADJACENT SATELLITE (57.5º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO
Uplink Frequency (GHz)	14.250	14.250	14.250	14.250	14.250	14.250
Uplink Beam Polarization	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	1.8	1.8	1.8	1.8	1.8	1.8
Uplink SFD (dBW/m2)	-73.8	-76.8	-81.8	-81.8	-81.8	-81.8
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO	ANDEAN/MEXICO
Downlink Frequency (GHz)	11.950	11.950	11.950	11.950	11.950	11.950
Downlink Beam Polarization	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	46.9	46.9	46.9	46.9	46.9	46.9
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	55.5W	55.5W	55.5W	55.5W	55.5W	55.5W
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	59.5W	59.5W	59.5W	59.5W	59.5W	59.5W
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	77M0G7W	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	52563	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	64451	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	77000	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)	7.0	1.8	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	57.0	44.8	47.5	47.5	47.5	55.5
Earth Station G/T (dB/K)	34.6	22.3	25.0	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)	77.9	80.6	65.4	45.3	57.3	48.3
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)	1.8	1.8	1.8	1.8	1.8	1.8
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-78.1	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	25.3	25.4	20.1	19.4	19.3	16.4
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	40.7	46.1	35.9	15.8	27.8	18.8
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)	34.6	22.3	25.0	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	-78.1	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	21.9	12.4	14.8	14.1	14.0	19.2
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	25.3	25.4	20.1	19.4	19.3	16.4
C/N Downlink (dB)	21.9	12.4	14.8	14.1	14.0	19.2
C/I Intermodulation (dB)	N/A	N/A	19.7	19.1	19.0	16.0
C/I Uplink Co-Channel (dB)*	25.3	25.0	26.3	26.3	26.6	23.3
C/I Downlink Co-Channel (dB)*	25.3	25.0	26.3	26.3	26.6	23.3
C/I Uplink Adjacent Satellite 1 (dB)	23.3	23.5	18.1	17.5	17.4	14.5
C/I Downlink Adjacent Satellite 1 (dB)	26.4	16.2	18.8	18.2	18.1	23.6
C/I Uplink Adjacent Satellite 2 (dB)	23.3	23.5	18.1	17.5	17.4	14.5
C/I Downlink Adjacent Satellite 2 (dB)	26.9	18.3	20.4	19.8	19.6	24.3
C/(N+I) Composite (dB)	15.4	9.4	9.5	8.9	8.8	8.3
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	14.4	8.4	8.5	7.9	7.8	7.3
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.4	5.1	4.6	4.9	4.4	3.9
Number of Carriers	2	1.0	5.6	577.3	36.5	192.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-45.0	-54.4	-59.8	-60.4	-60.5	-55.5
Downlink EIRP Density At Beam Peak (dBW/Hz)	-19.3	-26.0	-26.4	-27.0	-27.1	-30.1

EXHIBIT 14: ADJACENT SATELLITE (57.5º 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	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Uplink SFD (dBW/m2)	-76.5	-74.5	-76.5	-76.5	-76.5	-76.5
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	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Downlink Contour EIRP (dBW)	46.6	46.6	46.6	46.6	46.6	46.6
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	55.5W	55.5W	55.5W	55.5W	55.5W	55.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	59.5W	59.5W	59.5W	59.5W	59.5W	59.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	77M0G7W	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	52563	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	64451	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	77000	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)	9.0	2.4	3.0	2.4	2.4	6.1
Earth Station Gain (dBi)	59.0	47.5	49.2	47.5	47.5	55.5
Earth Station G/T (dB/K)	36.6	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)	78.2	80.2	69.1	49.9	61.9	52.5
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)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-78.1	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	23.3	22.7	21.4	21.8	21.7	18.3
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	44.1	44.1	34.0	14.8	26.8	17.4
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)	36.6	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	-78.1	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	27.3	13.1	14.5	13.2	13.0	17.8
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	23.3	22.7	21.4	21.8	21.7	18.3
C/N Downlink (dB)	27.3	13.1	14.5	13.2	13.0	17.8
C/I Intermodulation (dB)	N/A	N/A	18.1	18.4	18.3	14.9
C/I Uplink Co-Channel (dB)*	28.3	25.0	24.6	25.6	26.0	22.2
C/I Downlink Co-Channel (dB)*	28.3	25.0	24.6	25.6	26.0	22.2
C/I Uplink Adjacent Satellite 1 (dB)	19.6	19.1	17.8	18.2	18.0	14.6
C/I Downlink Adjacent Satellite 1 (dB)	33.8	19.2	20.7	19.2	19.1	24.2
C/I Uplink Adjacent Satellite 2 (dB)	19.6	19.1	17.8	18.2	18.0	14.6
C/I Downlink Adjacent Satellite 2 (dB)	34.2	20.7	22.0	20.8	20.7	24.8
C/(N+I) Composite (dB)	14.9	9.8	9.5	9.0	8.9	8.2
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.9	8.8	8.5	8.0	7.9	7.2
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.9	5.4	4.6	5.0	4.5	3.8
Number of Carriers	1	1.0	7.5	671.1	42.4	192.5
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-44.7	-54.8	-56.1	-55.7	-55.9	-51.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-13.9	-26.0	-26.3	-26.0	-26.1	-29.5

EXHIBIT 14: ADJACENT SATELLITE (57.5º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	NAOR	NAOR	NAOR	NAOR	NAOR	NAOR
Uplink Frequency (GHz)	14.375	14.375	14.375	14.375	14.375	14.375
Uplink Beam Polarization	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal
Uplink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Uplink Contour G/T (dB/K)	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6
Uplink SFD (dBW/m2)	-70.4	-82.4	-76.4	-76.4	-76.4	-76.4
Rain Rate (mm/hr)	63.0	63.0	63.0	63.0	63.0	63.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	NAOR	NAOR	NAOR	NAOR	NAOR	NAOR
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Downlink Contour EIRP (dBW)	39.7	39.7	39.7	39.7	39.7	39.7
Rain Rate (mm/hr)	63.0	63.0	63.0	63.0	63.0	63.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	55.5W	55.5W	55.5W	55.5W	55.5W	55.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	59.5W	59.5W	59.5W	59.5W	59.5W	59.5W
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)	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
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)	9.0	6.1	6.1	6.1	6.1	3.7
Earth Station Gain (dBi)	60.3	57.0	57.0	57.0	57.0	52.8
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)	81.3	80.5	72.8	52.7	63.2	54.2
Uplink Path Loss, Clear Sky (dB)	-207.6	-207.6	-207.6	-207.6	-207.6	-207.6
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.6	-3.6	-3.6	-3.6	-3.6	-3.6
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)	24.9	21.4	22.0	21.4	19.8	16.8
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	33.5	39.7	30.7	10.6	21.1	12.1
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)	18.5	10.3	11.2	10.7	10.9	12.5
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	24.9	21.4	22.0	21.4	19.8	16.8
C/N Downlink (dB)	18.5	10.3	11.2	10.7	10.9	12.5
C/I Intermodulation (dB)	N/A	N/A	20.2	19.6	18.0	15.0
C/I Uplink Co-Channel (dB)*	25.5	25.0	26.7	26.8	25.6	22.2
C/I Downlink Co-Channel (dB)*	25.5	25.0	26.7	26.8	25.6	22.2
C/I Uplink Adjacent Satellite 1 (dB)	26.5	23.0	23.5	23.0	21.3	18.4
C/I Downlink Adjacent Satellite 1 (dB)	24.8	16.3	17.2	16.6	17.0	18.7
C/I Uplink Adjacent Satellite 2 (dB)	26.5	23.0	23.5	23.0	21.3	18.4
C/I Downlink Adjacent Satellite 2 (dB)	25.2	17.9	18.4	17.9	18.0	19.3
C/(N+I) Composite (dB)	14.7	8.0	8.6	8.1	7.9	7.6
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.7	7.0	7.6	7.1	6.9	6.6
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.7	3.7	3.7	4.1	3.5	3.2
Number of Carriers	2	1.0	3.5	358.9	32.3	135.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-45.0	-53.0	-52.5	-53.0	-54.7	-53.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-24.5	-28.9	-29.6	-30.1	-31.8	-34.8