Engineering Statement

1) Introduction

Intelsat North America LLC ("Intelsat") seeks authority in this application to launch and operate a new satellite designated as Intelsat 17. This spacecraft would operate from the 66° E.L. orbital location. Intelsat 17 would replace the Intelsat 702 spacecraft, which is currently operating from 66° E.L. The characteristics of the Intelsat 17 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 17 is a Space Systems Loral model LS-1300 spacecraft that operates on the C-band frequencies of 5850 – 6425 MHz, 3625 – 4200 MHz, and Ku-band frequencies of 13750 – 14500 MHz, 10950 – 11200 MHz, 11450 – 11700 MHz and 12500 – 12750 MHz. The spacecraft utilizes 24 C-band channels and 25 Ku-band channels to provide service to Europe, Africa, Asia and Australia.

Intelsat 17 is a 3-axis stabilized type spacecraft, with a rectangular main body that supports the antennas and electronics for the various subsystems. It also utilizes two, five-panel deployable solar array wings as well as a bi-propellant propulsion system. A summary of the basic spacecraft characteristics is provided in Exhibit 1.

2.1) Structure

The structural design of Intelsat 17 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.

The primary structure of the spacecraft is composed of the following subassemblies: 1) central cylinder, 2) Support System Module ("SSM") panel, 3) anti-Earth panel, 4) Earth panel, 5) communications module, 6) Earth deck antenna assembly and support tower, 7) battery panels, 8) pressurant tank support structure, 9) east and west feed support structures, 10) momentum wheel support structures, 11) east and west access panels,

12) main thruster support structure, 13) solar wings, and 14) communication antenna (reflectors).

The central cylinder serves as the spacecraft's primary load carrying structure to which a number of other structural panels are attached. It houses two propellant tanks and provides the spacecraft's interface to the launch vehicle.

The SSM panel is attached to the central cylinder near the aft end of the spacecraft. This panel provides interfaces for a number of propulsion subsystem components as well as components associated with the Attitude Control Subsystem ("ACS") and Data Handling Subsystem ("DHS").

The anti-Earth panel is attached to the central cylinder at the aft end of the spacecraft. This panel receives the thrusters and propulsion lines at this level of the assembly. It also provides a mounting surface for the placement of a number of sensors, thrusters, and Telemetry, Command and Ranging ("TC&R") antennas.

The Earth panel is attached to the central cylinder at the front end of the spacecraft. This panel supports a number of thrusters, propulsion lines and propulsion units, as well as a number of components associated with the spacecraft's communications and TC&R subsystems. It also provides mounting interfaces for the antenna support structure.

The communications module consists of a north and south communication panel and shear web panels. These panels support the various components associated with the communications subsystem, the power subsystem and the DHS.

The Earth deck antenna and support tower is composed of an antenna support structure to which the following components have been integrated: C-band antenna, Ku-band steerable spot beam antenna, C- and Ku-band subreflectors, Earth sensor assembly, Uplink Power Control ("ULPC") antennas and TC&R antennas. The antenna support structure interfaces with the main body structure at attach points on the Earth panel.

The battery panels are composed of an east and west panel that are located near the aft end of the spacecraft. The battery panels provide the necessary support platform for the batteries.

The pressurant tank support structure is composed of two platforms, one located on the east side and the other located on the west side of the spacecraft, which are connected to the core cylinder via a series of struts. These structures provide mounting and support surfaces for the pressurant tanks.

The east and west feed support structures are attached near the front (nadir) section of the central cylinder on the east and west sides of the spacecraft. They provide the requisite mounting surfaces for the antenna feeds.

Four reaction wheel support structures provide the component mounting interface and the support structure for the four reaction wheels used aboard the spacecraft. These four reaction wheel support structures are located between the SSM and the anti-earth panels, near the aft end of the spacecraft, and attached directly to the central cylinder.

The east and west access panels are located on the east and west sides of the spacecraft, respectively. These panels stabilize the free edges of the north and south communication panel, the Earth panel and the SSM panel. The east and west access panels are easily removed and provide access to the interior of the spacecraft during assembly, integration and test.

The main thruster support structure is located in the aft section of the spacecraft and is mechanically fastened to the inside of the central cylinder. This structure provides the mounting surface for the main thruster.

The spacecraft utilizes two deployable solar wings, which are extended during transfer orbit. One solar wing is located on the north side of the spacecraft and the other is located on the south side of the spacecraft. The solar wings provide the mounting surfaces for the solar cells. Each solar wing is connected to the corresponding communication panel through the Solar Array Drive Assembly ("SADA").

Intelsat 17 utilizes four deployable reflector antennas. The antennas are supported by four main reflector support structures, located on the east and west sides of the spacecraft. These supporting structures are connected directly onto the central cylinder via a network of struts and secondary connecting platforms. The earth deck antenna assembly and support tower also supports a number of communication, TC&R and ULPC antennas.

The Intelsat 17 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 and heat rejection surfaces. Heat pipes are embedded in the north and south communication panels, the SSM panel and the battery panel radiators. High thermal dissipation components are located directly on the north and south communication/radiator 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, Earth and anti-Earth surfaces and on the Earth deck antenna assembly.

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 that are attached to protruding battery radiators.

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 17 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 five 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 17 utilizes three 22-cell Lithium ion batteries. The batteries are located on the east and west battery panels.

The Intelsat 17 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 17 are provided in Exhibit 3.

2.4) <u>Attitude Determination and Control Subsystem</u>

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

The ADCS is composed of primary and redundant sun and earth sensors, two gyros, 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 thrusters by the ADCS.

2.5) <u>Propulsion Subsystem</u>

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) three high pressure helium tanks, 2) pressurant control module comprised of series-redundant pressure regulators and service components for the helium pressurant, 3) dual propellant tanks, 4) propellant control module containing pressure transducers, isolation, service, filtration and flow control components for the propellants, 5) a single 455-N main satellite thruster ("MST"), 6) twelve 22-

N Attitude and Orbit Control ("AOC") thrusters, and 7) parallel-redundant pyrotechnic valves.

The spacecraft employs a bipropellant system, whereby it utilizes a combination of Nitrogen Tetroxide and Monomethyl Hydrazine as propellants. The system utilizes Helium gas as pressurant to pressurize the propellant tanks.

Following separation from the launch vehicle, the 22-N AOC thrusters are opened to vent residual gas. The pyrotechnic valves in the propellant control module are then fired, allowing propellants to fill the fuel and oxidizer lines to the MST and AOC thrusters. The pressurant control module latching valve is opened and one of the redundant pressurant module pyrotechnic valves is fired, initiating helium gas flow, thus pressurizing the propellant tanks. The MST is then fired as necessary during the transfer orbit operation to inject the spacecraft into a geosynchronous orbit. Upon completion of the transfer orbit, the MST is isolated from the rest of the propulsion system by closing the pressurant control latching valve and the isolation latching valves, and the AOC thrusters are then operated in a blow-down mode for the balance of the mission. During on-station operations, momentum wheels are used in conjunction with the AOC thrusters to maintain correct positioning and pointing of the spacecraft.

The architecture of the propulsion system is based on a low risk approach which has been flight proven (e.g., Intelsat 14). The system utilizes space qualified components and incorporates full redundancy for all critical components.

2.6) Communication Subsystem

2.6.1) Overview

Intelsat 17 provides 24 active communication channels at C-band frequencies and 25 active channels at Ku-band frequencies. The C-band payload employs channels having bandwidths of 36 MHz, 41 MHz and 72 MHz. The Ku-band payload employs channels having bandwidths of 36 MHz and 72 MHz. The Intelsat 17 frequency and polarization plans are provided in Exhibits 4A and 4B. The Intelsat 17 receive and transmit beams provide coverage of Europe, Africa, Asia and Australia.

At both C- and Ku-band frequencies, Intelsat 17 employs full frequency reuse through the use of orthogonal polarization within the same beam. The C-band Landmass beams utilize linear horizontal and vertical polarization, whereby the polarization of the uplink is opposite that of the downlink. The C-band west hemispheric and global beams utilize left hand circular and right hand circular polarization, whereby the polarization of the uplink is opposite that of the downlink. Accordingly, at C-band, Intelsat 17 is compliant with the provisions of Section 25.210(f) of the Commission's rules.

The Ku-band beams utilize linear (horizontal and vertical) polarization, whereby the polarization of the uplink is opposite that of the downlink. Accordingly, at Ku-band, Intelsat 17 is compliant with the provisions of Section 25.210(f) of the Commission's rules.

With respect to the application of US 245, NG 169 and NG 185 of the United States Table of Frequency Allocations, contained in Section 2.106 of the Commission's rules, in the frequency band 3625 – 3700 MHz, it is noted that the service area of Intelsat 17 does not encompass the United States and transmissions from Intelsat 17 will be to areas outside of the United States.

Similarly, with respect to the application of US 245 of the United States Table of Frequency Allocations in the frequency band 5850 – 5925 MHz, it is noted that Intelsat 17 does not encompass the United States and transmissions to Intelsat 17 will be from areas outside of the United States.

2.6.2) <u>Antennas and Beam Coverage</u>

Intelsat 17 utilizes a C-band transmit/receive offset reflector antenna, a Ku-band transmit/receive steerable antenna, a C-band global horn transmit antenna and a C-band global horn receive antenna, all located on the spacecraft Earth deck antenna assembly; a C-band transmit/receive Gregorian antenna deployed off the southwest side of the spacecraft; a Ku-band transmit/receive Gregorian antenna deployed off the northwest side of the spacecraft; a Ku-band transmit/receive Gregorian antenna deployed off the northeast side of the spacecraft; and a Ku-band transmit/receive Gregorian antenna deployed off the southeast side of the spacecraft.

The C- and Ku-band antennas provide, in the aggregate, coverage of Europe, Africa, Asia and Australia. The coverage beams of the Intelsat 17 antennas are shown in Exhibits 5A through 5T, in the format prescribed in Section 25.114(d) (3) of the Commission's rules.

The performance characteristics for each beam and the maximum beam gain are provided in Exhibits 5A through 5T. 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 24 dB for C-band channels, and ranging from 0 to 22 dB for Ku-band channels.

Exhibit 6 provides a detailed calculation of the EIRP, G/T and SFD of the Intelsat 17 uplink and downlink beams.

Exhibits 5BB-1 through 5BB-6 depicts the cross-polarization isolation contours for the Intelsat 17 Landmass and Europe-Middle East receive and transmit beams. These Intelsat 17 beams do not fully comply with the antenna cross-polarization requirement of section 25.210(i)(1) of the Commission's rules. Specifically, the minimum cross-polarization isolation within the primary coverage area of each of the aforementioned beams is as listed below:

Beam Name / Polarization	Beam Type	Minimum Cross Polarization Isolation (dB)
Landmass (H)	Receive	23
Landmass (V)	Receive	22
Europe-Middle East (H)	Receive	28.5
Landmass (H)	Transmit	25
Landmass (V)	Transmit	25
Europe-Middle East (V)	Transmit	28.5

Section 25.210(i) of the Commission's rules requires that the cross-polarization of each beam be at least 30 dB within its primary coverage area. Accordingly, with respect to the Landmass and Europe-Middle East receive and transmit beams, Intelsat requests a waiver of this section of the rules.

The level of cross-polarization isolation achieved for the non-compliant beams was the best that the satellite manufacturer could achieve without causing excessive degradation in the co-polarized gain of the beam and/or in the size of its coverage area. As a result, a reduction in the cross-polarization isolation with respect to the 30 dB requirement was considered to be the best approach for making efficient use of the orbit/spectrum resources by Intelsat 17.

Moreover, as the Commission has previously recognized, "failure to meet the cross-polarization isolation requirements will not adversely impact any other operator and the only party to suffer an increase in interference" is the applicant itself. Further, in the case of Intelsat 17, deviation from the 30 dB requirement has minimal impact on potential interference to adjacent satellites. The reduction in Intelsat 17's cross-polarization isolation in the affected portions of its coverage area will slightly increase the interference to Intelsat 17 carriers from its own oppositely polarized carriers as well as from emissions (of other operators) generated by adjacent satellites. By controlling the power level of Intelsat 17's carriers, however, Intelsat can compensate for this factor, thereby meeting its transmission objectives and the requirements of its customers.

The Commission previously has granted waivers of the requirement in Section 25.210(i) based on the same factors that support the waiver Intelsat is requesting in this application. Accordingly, Commission precedent supports a grant of Intelsat's waiver request.

Additionally, with regard to the cross-polarization contours of the Landmass and Europe-Middle East beams, as depicted in Exhibits 5BB-1 through 6, the satellite manufacturer did not provide the contours in the format prescribed in Section 25.114(d)(3). Accordingly, Intelsat requests a waiver of this section of the rules with regard to these beams.

2.6.3) <u>Transponder description</u>

2.6.3.1) <u>C-Band</u>

The output of each C-band (transmit/receive) antenna is divided into its polarization specific input signal components through the use of an orthomode junction ("OMJ"). For the West Hemi A and B beams as well as the Landmass beams, the output of the OMJ is directed to a diplexer which filters or separates the receive signals from the transmit signals. Each (receive) input signal is fed through an input test coupler and then to a preselect filter that is designed to further reject the transmit frequency band and other undesired signals and prevent the overloading of the receiver.

From the preselect filter, the signal is routed to a C-band receiver. Intelsat 17 utilizes six C-band receivers that are configured in a 9-for-6 redundancy scheme.

With regard to the Global A receive beam, from the preselect filter, the signal is routed to a directional filter that is designed to strip the command frequencies and direct them to the TC&R subsystem while passing the communication frequencies to one of the input receivers mentioned above.

The receivers establish the system noise figure and down-convert the received signal to the transmit frequency band. Each receiver operates over the entire 5850 – 6425 MHz band in linear operation and is designed to have high sensitivity (i.e. good noise performance) and low cross-talk (i.e. good linearity characteristics). Given that the receiver downconverts the received signal to the necessary frequency required for transmission, the frequency stability of the transmitted signal is controlled entirely by the receiver itself. The Intelsat 17 C-band receiver 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. Accordingly, Intelsat 17 is compliant with the provisions of section 25.202(e) of the Commission's Rules.

The output of the receivers is routed through a switching network to a set of hybrids which equally divide the signal, which is then routed 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 Linear Channel 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 pair should the primary units fail. The LCAMP/TWTAs are configured in a 30-for-24 redundancy ring.

The LCAMP provides high gain, and amplitude and gain expansion to compensate for the selected TWTA. The LCAMP may be operated in Fixed Gain Mode ("FGM"). In the FGM mode, the output of the LCAMP may be adjusted by ground command from 0 to 24 dB of attenuation in 1 dB increments, and is compliant with Section 25.210(c) of the Commission's rules.

The output of each LCAMP is fed to its associated TWTA. At C-band, Intelsat 17 utilizes 65 Watt conduction cooled TWTAs.

The output of each LCAMP/TWTA is then routed through a bank of switches to a set of Output Multiplexers ("OMUXs"). The switching network allows the output of a redundant LCAMP/TWTA to be connected to the appropriate OMUX should the primary LCAMP/TWTA units fail. The combined output of each OMUX is fed into a harmonic filter which, in turn, feeds into a test coupler. The output of the test coupler is fed to an OMJ and then to the transmit antenna feed. With regard to the West Hemi A and B downlink beams and the Landmass beams, the signal from the test coupler is injected into a diplexer prior to being sent to OMJ.

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 OMJ. Each receive signal is fed through an input test coupler and then to a preselect filter that is designed to reject the transmit frequency band and other undesired signals, and prevent overloading of the receiver. The output of the preselect filter is connected to a redundancy switching network and then to one of four Low Noise Amplifiers ("LNAs"). The Ku-band LNAs are configured in a 6-for-4 redundancy ring.

From the LNA the signal is sent to a bank of hybrids and then to a frequency down-converter, which converts the uplink frequency to the appropriate downlink frequency. Intelsat 17 utilizes three sets of down-converters. One set, which is in a 5-for-3 redundancy configuration, down-converts the signal by 1248 MHz. The second set is configured in a 7-for-4 redundancy scheme and down-converts the signal by 2800 MHz. The third set is configured in a 5-for-3 redundancy ring and down-converts the signal by 3050 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 17 Ku-band frequency down-converters are able to maintain over the life of the spacecraft the frequency of the transmitted (downconverted) signal to within +/- 0.002% of the desired value. Accordingly, Intelsat 17 is compliant with the provisions of Section 25.202(e) of the Commission's rules.

The output of the downconverter is routed through a switching network to a set of hybrids which then route the signal to a bank of IMUXs. The IMUXs are filters that provide frequency band separation for each channel.

The output of each IMUX channel is connected to a corresponding 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 redundancy rings of 15-for-12, 9-for-7 and 8-for-6. Each LCAMP/TWTA is comprised of an LCAMP that feeds a 150 Watt, radiation cooled, Ku-band TWTA.

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 22 dB in 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. When operating in the ALC mode, the dynamic range of the LCAMP is 15.5 dB, with the gain being adjustable in increments of 0.5 dB.

The output of each LCAMP/TWTA is then routed through a bank of switches to a set of OMUXs. 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 to a diplexer, through a test coupler, into an OMJ which is part of the transmit antenna feed for each coverage antenna. With regard to the global steerable beam, the output of the OMUX is fed directly to the antenna feed horn, i.e. no diplexer is employed.

2.7) <u>Telemetry, Command and Ranging Subsystem</u>

The telemetry, command and ranging 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) two wide-beam command antennas located on the Earth deck, 2) two medium-beam command antennas located on the anti-Earth deck, 3) two wide-beam telemetry antennas located on the Earth deck, 4) two medium-beam telemetry antennas located on the anti-Earth deck, 5) C-band global A receive beam antenna, 6) C-band Global A transmit beam antenna, 7) two command receivers, 8) two telemetry transmitters, 9) two 65 Watt TWTAs, 10) Data Handling Subsystem ("DHS"), and 11) microwave components including filters, switches, couplers, isolators, cables and waveguide.

2.7.1) <u>Antennas</u>

The coverage patterns of the command and telemetry beams are provided in Exhibits 5U, 5V, 5W, 5X, 5Y and 5Z. When on-station, command and telemetry signals are received and transmitted through Intelsat 17's main C-band Global beam receive and transmit antennas. The coverage pattern of the on-station C-band command and telemetry beams are shown in Exhibits 5U and 5X, respectively.

During emergencies and transfer orbit operations, command and telemetry signals are received and transmitted through a set of wide-beam and medium-beam Omni-directional antennas. For command, two wide-beam antennas are located on the front (nadir) section of the spacecraft; and two medium-beam antennas are located in the aft section of the spacecraft. Similarly, for telemetry, two wide-beam antennas are located on the front section of the spacecraft and two medium-beam antennas are located on the aft section. Representative gain graphs for the command and telemetry Omni-directional antennas are provided in Exhibits 5V, 5W, 5Y and 5Z.

During extreme on-station emergencies and during transfer orbit operations, it is assumed that the spacecraft is not properly oriented and communication with the spacecraft cannot be established through the main communication antenna. The antenna plots in Exhibits 5V, 5W, 5Y and 5Z show the variation in the gain of the wide-beam and medium-beam antennas at 0° roll angle referenced to the antenna axis with the azimuth varying from –180º and +180º. Given that the wide-beam and medium-beam antennas are horn type antennas and their gain characteristics are symmetrical about the main axis of the antenna aperture, the gain variations shown in Exhibits 5V, 5W, 5Y and 5Z are also representative of roll angles other than 0°. The field of view of the wide-beam antenna is approximately ±55º in both elevation and azimuth. The field of view of the medium-beam antennas is approximately ±25º in both elevation and azimuth. For the wide-beam antenna the variation in gain is less than 6.5 dB for azimuths varying from –55° to +55° relative to the beam center. For the medium-beam antenna the variation in gain is less than 3 dB for azimuths varying from –25° to +25° relative to the beam center.

During emergency conditions, when the spacecraft's main communication antenna is not pointing towards Earth, the wide-beam and medium-beam Omni-directional antennas would be used since their field of view is greater than +/- 25º and the earth disk is only +/- 8.4º. From Exhibits 5V, 5W, 5Y and 5Z, it is evident that the coverage of the wide-beam and medium-beams antennas is relatively flat over the entire earth, whereby the variation in gain will be typically less than 2.5 dB. The peak gain of the wide-beam and medium-beam antennas is 2 dBi and 6 dBi, respectively.

The wide-beam and medium-beam antenna gain diagrams (Exhibits 5V, 5W, 5Y and 5Z) were not prepared in accordance with the specifications in Section 25.114(d)(3) of the Commission's rules due to the fact that the satellite manufacturer does not provide the patterns in the required form as the pointing of these Omni-directional antennas with respect to the Earth will vary during an emergency situation. In this respect, it is our understanding that, given the specificity of the situation, Exhibits 5V, 5W, 5Y and 5Z together with the descriptive characterization given in the previous paragraphs of this section, fulfill the requirements of Section 25.114(d)(3). However, in case the Commission has a different understanding in this respect, a waiver of the requirements of Section 25.114(d)(3) of the FCC rules with respect to the presentation of the wide-beam and medium beam antenna patterns is requested.

2.7.2) Command

The Intelsat 17 command subsystem performance summary is provided in Exhibit 8. Detailed calculation of the G/T and SFD for each command beam is provided in Exhibit 9.

During on-station operations, commands are sent to the spacecraft by transmission of two independent, circularly polarized, FM signals on the frequencies of 6173.7 MHz and 6176.3 MHz. The command signals are received by the spacecraft through the main C-band Global A receive beam antenna. The coverage pattern of this antenna is provided in Exhibit 5U. The command signals are then routed to the two command receivers. 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 DHS, where the commands are decoded and sent to the appropriate unit.

During transfer orbit or 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 wide-beam and medium-beam antennas.

As indicated above, the command frequencies of Intelsat 17 are not located at the edge of the 5850 – 6425 MHz band but rather in the middle of the allocated band. Hence, Intelsat 17 is not compliant with the provisions of Section 25.202(g) of the Commission's rules. The specific command channels were chosen for Intelsat 17 so as to minimize any corresponding hardware impact on Intelsat's ground control stations.

Moreover, Intelsat 17 will be operating from an orbital location that does not have view of the United States and where the command frequencies of other adjacent satellites may or may not be located at the edge of the operating frequency bands. In such cases, command related transmissions are addressed through normal coordination agreements with other affected satellite operators.

In addition to Intelsat 702, which will be replaced by Intelsat 17 at 66º E.L., the nearest co-frequency satellites to Intelsat 17 are: Intelsat 10 located at 68.5º E.L.; Intelsat 7 located at 68.65ºE.L.; Intelsat 906 located at 64.15º E.L.; and Inmarsat 3 F1 located at 64.5º E.L. Intelsat or its sister company PanAmSat Licensee Corp. operate the Intelsat 702, Intelsat 10, Intelsat 7 and Intelsat 906 satellites. Inmarsat is the operator of Inmarsat 3 F1.

Operation of the Intelsat 17 command frequencies has been coordinated with Inmarsat. Coordination with the other above listed Intelsat satellites will be conducted internally. Additionally, Intelsat shall coordinate, as necessary, its command transmissions with any other affected satellite operator that may be operating in the vicinity of Intelsat 17. In view of the foregoing, Intelsat believes that its request for a waiver of Section 25.202(g) of the rules is justified.

2.7.3) Telemetry

The Intelsat 17 telemetry subsystem performance summary is provided in Exhibit 8. Detailed calculation of the EIRP for each telemetry beam is provided in Exhibit 9.

During on-station operations, telemetry is transmitted by the spacecraft on two independent, linearly polarized, PM signals on the frequencies of 3947.5 MHz and 3952.5 MHz. The telemetry baseband functions are implemented in the DHS, where data from the various spacecraft units are collected, processed, multiplexed, formatted and encoded onto subcarriers. The output of the DHS is then routed to two telemetry transmitters where the signal is modulated onto the main carrier frequencies of 3947.5 MHz and 3952.5 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. The output of the telemetry transmitters is then routed to the C-band (communication) OMUX and, from there, to the main C-band Global A beam transmit antenna for transmission to Earth.

During transfer orbit or emergency operations, the telemetry subsystem may be operated in the high power mode or in the low power mode, depending on the circumstance. In the high power mode, the low power output of each telemetry transmitter is routed to a 65 Watt TWTA from the C-band communication section for additional amplification and transmitted to Earth through the wide-beam and medium-beam antenna. In this mode of operation, the output of the TWTA is limited to 45 Watts (instead of its maximum power capability of 65 Watts). In the low power mode, the high power output of each telemetry transmitter is routed to the wide-beam and medium beam antennas for transmission to Earth.

As indicated above, the telemetry frequencies of Intelsat 17 are not located at the edge of the 3625 – 4200 MHz band but rather in the middle of the allocated band. Hence, Intelsat 17 is not compliant with the provisions of Section 25.202(g) of the rules. The specific telemetry channels were chosen for Intelsat 17 so as to minimize any corresponding hardware impact on Intelsat's ground control stations.

Moreover, Intelsat 17 will be operating from an orbital location that does not have view of the United States and where the telemetry frequencies of other adjacent satellites may or may not be located at the edge of the operating frequency bands. In such cases, telemetry transmissions are addressed through normal coordination agreements with other affected satellite operators.

In addition to Intelsat 702, which will be replaced by Intelsat 17 at 66º E.L., the nearest co-frequency satellites to Intelsat 17 are: Intelsat 10 located at 68.5º E.L.; Intelsat 7 located at 68.65ºE.L.; Intelsat 906 located at 64.15º E.L.; and Inmarsat 3 F1 located at 64.5º E.L. Intelsat or its sister company PanAmSat Licensee Corp. operate the Intelsat 702, Intelsat 10, Intelsat 7 and Intelsat 906 satellites. Inmarsat is the operator of Inmarsat 3 F1.

Operation of the Intelsat 17 telemetry frequencies has been coordinated with Inmarsat. Coordination with the other above listed Intelsat satellites will be conducted internally. Additionally, Intelsat shall coordinate, as necessary, its telemetry transmissions with any other affected satellite operator that may be operating in the vicinity of Intelsat 17. In view of the foregoing, Intelsat believes that its request for a waiver of Section 25.202(g) of the rules is justified.

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 17 command, telemetry and ranging subsystems are provided in Exhibit 8.

2.8) <u>Uplink Power Control Subsystem ("ULPC")</u>

2.8.1 <u>Antennas</u>

Intelsat 17 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 patterns of the C-band ULPC beams are provided in Exhibits 5AA-1 and 5AA-2. The coverage patterns of the Ku-band ULPC beams are provided in Exhibit 5AA-3.

With regard to the C-band and Ku-band ULPC antennas, the graphs in Exhibits 5AA-1, 5AA-2 and 5AA-3 show the variation in the gain of the antenna at 0° elevation angle, with the azimuth varying from -80º and +80º. Given that the antennas are horn antennas having symmetrical gain performance about the center axis of the antenna aperture, the gain variations shown in Exhibits 5AA-1, 5AA-2 and 5AA-3 are also representative of the case where the azimuth angle of the antenna is 0°, referenced to the (vertical) plane located at the center axis of the antenna aperture, with the elevation varying from -80° and +80°.

The antenna gain diagrams associated with the C-band and Ku-band ULPC antennas shown in Exhibits 5AA-1, 5AA-2 and 5AA-3 were not prepared in accordance with the specifications in Section 25.114(d)(3) of the

Commission's rules due to the fact that typically satellite manufacturers do not provide the patterns in the required form. Given the specificity of the situation, it is our understanding that Exhibits 5AA-1, 5AA-2 and 5AA-3 together with the descriptive characterization given in the previous paragraph, fulfill the requirements of Section 25.114(d)(3). However, in case the Commission has a different understanding in this respect, a waiver of the requirements of Section 25.114(d)(3) of the FCC's rules with respect to the presentation of these antenna patterns is requested.

2.8.2 ULPC System Description

Intelsat 17 provides three Ku-band beacons and two C-band beacons which can be used for uplink power control by customers transmitting to the spacecraft. The C-Band ULPC beacons are linearly polarized and operate on the frequencies of 3950 MHz and 3950.5 MHz. The Ku-Band ULPC beacons are circularly polarized and operate on the frequencies of 11198 MHz, 11452 MHz and 12502 MHz. The characteristics of the ULPC beacon are provided in Exhibit 1. Detailed calculation of the EIRP for each ULPC beam is provided in Exhibit 6.

The Intelsat 17 C-band Uplink Power Control (ULPC) Beacon/Telemetry transmitters are able to maintain the downlink transmit frequency to within +/- 0/002% of the desired frequency over the life of the spacecraft. The 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 17 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 at 3950 MHz and a separate 2-for-1 redundant transmitter to generate the beacon at 3950.5 MHz. The output signal from each ULPC transmitter is directed to an OMJ and then routed to the C-band transmitting horn antenna for transmission to Earth. The coverage patterns of the C-band ULPC beams are provided in Exhibits 5AA-1 and 5AA-2.

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 three port OMUX and then sent to the Ku-band transmitting horn antenna for transmission to Earth. The coverage pattern of the Ku-band ULPC beams are provided in Exhibit 5AA-3.

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 16.2 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 stationkeeping is 16.2 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 17 is designed for an operational and mission life of 16.2 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 16.2 years. Redundancy concepts are applied to all critical components. All avoidable single-point failure modes have been eliminated.

The projected reliability of the C-band payload is 96.67%, the Ku-band payload is 95.3%. The projected reliability of the bus system is 84.5%. The overall reliability of the Intelsat 17 spacecraft is projected to be 77.8%. The subsystem reliability assessments were based upon the use of failure rates, modeling assumptions from previous spacecraft programs and those specific to Intelsat 17. 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 17 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 17 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 10.

4.0) Power Flux Density ("PFD")

The power flux density ("PFD") limits for space stations operating in the 3700 – 4200 MHz, 10950 – 11200 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.

The maximum PFD levels for the Intelsat 17 transmissions were calculated for a number of TV/FM and/or digital carriers listed in Exhibit 10 operating in the 3700 – 4200 MHz, 10950 – 11200 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 17 telemetry and ULPC carriers. The results are provided in Exhibit 11 and show that the downlink power flux density levels of the Intelsat 17 carriers do not exceed limits specified in Section 25.208 of the Commission's rules or in No. 21.16 of the ITU Radio Regulations.

5.0) <u>Emission Limitations</u>

The Intelsat 17 receiver and transmitter channel filter response characteristics are provided in Exhibit 7, 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 17 emissions.

6.0) <u>Service Area</u>

The primary service area of Intelsat 17 is Europe, Africa, Asia and Australia.

7.0) <u>Orbital Location</u>

Intelsat requests that it be assigned the 66° E.L. orbital location for Intelsat 17. Intelsat 17 would replace the Intelsat 702 spacecraft, which is currently operating from 66° E.L., allowing continued use of the C-band and Ku-band channels by the existing customers of Intelsat 702. The 66° E.L. location satisfies Intelsat 17 requirements for optimizing coverage, elevation angles and service availability and ensures that maximum operational, economic and public interest benefits will be derived.

8.0) <u>Orbital Arc Limitations</u>

Intelsat 17 is intended to provide video, audio and data services to satellite users within its coverage area. The 66° E.L. position affords reasonable earth station angles to the region. The attractiveness of Intelsat 17 to this market would be severely diminished if service to this area is not possible.

9.0) <u>Intelsat 17 Link Budgets and Interference Analysis</u>

Link analysis for Intelsat 17 was conducted for a number of representative carriers. For the analyses, it was assumed that the nearest satellites to Intelsat 17 was a hypothetical satellite operating from 64° E.L. and a hypothetical satellite operating from 68° E.L. The hypothetical satellites were assumed to have the same operational parameters as Intelsat 17.

At C-band, the uplink power density of the emissions to each of the hypothetical satellites was assumed to be -38.7 dBW/Hz, the maximum level specified in section 25.212(d) of the Commission's rules for digital C-band carriers. The C-band downlink EIRP of each of the hypothetical satellites was assumed to be one of the following values depending on the Intelsat 17 downlink beam and channel bandwidth combination under consideration: -42.0 dBW/m^2, -42.8 dBW/m^2 and -43.6 dBW/m^2.

At Ku-band, the uplink power density of the emissions to each of the hypothetical satellites was assumed to be -50 dBW/Hz, the maximum level specified in sections 25.212(c) of the Commission's rules for digital Ku-band carriers. At Ku-band, the maximum downlink EIRP density of the emissions from each of the hypothetical satellites was assumed to be -26 dBW/Hz, the maximum level specified in Section 25.212(c) of the Commission's rules.

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

a) In the plane of the geostationary satellite orbit, all transmitting and receiving earth station antennas have off-axis co-polar gains that are compliant with the limits specified in Section 25.209(a)(1) of the FCC's rules.
b) All transmitting and receiving earth stations have a cross-polarization isolation value of at least 30 dB within their main beam lobe.
c) 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.

The impact of the TV/FM carriers from the adjacent satellites at 64° E.L. and 68° E.L. on the transmissions of Intelsat 17 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 17 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 72 MHz and a channel having a bandwidth of 36 MHz have the same associated adjacent satellite downlink interfering EIRP density, then link budgets were performed only for emissions that were transmitted through the 72 MHz channel, since the carrier level would typically have less (uplink and downlink) power in comparison to those which would be transmitted through the 36 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 36 MHz channel was subjected was larger than that for the 72 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[72/36]), then link calculations were performed only for the emissions of the 36 MHz channel, since the impact of adjacent satellite interference is greater on emissions of this channel (in comparison to those being transmitted through the 72 MHz channel).

As previously mentioned, at Ku-band, Intelsat 17 can utilize the downlink frequency bands of 10950 – 11200 MHz, 11450 – 11700 MHz and 12500 – 12750 MHz. In order to keep the number the Intelsat 17 link calculations to a manageable number, all Ku-band link calculations were conducted at the single representative uplink frequency of 14250 MHz and downlink frequency of 11950 MHz (that is approximately midway between 10950 MHz and 12750 MHz). At C-band, all calculations were conducted at the single representative frequency of 6175 MHz for the uplink and 3950 MHz for the downlink.

The results of the C-band and Ku-band analysis are shown in Exhibit 12 and demonstrate that operation of the Intelsat 17 satellite from 66° E.L. would permit the intended services to achieve their respective performance objectives while maintaining sufficient link margin. Additionally, the EIRP density levels of the carriers listed in Exhibit 12 comply with the limits contained in Section 25.212(c) and (d) of the Commission's rules.

10.0) Adjacent Satellite Link Analysis

The impact of the Intelsat 17 emissions on the transmissions of adjacent satellites was not analyzed. This is due to Intelsat's intent to limit the power level of Intelsat 17 transmissions to those levels contained in Sections 25.212(c) and (d) of the FCC's rules. In those cases where Intelsat may require to transmit carriers with power levels in excess of those in Sections 25.212(c) and (d), it will coordinate internally and/or with the affected adjacent satellite operators, as the case may be, as part of the normal coordination process, so as to limit the level of interference that is mutually caused and received by Intelsat 17 and any future adjacent satellite.

11.0) Schedule S Submission

Intelsat is providing with its application a Schedule S for the operations of Intelsat 17 from 66º E.L. It is noted that the antenna gain patterns for the Intelsat 17 wide-beam and medium-beam command and telemetry antennas as well as the C- and Ku-band ULPC antennas were included in column "e" (instead of column "f") of Section S8 of the Schedule S, since they are not in GXT format (see sections 2.7.1 and 2.8.1).

The cross-polarization contours of the Landmass and Europe-Middle East receive and transmit beams is provided in column "e" of the Schedule S. The value listed with each contour represents the absolute level of cross-polarization isolation.

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 of 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 702, Intelsat 17 will not be located at the same orbital location as another satellite or at an orbital location that has an overlapping stationkeeping volume with another satellite.

The proposed orbital location for Intelsat 17 is 66° E.L. Currently Intelsat 702 operates from 66° E.L. Following transfer of traffic to Intelsat 17, Intelsat 702 shall be relocated to another orbital position such that its stationkeeping volume shall not overlap with that of Intelsat 17. During the brief period in which communication traffic is being transferred from Intelsat 702 to Intelsat 17, Intelsat will take all the necessary steps, e.g., "pass-in-the-night maneuver" or slight temporary relocation of Intelsat 702 and/or Intelsat 17, to minimize the risk of collision between the two spacecraft.

With the exception of Intelsat 702, 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 17. Intelsat is also not aware of any system with an overlapping stationkeeping volume with Intelsat 17 that is the subject of an ITU filing and that is either in orbit or progressing towards launch.

12.4) <u>Post Mission Disposal</u>

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 63.5 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 17 spacecraft is 0.055 m^2/kg, resulting in a minimum perigee disposal altitude under the IADC formula of at most 295 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 17 planned disposal orbit complies with the FCC's rules.

13) ITU Filing

Intelsat currently has no filing with the ITU for a satellite network that specifies operation on the frequency band of 13750 – 14000 MHz at the nominal orbital location of 66° E.L. Intelsat will submit to the Commission the Advanced Publication Information ("API"), for a new satellite network that utilizes the 13750 - 14000 MHz band at the nominal orbital of 66° E.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	July 2, 2010
Jose Albuquerque Intelsat Senior Director Spectrum Engineering	Date

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS

GENERAL	
Spacecraft Name	Intelsat 17
Orbital Location	66° E.L.
Spacecraft Manufacturer	Space Systems Loral
Spacecraft Model	LS-1300
Spacecraft Type	3-axis stabilized
Spacecraft Dimensions	
Length	26.1 meters
Width	9.2 meters
Depth	7.7 meters
Spacecraft Mass	
Mass w/o fuel	2466 kg
Mass w/ fuel	5612 kg
Spacecraft Expected Lifetime	16.2 years
Eclipse Capability	100%
Station-keeping	
North-South	±0.05°
East-West	±0.05°
Antenna Pointing Accuracy	
North-South	0.16°
East-West	0.16°
Rotational	0.16°
Spacecraft Reliability	77.8%
Payload Reliability	92.1%
C-Band	96.7%
Ku-Band	95.3%
Bus Reliability	84.5 %
Propulsion Type	Bi-propellant
Maximum Solar Array Power	
Beginning of Life	12405 Watts
End of Life	12216 Watts
Deployed Area of Solar Array	74.3 sq. meters

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS (continued)

COMMUNICATION	
Frequency Bands	
C-band Uplink	5850 – 6425 MHz
C-band Downlink	3625 – 4200 MHz
Ku-band Uplink	13750 – 14500 MHz
Ku-band Downlink	10950 – 11200 MHz 11450 – 11700 MHz 12500 – 12750 MHz
Polarization	
C-band Uplink	Linear Horizontal / Linear Vertical Left Hand Circular / Right Hand Circular
C-band Downlink	Linear Horizontal / Linear Vertical Left Hand Circular / Right Hand Circular
Ku-band Uplink	Linear Horizontal / Linear Vertical
Ku-band Downlink	Linear Horizontal / Linear Vertical
Coverage Area	
C-band Uplink	Europe, Africa, Australia, Asia
C-band Downlink	Europe, Africa, Australia, Asia
Ku-band Uplink	Europe, Africa, Australia, Asia
Ku-band Downlink	Europe, Africa, Australia, Asia
Beam Cross-Polarization Isolation	
West Hemi A Uplink Beam (LHCP)	≥ 30 dB
West Hemi B Uplink Beam (RHCP)	≥ 30 dB
Landmass Uplink Beam (H)	≥ 23 dB
Landmass Uplink Beam (V)	≥ 22 dB
Global A Uplink Beam (LHCP)	≥ 30 dB
Global B Uplink Beam (RHCP)	≥ 30 dB
Russia Uplink Beam (V)	≥ 30 dB
Europe-Middle East Uplink Beam (H)	≥ 28.5 dB
Africa Uplink Beam (V)	≥ 30 dB
Steerable Uplink Beam (V)	≥ 30 dB
West Hemi A Downlink Beam (RHCP)	≥ 30 dB
West Hemi B Downlink Beam (LHCP)	≥ 30 dB
Landmass Downlink Beam (H)	≥ 25 dB
Landmass Downlink Beam (V)	≥ 25 dB

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS (continued)

COMMUNICATION	
Global A Downlink Beam (RHCP)	≥ 30 dB
Global B Downlink Beam (LHCP)	≥ 30 dB
Russia Downlink Beam (H)	≥ 30 dB
Europe-Middle East Downlink Beam (V)	≥ 28.5 dB
Africa Downlink Beam (H)	≥ 30 dB
Steerable Downlink Beam (H)	≥ 30 dB
Number of Channels	
C-band	24
Ku-band	25
Channel Bandwidth	
C-Band	72 / 36 / 41 MHz
Ku-Band	72 / 36 MHz
Maximum Downlink EIRP	
C-band	
West Hemi A (RHCP)	39.8 dBW
West Hemi B (LHCP)	39.8 dBW
Landmass (H)	39.2 dBW
Landmass (V)	39.2 dBW
Global A (RHCP)	36.5 dBW
Global B (LHCP)	36.5 dBW
Ku-Band	
Russia (H)	53.3 dBW
Europe-Middle East (V)	50.9 dBW
Africa (H)	52.1 dBW
Steerable (H)	53.2 dBW
Maximum Uplink G/T	
C-band	
West Hemi A (RHCP)	-1.1 dB/K
West Hemi B (LHCP)	-1.1 dB/K
Landmass (H)	-1.8 dB/K
Landmass (V)	-1.8 dB/K
Global A (RHCP)	-7.8 dB/K
Global B (LHCP)	-7.8 dB/K
Ku-Band	

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS
(continued)

COMMUNICATION	
Russia (V)	6.0 dB/K
Europe-Middle East (H)	5.2 dB/K
Africa (V)	6.7 dB/K
Steerable (V)	6.7 dB/K
Uplink SFD Range @ Maximum G/T	
C-band	
West Hemi A (RHCP)	-103.5 to -79.5 dBW/m^2
West Hemi B (LHCP)	-103.5 to -79.5 dBW/m^2
Landmass (H)	-100.2 to -76.2 dBW/m^2
Landmass (V)	-100.2 to -76.2 dBW/m^2
Global A (RHCP)	-97.0 to -73.0 dBW/m^2
Global B (LHCP)	-97.0 to -73.0 dBW/m^2
Ku-Band	
Russia (V)	-102.6 to -80.6 dBW/m^2
Europe-Middle East (H)	-103.7 to -81.7 dBW/m^2
Africa (V)	-99.8 to -77.8 dBW/m^2
Steerable (V)	-103.5 to -81.5 dBW/m^2
Transponder Attenuator Range	
C-band	24 dB in 1 dB increments
Ku-band	
FGM Mode	22 dB in 1 dB increments
ALC Mode	15.5 dB in 0.5 dB increments
Transponder Gain	
C-band	See Exhibit 4B
Ku-band	See Exhibit 4B
Unit Redundancy	
C-band Receivers	9 for 6
C-band Amplifiers	30 for 24
Ku-band LNAs	6 for 4
Ku-band frequency converters	5 for 3 / 7 for 4 / 5 for 3
Ku-band Amplifier	15 for 12 / 9 for 7 / 8 for 6
Maximum Power of Last Amplifier Stage	
C-band	65 Watts
Ku-band	150 Watts

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS (continued)

COMMUNICATION	
Transmit Frequency Stability	
C-band	≤ 0.002%
Ku-band	≤ 0.002%
TELEMETRY, COMMAND & RANGING	
Command Frequency	
Transfer Orbit / Emergency	6173.7 / 6176.3 MHz
On-Station	6173.7 / 6176.3 MHz
Command Polarization	
Transfer Orbit	Left Hand Circular
On-Station	Left Hand Circular
Command Carrier Modulation	FM
Command Carrier Bandwidth	
Occupied Bandwidth	850 kHz
Allocated Bandwidth	1000 kHz
Command Antennas	
Transfer Orbit	4 Omni Antennas
On-Station	Global Horn
Command Threshold at Beam Peak	
Transfer Orbit / Emergency	
Wide Beam Antenna	-97.5 dBW/m^2
Medium Beam Antenna	-94.0 dBW/m^2
On-Station	-110.2 dBW/m^2
Command G/T at Beam Peak	
Transfer Orbit / Emergency	
Wide Beam Antenna	-34.8 dB/K
Medium Beam Antenna	-38.3 dB/K
On-Station	-22.1 dB/K
Telemetry Frequency	
Transfer Orbit / Emergency	3947.5 / 3952.5 MHz
On-Station	3947.5 / 3952.5 MHz
Telemetry Polarization	
Transfer Orbit / Emergency	Right Hand Circular

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS (continued)

TELEMETRY, COMMAND & RANGING	
On-Station	Right Hand Circular
Telemetry Modulation	PM
Telemetry Carrier Occupied Bandwidth	
Occupied Bandwidth	250 kHz
Allocated Bandwidth	500 kHz
Telemetry Antenna	
Transfer Orbit / Emergency	4 Omni Antennas
On-Station	Global Horn
Telemetry Frequency Stability	≤ 0.002%
Telemetry EIRP at Beam Peak	
Transfer Orbit / Emergency	
Wide Beam Antenna	13.2 dBW
Medium Beam Antenna	10.9 dBW
On-Station	13.5 dBW
Ranging Accuracy	30 meters
ULPC	
Frequency	
C-Band	3950 / 3950.5 MHz
Ku-Band	11198 / 11452 / 12502 MHz
Polarization	
C-Band	Linear Horizontal / Linear Vertical
Ku-Band	Right Hand Circular
Coverage Area	
C-Band	Global
Ku-Band	Global
Number of channels	
C-Band	2
Ku-Band	3
Channel Bandwidth	
C-Band	25 kHz
Ku-Band	25 kHz
Transmit Frequency Stability	
C-Band	≤ 0.002%

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS (continued)

ULPC	
Ku-Band	≤ 0.002%
Maximum Downlink EIRP	
C-Band	12.3 dBW
Ku-Band	17.8 dBW

EXHIBIT 2: SPACECRAFT MASS BUDGET

Mass of Spacecraft without Fuel (kg)	2466
Mass of Fuel and Disposables (kg)	3146
Launch Mass (kg)	5612
Mass of Fuel, in orbit, at Beginning of Life (kg)	1072

EXHIBIT 3: SPACECRAFT POWER BUDGET

	BEGINNING OF LIFE		END OF LIFE	
	AUTUMN EQUINOX	SUMMER SOLSTICE	AUTUMN EQUINOX	SUMMER SOLSTICE
PAYLOAD (WATTS)	8752	8752	8752	8752
BUS (WATTS)	2459	1192	2459	1192
TOTAL POWER (WATTS)	11211	9944	11211	9944
SOLAR ARRAY POWER (WATTS)	12405	11328	12216	11155
DEPTH OF BATTERY DISCHARGE (%)	58.8%	N/A	62.7%	N/A

EXHIBIT 4A: FREQUENCY PLAN

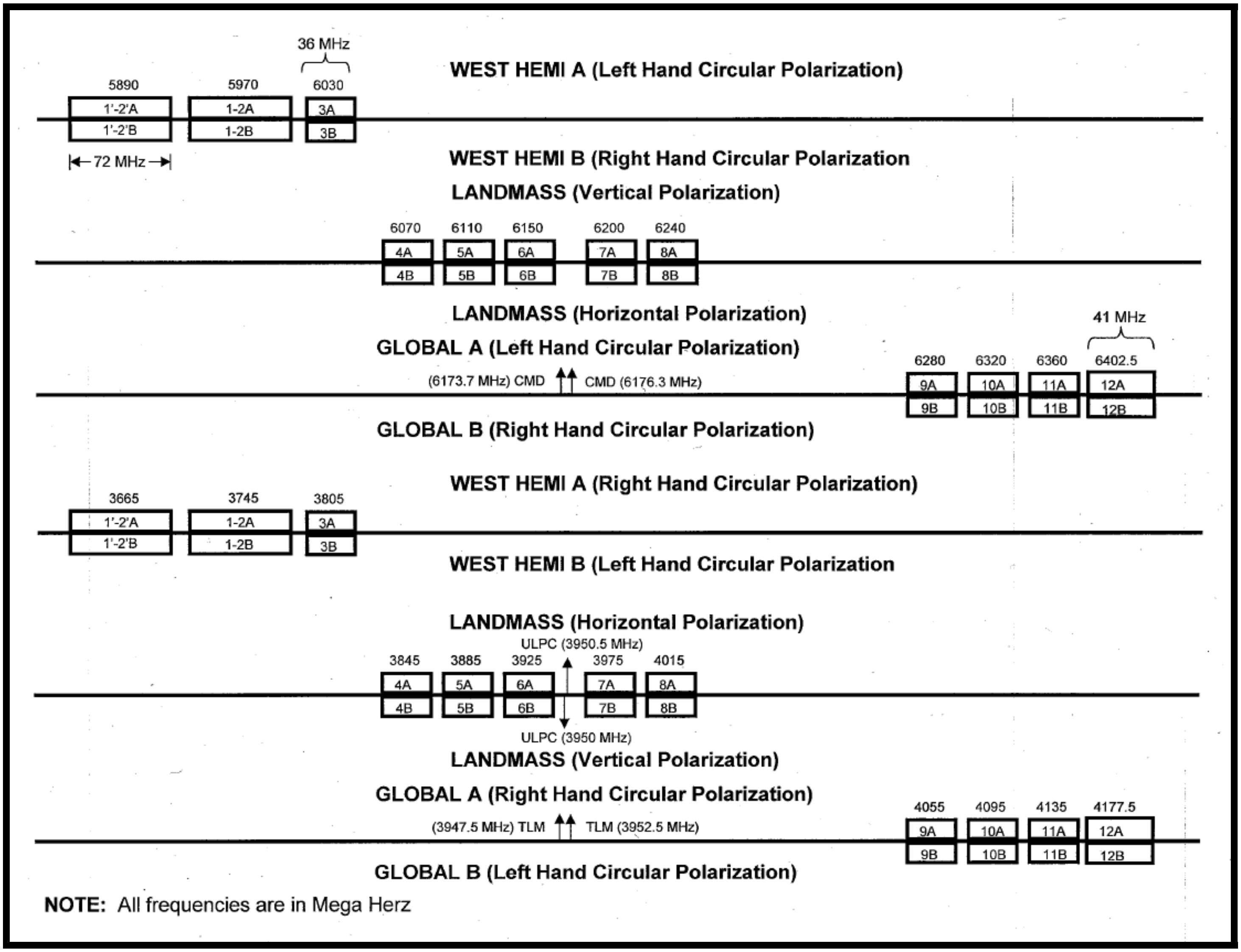
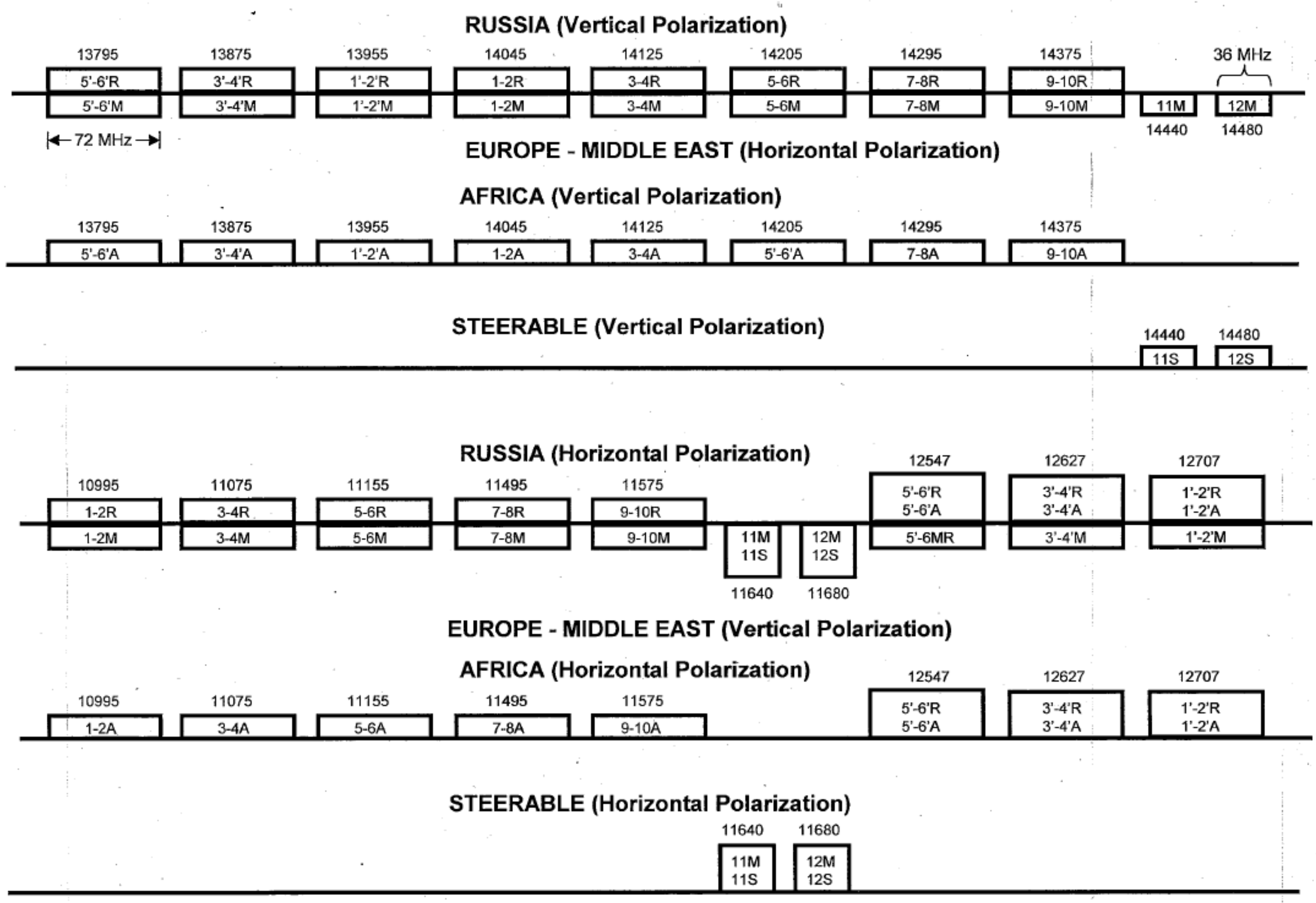
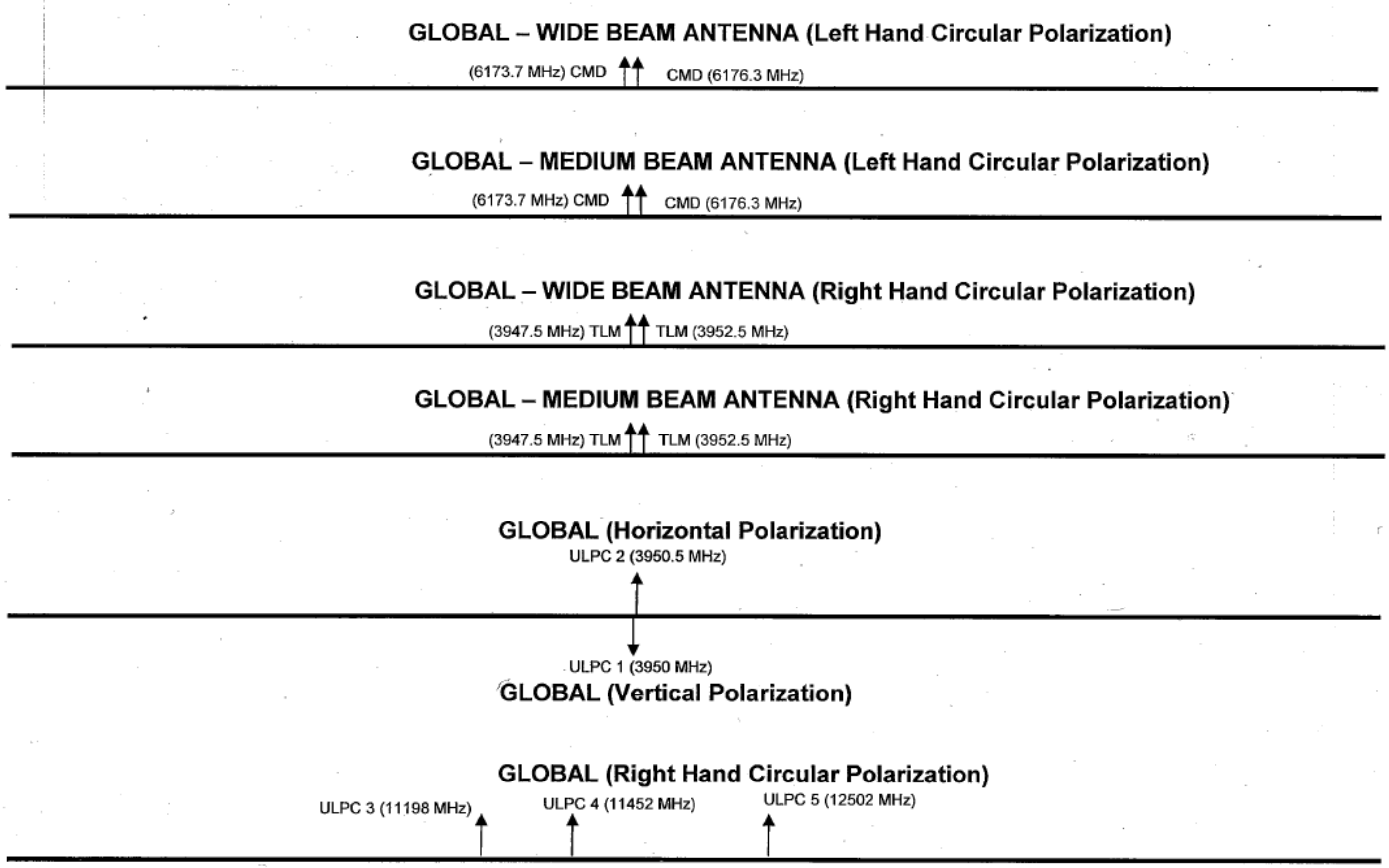


EXHIBIT 4A: FREQUENCY PLAN (continued)



NOTE: All frequencies are in Mega Herz

EXHIBIT 4A: FREQUENCY PLAN (continued)



NOTE: All frequencies are in Mega Herz

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)
1’-2’A	West Hemi A	Left Hand Circular	5890	1’-2’A	West Hemi A	Right Hand Circular	3665	72	128.0
1-2 A	West Hemi A	Left Hand Circular	5970	1-2 A	West Hemi A	Right Hand Circular	3745	72	128.0
3A	West Hemi A	Left Hand Circular	6030	3A	West Hemi A	Right Hand Circular	3805	72	128.0
4A	Landmass	Vertical	6070	4A	Landmass	Horizontal	3845	36	125.6
5A	Landmass	Vertical	6110	5A	Landmass	Horizontal	3885	36	125.6
6A	Landmass	Vertical	6150	6A	Landmass	Horizontal	3925	36	125.6
7A	Landmass	Vertical	6200	7A	Landmass	Horizontal	3975	36	125.6
8A	Landmass	Vertical	6240	8A	Landmass	Horizontal	4015	36	125.6
9A	Global A	Left Hand Circular	6280	9A	Global A	Right Hand Circular	4055	36	129.8
10A	Global A	Left Hand Circular	6320	10A	Global A	Right Hand Circular	4095	36	129.8
11A	Global A	Left Hand Circular	6360	11A	Global A	Right Hand Circular	4135	36	129.8
12A	Global A	Left Hand Circular	6402.5	12A	Global A	Right Hand Circular	4177.5	41	129.8
1’-2’B	West Hemi B	Right Hand Circular	5890	1’-2’B	West Hemi B	Left Hand Circular	3665	72	128.0
1-2 B	West Hemi B	Right Hand Circular	5970	1-2 B	West Hemi B	Left Hand Circular	3745	72	128.0
3B	West Hemi B	Right Hand Circular	6030	3B	West Hemi B	Left Hand Circular	3805	72	128.0
4B	Landmass	Horizontal	6070	4B	Landmass	Vertical	3845	36	125.6
5B	Landmass	Horizontal	6110	5B	Landmass	Vertical	3885	36	125.6
6B	Landmass	Horizontal	6150	6B	Landmass	Vertical	3925	36	125.6
7B	Landmass	Horizontal	6200	7B	Landmass	Vertical	3975	36	125.6
8B	Landmass	Horizontal	6240	8B	Landmass	Vertical	4015	36	125.6
9B	Global B	Right Hand Circular	6280	9B	Global B	Left Hand Circular	4055	36	129.8
10B	Global B	Right Hand Circular	6320	10B	Global B	Left Hand Circular	4095	36	129.8
11B	Global B	Right Hand Circular	6360	11B	Global B	Left Hand Circular	4135	36	129.8
12B	Global B	Right Hand Circular	6402.5	12B	Global B	Left Hand Circular	4177.5	41	129.8
				ULPC1	Global	Horizontal	3950	25	
				ULPC2	Global	Vertical	3950.5	25	
CMD1	Global A	Left Hand Circular	6173.7					1	
CMD2	Global A	Left Hand Circular	6176.3					1	
CMD3	Global (Wide Beam)	Left Hand Circular	6173.7					1	
CMD4	Global (Wide Beam)	Left Hand Circular	6176.3					1	
CMD5	Global (Medium Beam)	Left Hand Circular	6173.7					1	
CMD6	Global (Medium Beam)	Left Hand Circular	6176.3					1	
				TLM1	Global A	Right Hand Circular	3947.5	0.5	
				TLM2	Global A	Right Hand Circular	3952.5	0.5	
				TLM3	Global (Wide Beam)	Right Hand Circular	3947.5	0.5	
				TLM4	Global (Wide Beam)	Right Hand Circular	3952.5	0.5	
				TLM5	Global (Medium Beam)	Right Hand Circular	3947.5	0.5	
				TLM6	Global (Medium Beam)	Right Hand Circular	3952.5	0.5	

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)
5’-6’R	Russia	Vertical	13795	5’-6’R	Russia	Horizontal	12547	72	132.8
				5’-6’A	Africa	Horizontal	12547	72	131.5
3’-4’R	Russia	Vertical	13875	3’-4’R	Russia	Horizontal	12627	72	132.8
				3’-4’A	Africa	Horizontal	12627	72	131.5
1’-2’R	Russia	Vertical	13955	1’-2’R	Russia	Horizontal	12707	72	132.8
				1’-2’A	Africa	Horizontal	12707	72	131.5
1-2R	Russia	Vertical	14045	1-2R	Russia	Horizontal	10995	72	132.8
3-4R	Russia	Vertical	14125	3-4R	Russia	Horizontal	11075	72	132.8
5-6R	Russia	Vertical	14205	5-6R	Russia	Horizontal	11155	72	132.8
7-8R	Russia	Vertical	14295	7-8R	Russia	Horizontal	11495	72	132.8
9-10R	Russia	Vertical	14375	9-10R	Russia	Horizontal	11575	72	132.8
5’-6’M	Europe – M.E.	Horizontal	13795	5’-6’M	Europe – M.E.	Vertical	12547	72	133.3
3’-4’M	Europe – M.E.	Horizontal	13875	3’-4’M	Europe – M.E.	Vertical	12627	72	133.3
1’-2’M	Europe – M.E.	Horizontal	13955	1’-2’M	Europe – M.E.	Vertical	12707	72	133.3
1-2M	Europe – M.E.	Horizontal	14045	1-2M	Europe – M.E.	Vertical	10995	72	133.3
3-4M	Europe – M.E.	Horizontal	14125	3-4M	Europe – M.E.	Vertical	11075	72	133.3
5-6M	Europe – M.E.	Horizontal	14205	5-6M	Europe – M.E.	Vertical	11155	72	133.3
7-8M	Europe – M.E.	Horizontal	14295	7-8M	Europe – M.E.	Vertical	11495	72	133.3
9-10M	Europe – M.E.	Horizontal	14375	9-10M	Europe – M.E.	Vertical	11575	72	133.3
11M	Europe – M.E.	Horizontal	14440	11M	Europe – M.E.	Vertical	11640	36	133.3
				11S	Steerable	Horizontal	11640	36	134.7
12M	Europe – M.E.	Horizontal	14440	12M	Europe – M.E.	Vertical	11680	36	133.3
				12S	Steerable	Horizontal	11680	36	134.7
5’-6’A	Africa	Vertical	13795	5’-6’R	Russia	Horizontal	12547	72	129.2
				5’-6’A	Africa	Horizontal	12547	72	127.9
3’-4’A	Africa	Vertical	13875	3’-4’R	Russia	Horizontal	12627	72	129.2
				3’-4’A	Africa	Horizontal	12627	72	127.9
1’-2’A	Africa	Vertical	13955	1’-2’R	Russia	Horizontal	12707	72	129.2
				1’-2’A	Africa	Horizontal	12707	72	127.9
1-2A	Africa	Vertical	14045	1-2A	Africa	Horizontal	10995	72	127.9
3-4A	Africa	Vertical	14125	3-4A	Africa	Horizontal	11075	72	127.9
5-6A	Africa	Vertical	14205	5-6A	Africa	Horizontal	11155	72	127.9
7-8A	Africa	Vertical	14295	7-8A	Africa	Horizontal	11495	72	127.9
9-10A	Africa	Vertical	14375	9-10A	Africa	Horizontal	11575	72	127.9
11S	Steerable	Vertical	14440	11M	Europe – M.E.	Vertical	11640	36	131.6
				11S	Steerable	Horizontal	11640	36	133.0
12S	Steerable	Vertical	14480	12M	Europe – M.E.	Vertical	11680	36	131.6
				12S	Steerable	Horizontal	11680	36	133.0
				ULPC3	Global	Right Hand Circular	11198	0.025	
				ULPC4	Global	Right Hand Circular	11452	0.025	
				ULPC5	Global	Right Hand Circular	12502	0.025	

EXHIBIT 5A: C-BAND WEST HEMI A RECEIVE BEAM
(Schedule S Beam ID: HAUL)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 27.0 dBi
Peak Beam G/T: -1.1 dB/K
Saturated Flux Density @ Peak Beam G/T: -103.5 to -79.5 dBW/m^2

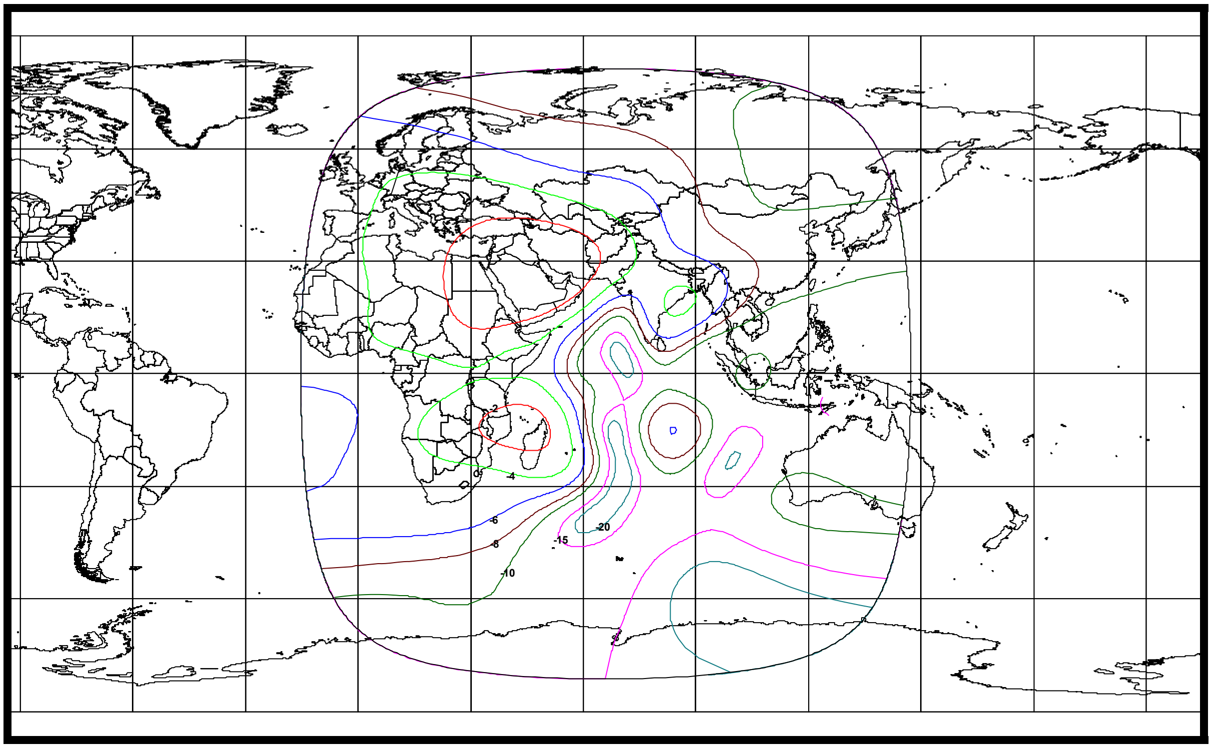


EXHIBIT 5B: C-BAND WEST HEMI B RECEIVE BEAM
(Schedule S Beam ID: HBUR)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 27.0 dBi
Peak Beam G/T: -1.1 dB/K
Saturated Flux Density @ Peak Beam G/T: -103.5 to -79.5 dBW/m^2

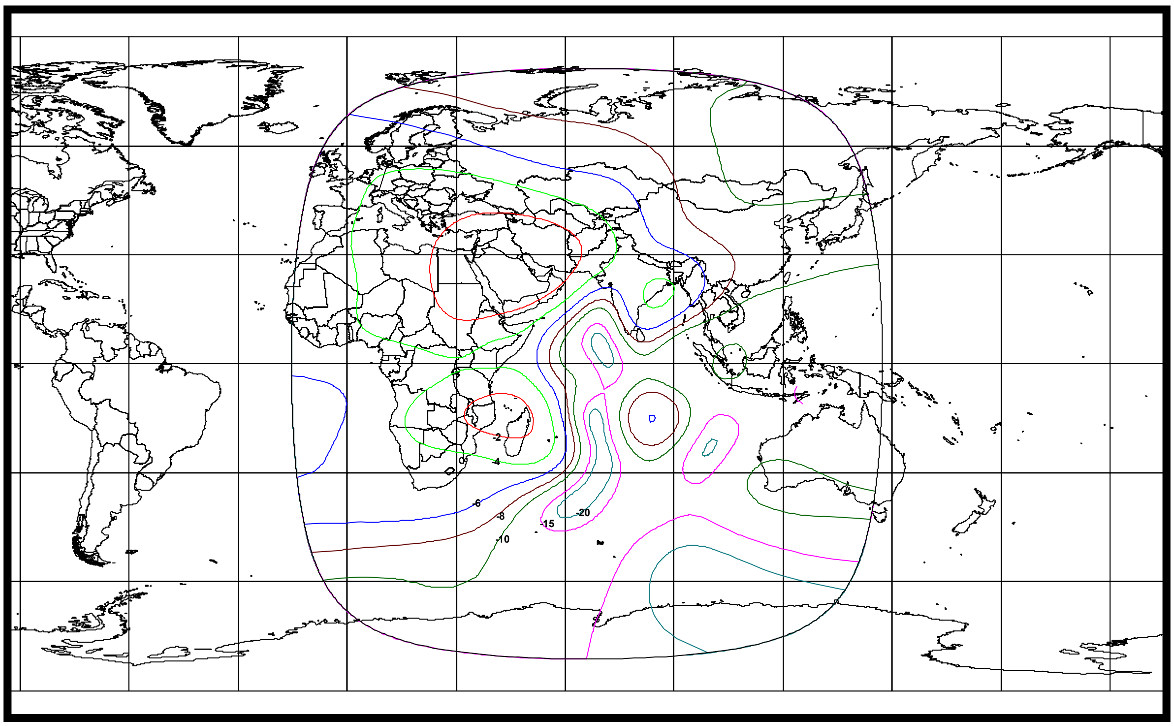


EXHIBIT 5C: C-BAND LANDMASS RECEIVE BEAM
(Schedule S Beam ID: LMUV)

Beam Polarization: Vertical
Peak Beam Gain: 26.4 dBi
Peak Beam G/T: -1.8 dB/K
Saturated Flux Density @ Peak Beam G/T: -100.2 to -76.2 dBW/m^2

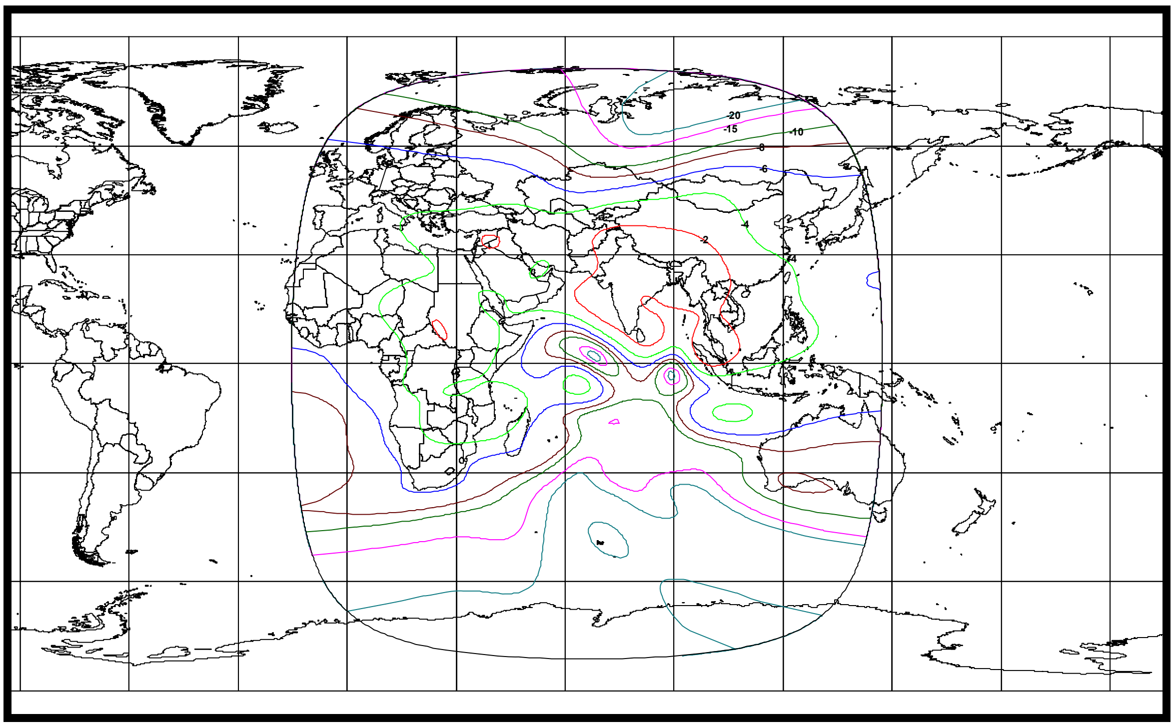


EXHIBIT 5D: C-BAND LANDMASS RECEIVE BEAM
(Schedule S Beam ID: LMUH)

Beam Polarization: Horizontal
Peak Beam Gain: 26.4 dBi
Peak Beam G/T: -1.8 dB/K
Saturated Flux Density @ Peak Beam G/T: -100.2 to -76.2 dBW/m^2

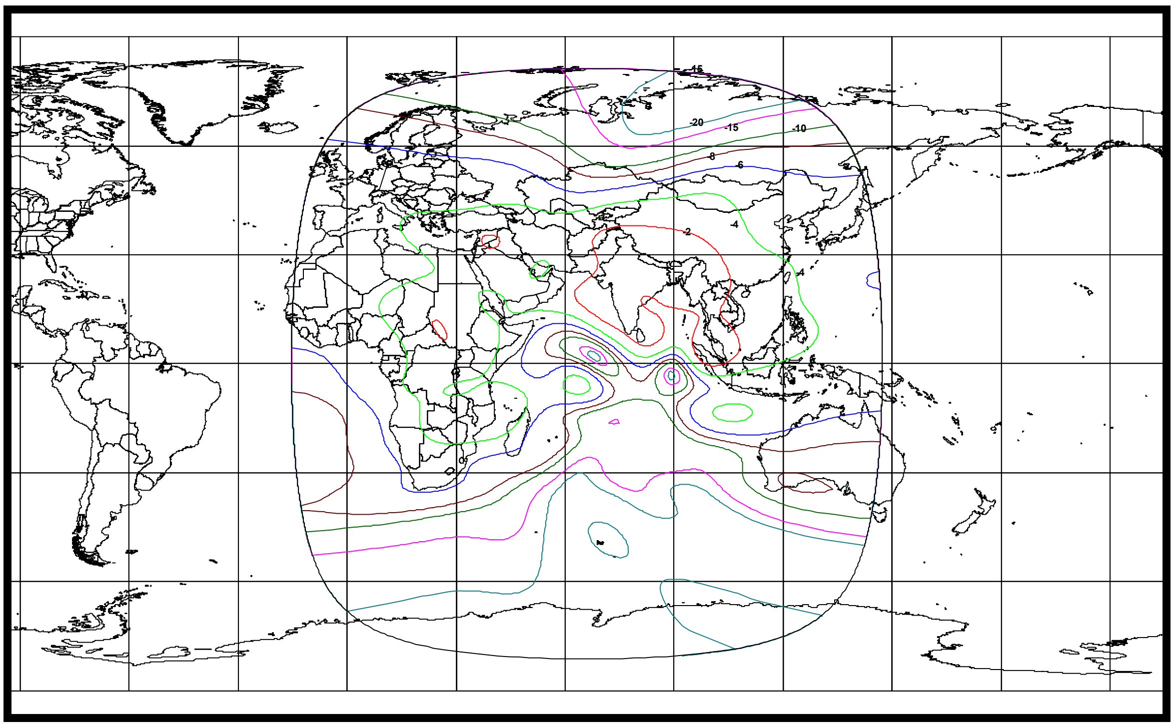


EXHIBIT 5E: C-BAND GLOBAL A RECEIVE BEAM
(Schedule S Beam ID: GAUL)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 20.6 dBi
Peak Beam G/T: -7.8 dB/K
Saturated Flux Density @ Peak Beam G/T: -97.0 to -73.0 dBW/m^2

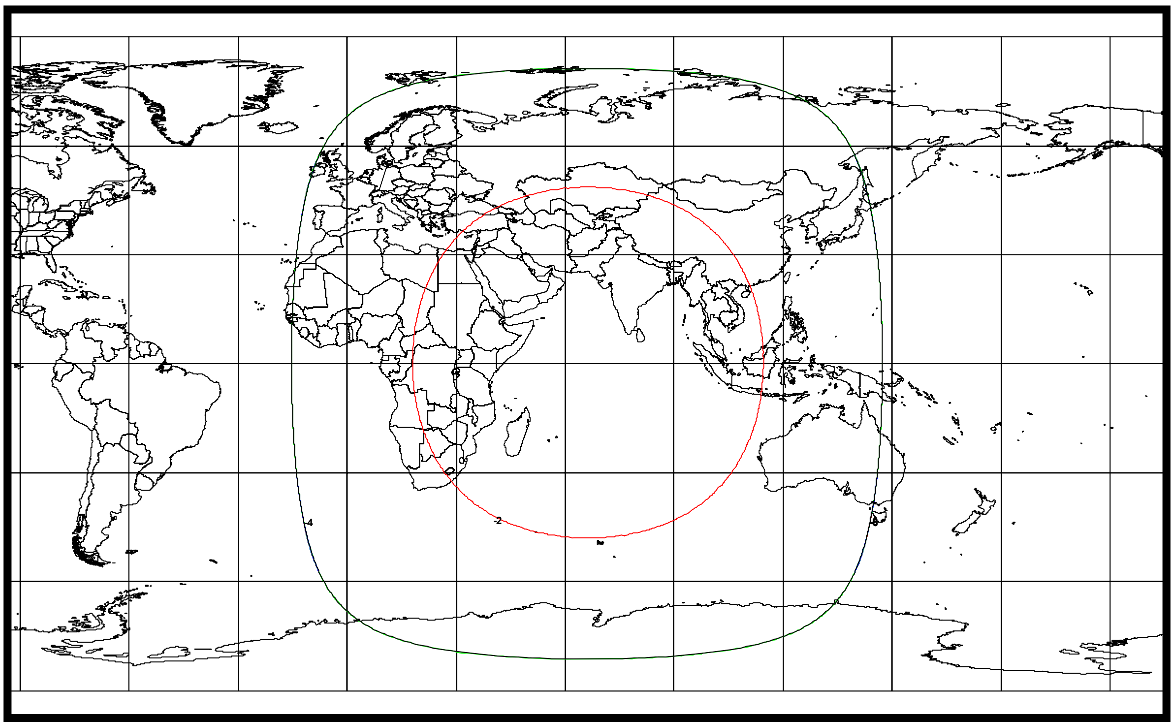


EXHIBIT 5F: C-BAND GLOBAL B RECEIVE BEAM
(Schedule S Beam ID: GBUR)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 20.6 dBi
Peak Beam G/T: -7.8 dB/K
Saturated Flux Density @ Peak Beam G/T: -97.0 to -73.0 dBW/m^2

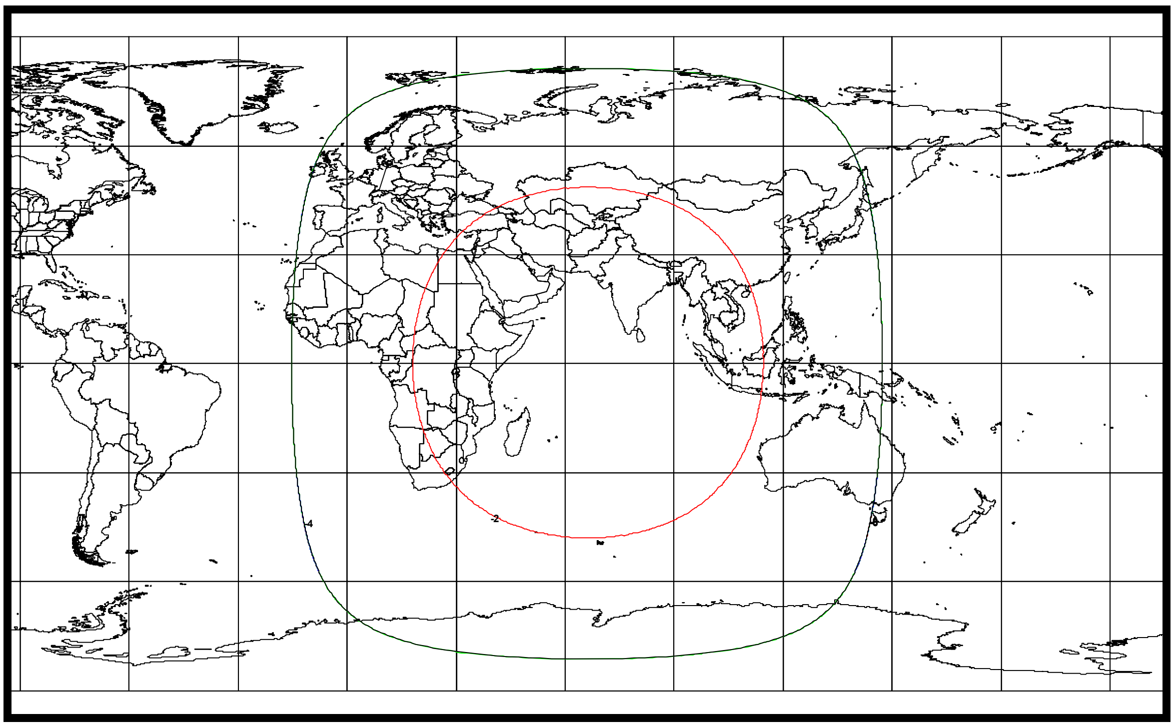


EXHIBIT 5G: Ku-BAND RUSSIA RECEIVE BEAM
(Schedule S Beam ID: RUUV)

Beam Polarization: Vertical
Peak Beam Gain: 34.0 dBi
Peak Beam G/T: 6.0 dB/K
Saturated Flux Density @ Peak Beam G/T: -102.6 to -80.6 dBW/m^2

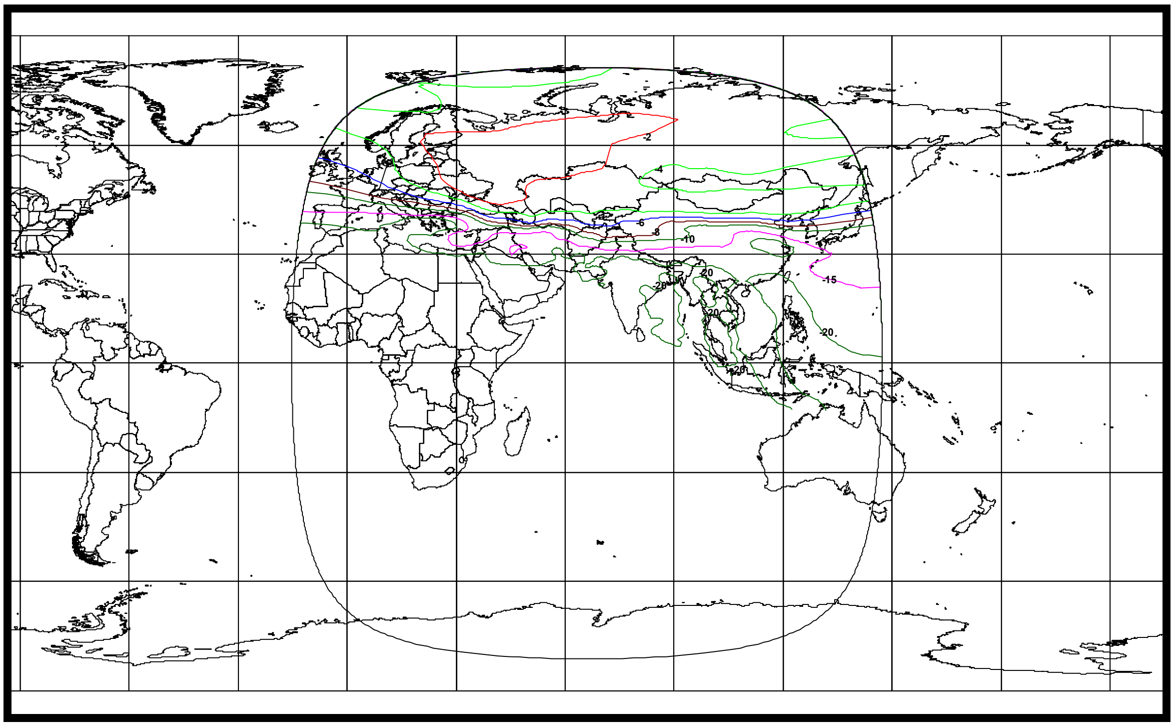


EXHIBIT 5H: Ku-BAND EUROPE - MIDDLE EAST RECEIVE BEAM (Schedule S Beam ID: EMUH)

Beam Polarization: Horizontal
Peak Beam Gain: 33.2 dBi
Peak Beam G/T: 5.2 dB/K
Saturated Flux Density @ Peak Beam G/T: -103.7 to -81.7 dBW/m^2

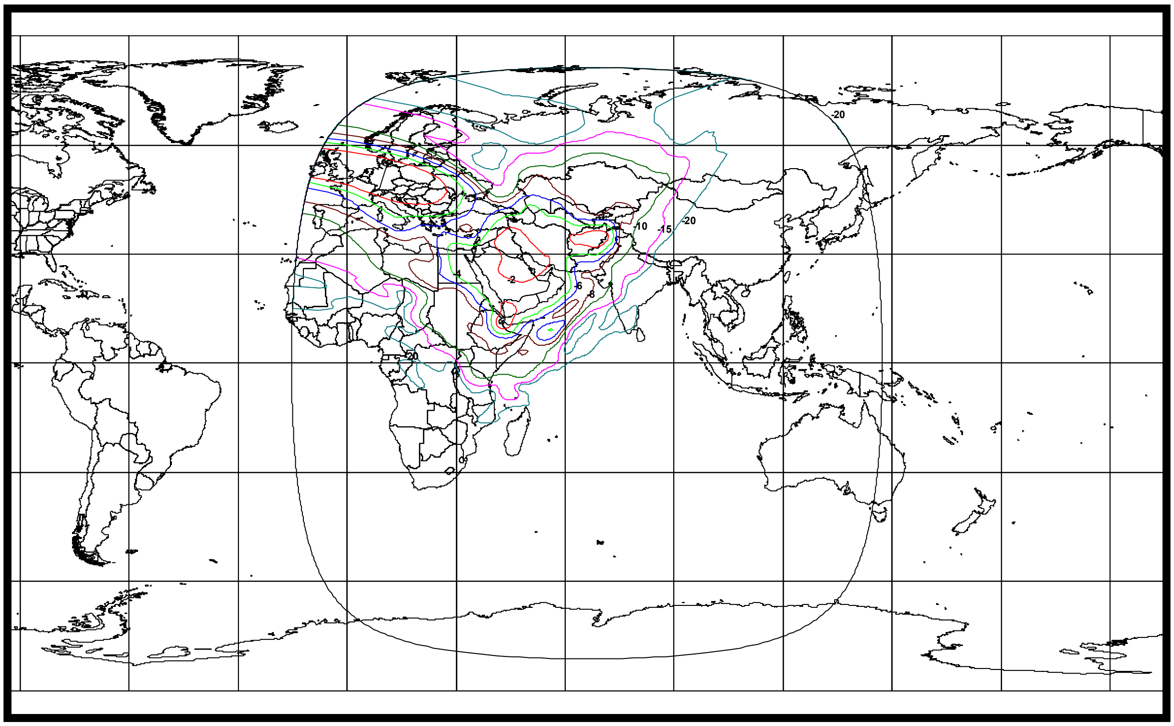


EXHIBIT 5I: Ku-BAND AFRICA RECEIVE BEAM
(Schedule S Beam ID: AFUV)

Beam Polarization: Vertical
Peak Beam Gain: 34.8 dBi
Peak Beam G/T: 6.7 dB/K
Saturated Flux Density @ Peak Beam G/T: -99.8 to -77.8 dBW/m^2

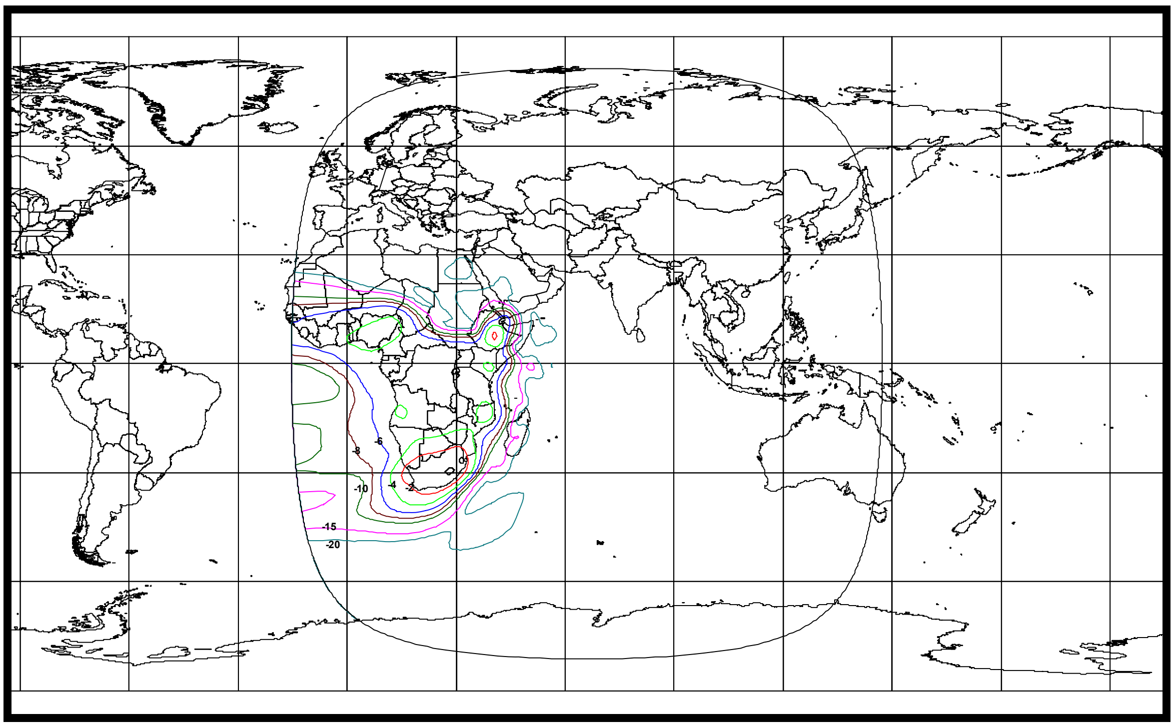


EXHIBIT 5J: Ku-BAND STEERABLE RECEIVE BEAM
(Schedule S Beam ID: GSUV)

Beam Polarization: Vertical
Peak Beam Gain: 35.0 dBi
Peak Beam G/T: 6.7 dB/K
Saturated Flux Density @ Peak Beam G/T: -103.5 to -81.5 dBW/m^2

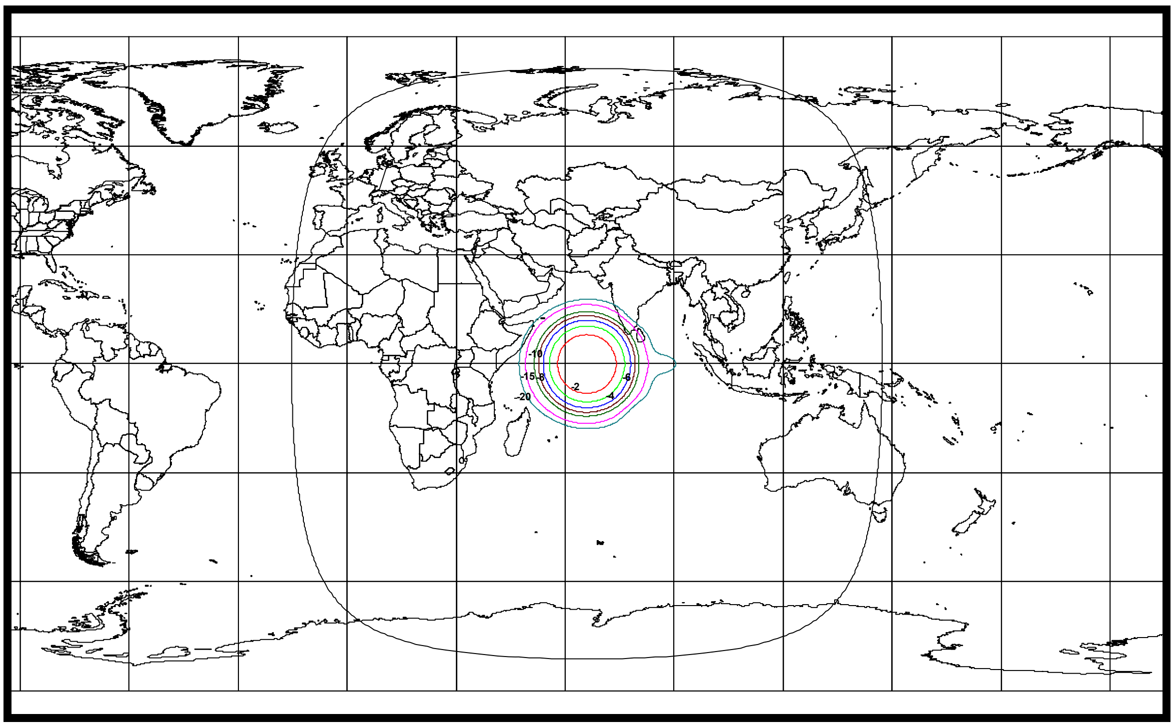


EXHIBIT 5K: C-BAND WEST HEMI A TRANSMIT BEAM
(Schedule S Beam ID: HADR)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 25.2 dBi
Peak Beam EIRP: 39.8 dBW

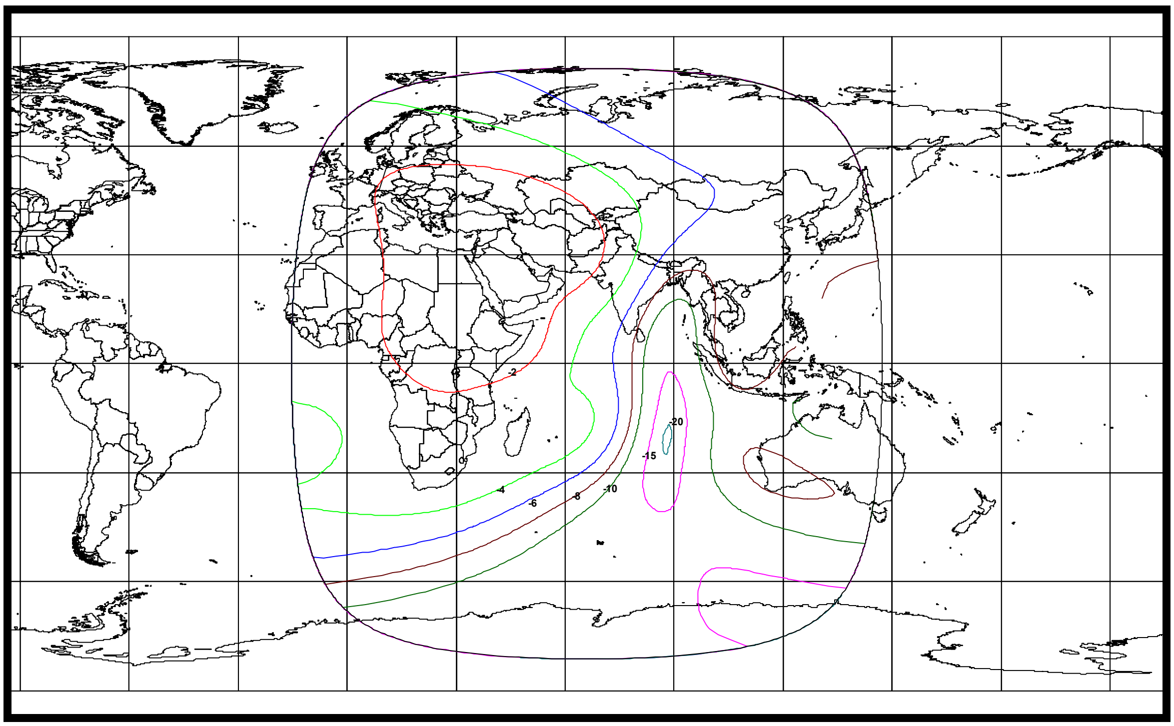


EXHIBIT 5L: C-BAND WEST HEMI B TRANSMIT BEAM
(Schedule S Beam ID: HBDL)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 25.2 dBi
Peak Beam EIRP: 39.8 dBW

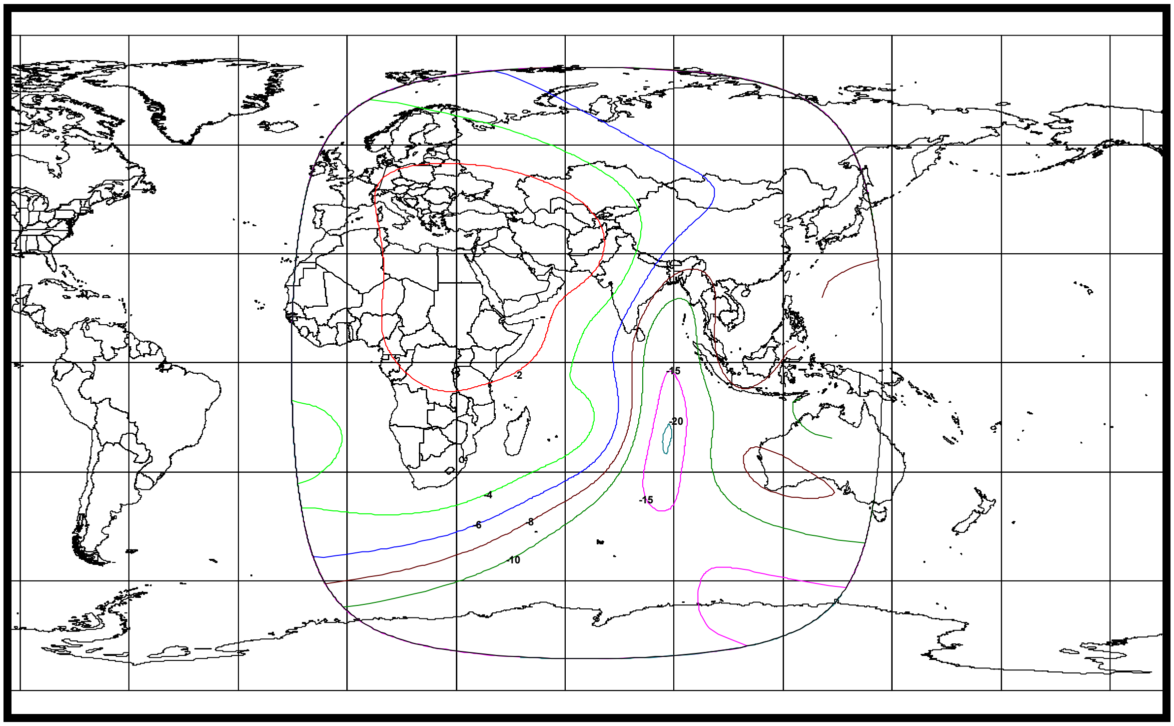


EXHIBIT 5M: C-BAND LANDMASS TRANSMIT BEAM
(Schedule S Beam ID: LMDH)

Beam Polarization: Horizontal
Peak Beam Gain: 24.6 dBi
Peak Beam EIRP: 39.2 dBW

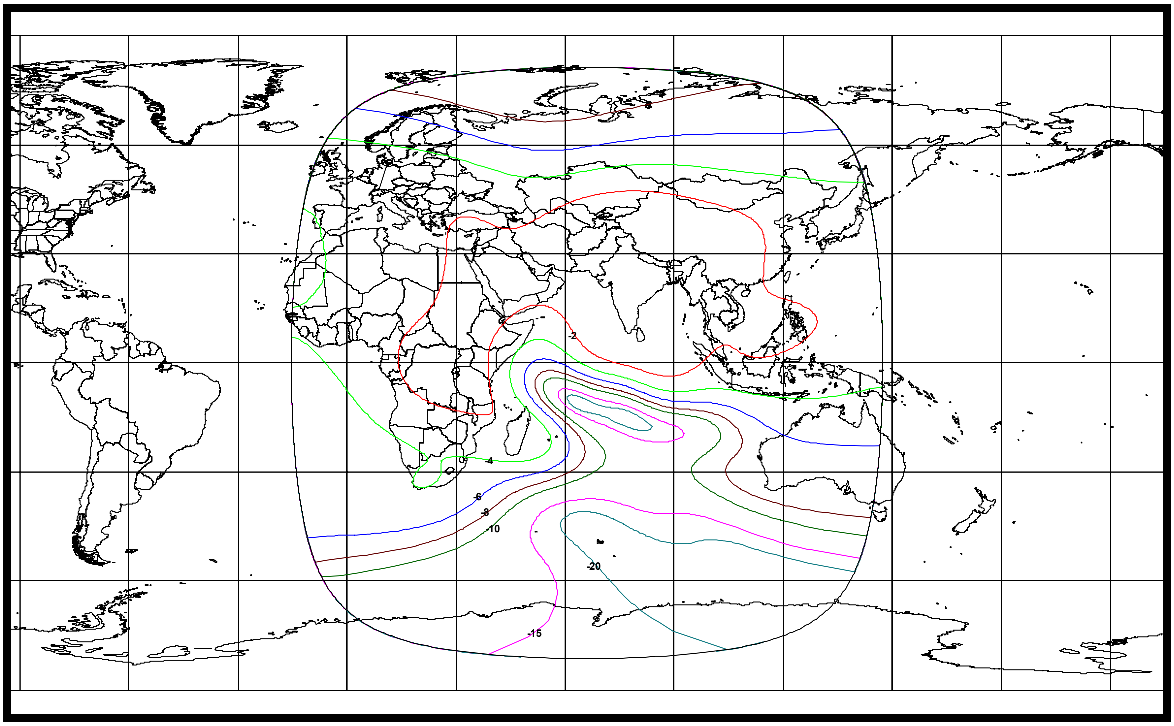


EXHIBIT 5N: C-BAND LANDMASS TRANSMIT BEAM
(Schedule S Beam ID: LMDV)

Beam Polarization: Vertical
Peak Beam Gain: 24.6 dBi
Peak Beam EIRP: 39.2 dBW

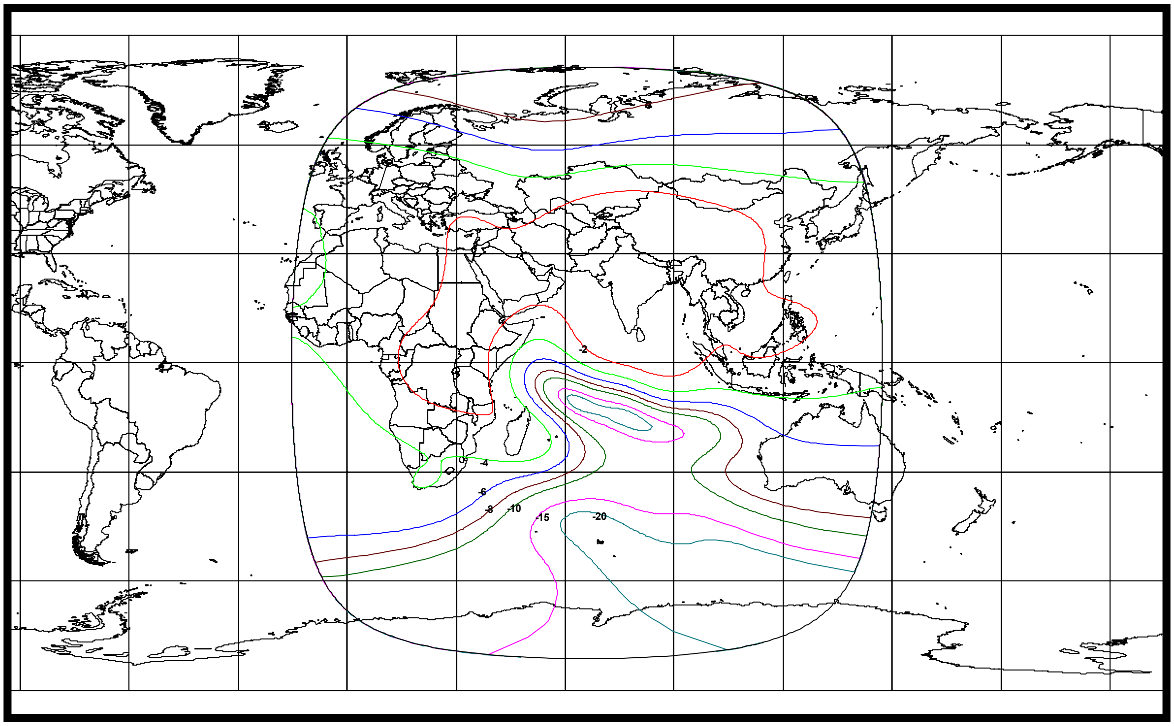


EXHIBIT 5O: C-BAND GLOBAL A TRANSMIT BEAM
(Schedule S Beam ID: GADR)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 20.6 dBi
Peak Beam EIRP: 36.5 dBW

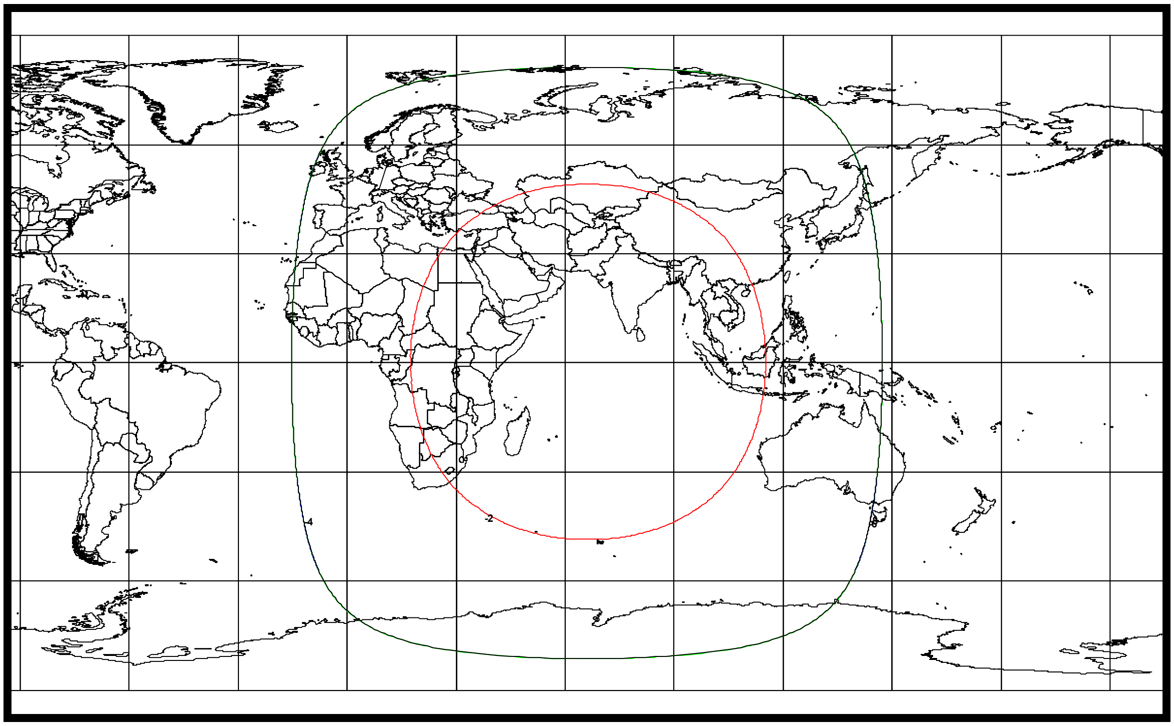


EXHIBIT 5P: C-BAND GLOBAL B TRANSMIT BEAM
(Schedule S Beam ID: GBDL)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 20.6 dBi
Peak Beam EIRP: 36.5 dBW

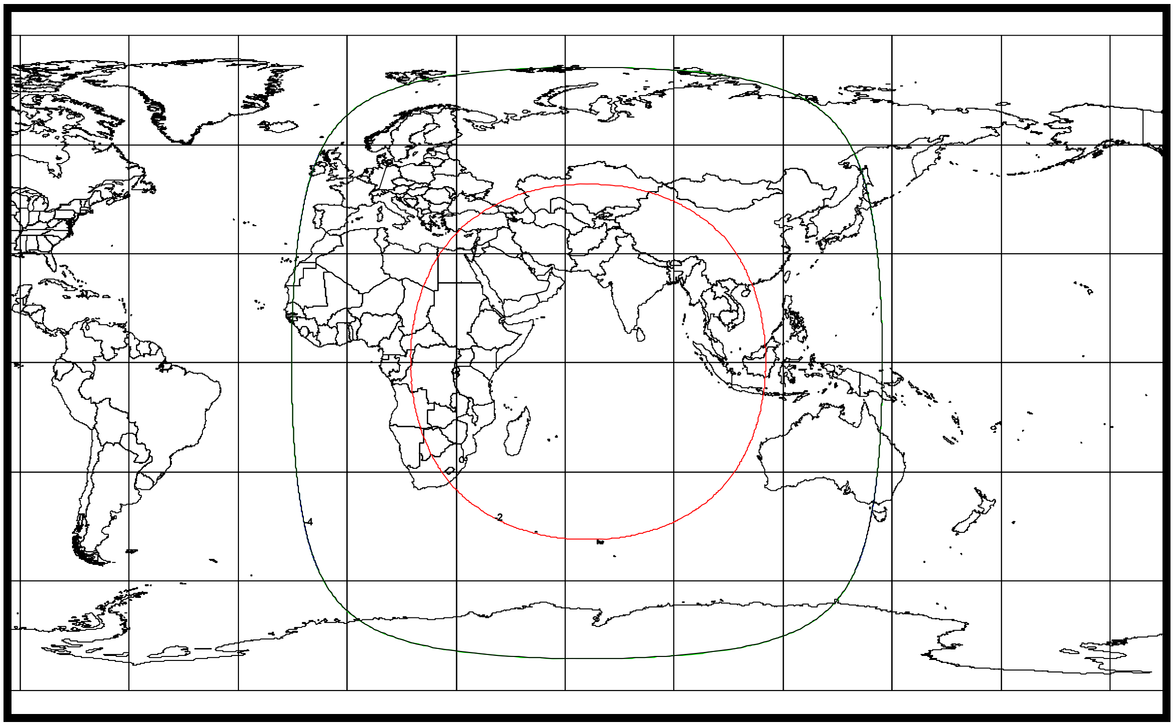


EXHIBIT 5Q: Ku-BAND RUSSIA TRANSMIT BEAM (Schedule S Beam ID: RUDH)

Beam Polarization: Horizontal
Peak Beam Gain: 33.5 dBi
Peak Beam EIRP: 53.3 dBW

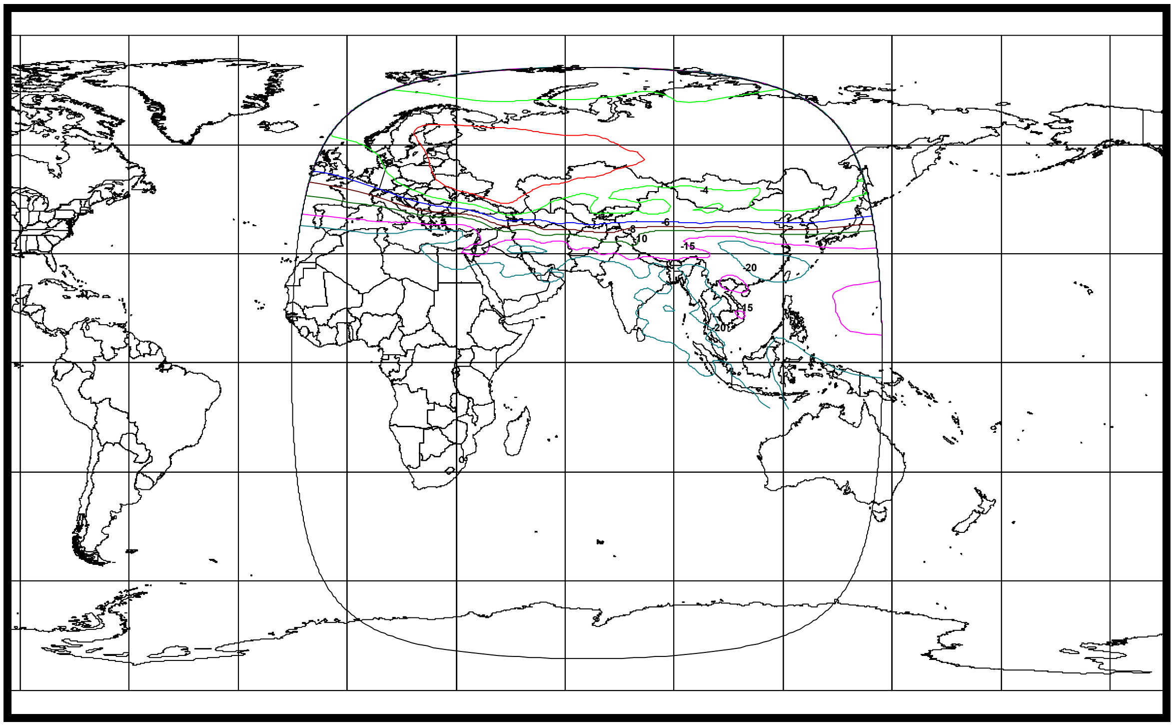


EXHIBIT 5R: Ku-BAND EUROPE-MIDDLE EAST TRANSMIT BEAM (Schedule S Beam ID: EMDV)

Beam Polarization: Vertical
Peak Beam Gain: 32.5 dBi
Peak Beam EIRP: 50.9 dBW

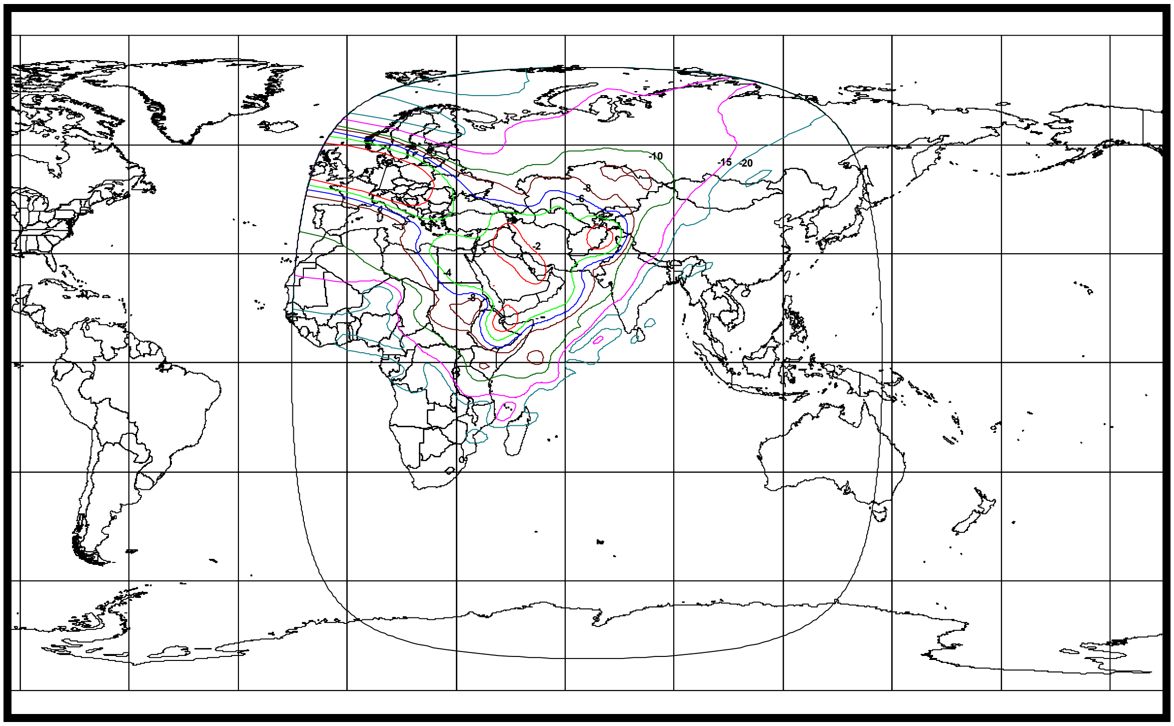


EXHIBIT 5S: Ku-BAND AFRICA TRANSMIT BEAM
(Schedule S Beam ID: AFDH)

Beam Polarization: Horizontal
Peak Beam Gain: 33.6 dBi
Peak Beam EIRP: 52.1 dBW

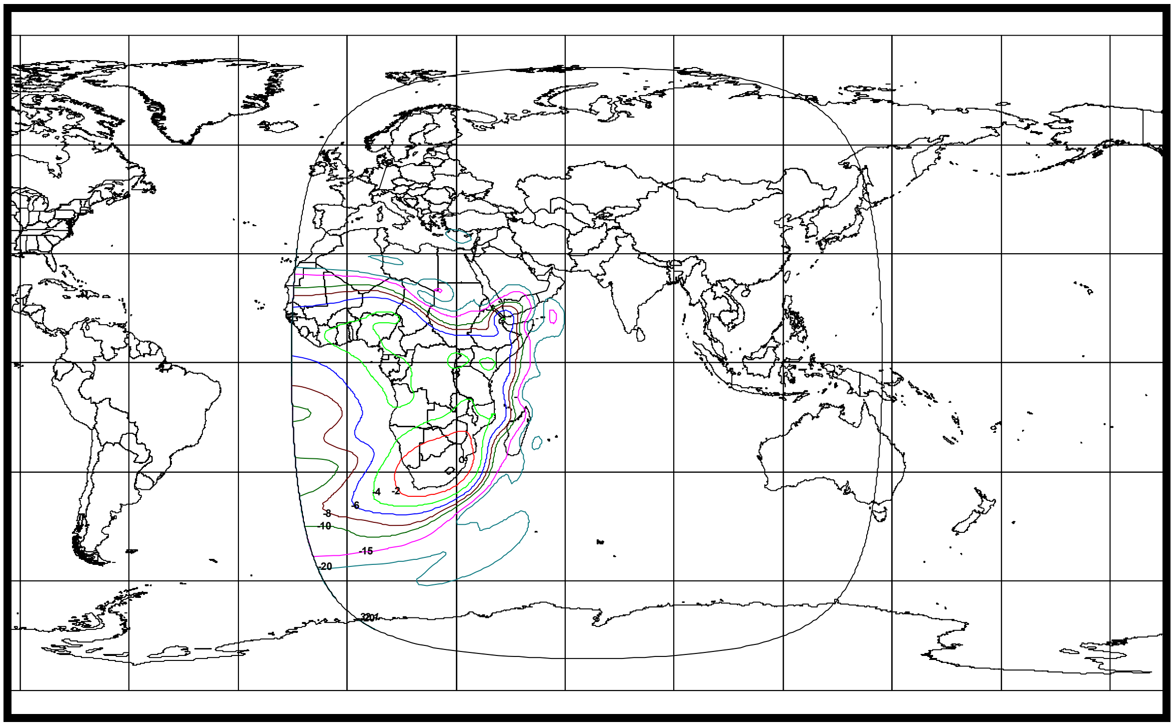


EXHIBIT 5T: Ku-BAND GLOBAL STEERABLE TRANSMIT BEAM (Schedule S Beam ID: GSDH)

Beam Polarization: Horizontal
Peak Beam Gain: 33.4 dBi
Peak Beam EIRP: 53.2 dBW

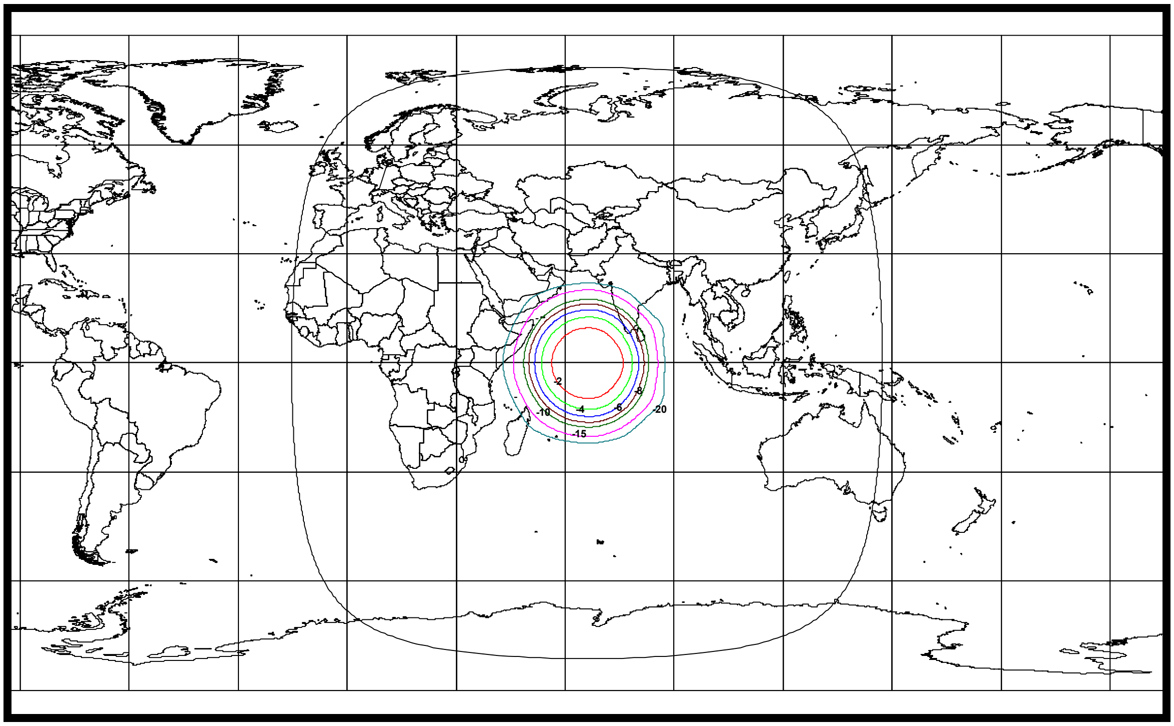


EXHIBIT 5U: C-BAND COMMAND RECEIVE BEAM (on-station)
(Schedule S Beam ID: CMDC)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 20.6 dBi
Peak Beam G/T: -22.1 dB/K
Command Threshold Flux Density @ Peak Beam G/T: -110.2 dBW/m^2

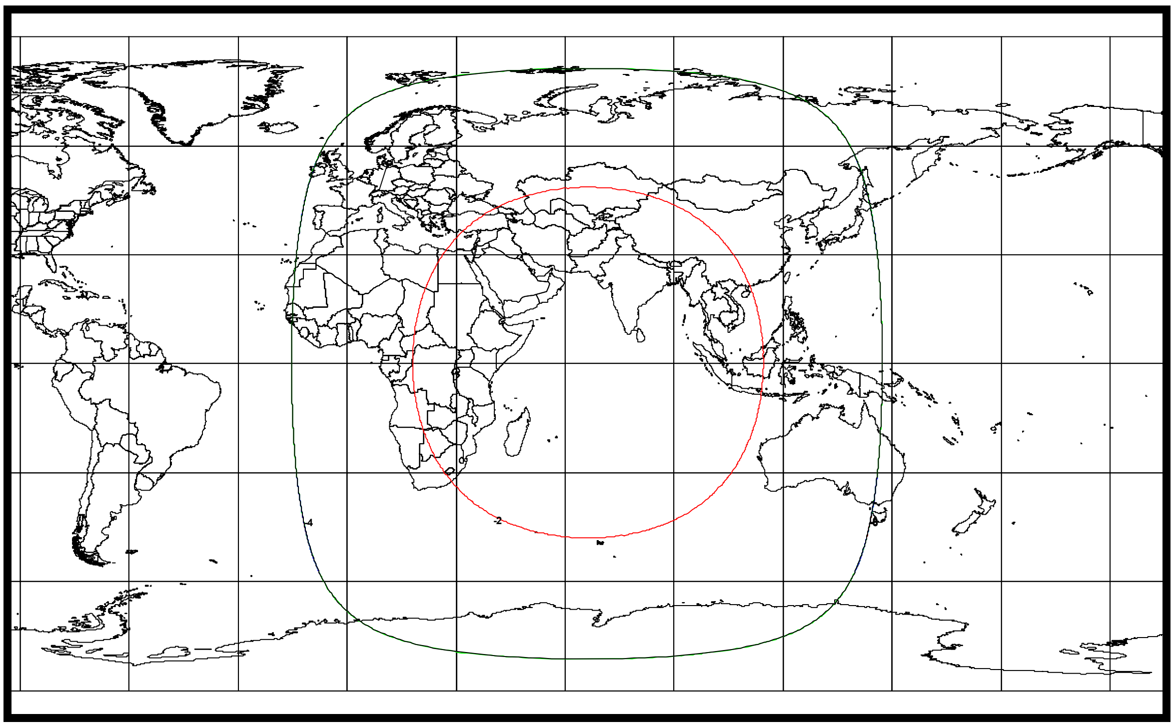


EXHIBIT 5V: C-BAND COMMAND RECEIVE BEAM (back-up)
(Wide-Beam Antenna)
(Schedule S Beam ID: CMDW)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 2 dBi
Peak Beam G/T: -34.8 dB/K
Command Threshold Flux Density @ Peak Beam G/T: -97.5 dBW/m^2

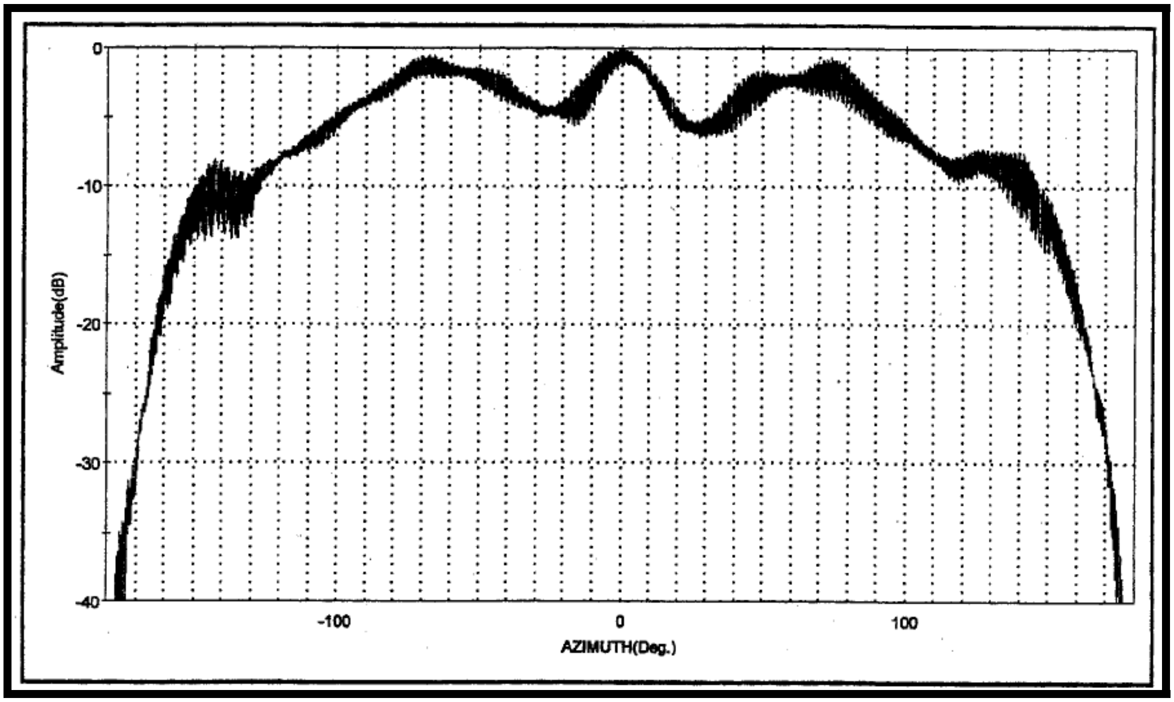


EXHIBIT 5W: C-BAND COMMAND RECEIVE BEAM (back-up)
(Medium-Beam Antenna)
(Schedule S Beam ID: CMDM)

Beam Polarization: Left Hand Circular
Peak Beam Gain: 6.0 dBi
Peak Beam G/T: -38.3 dB/K
Command Threshold Flux Density @ Peak Beam G/T: -94.0 dBW/m^2

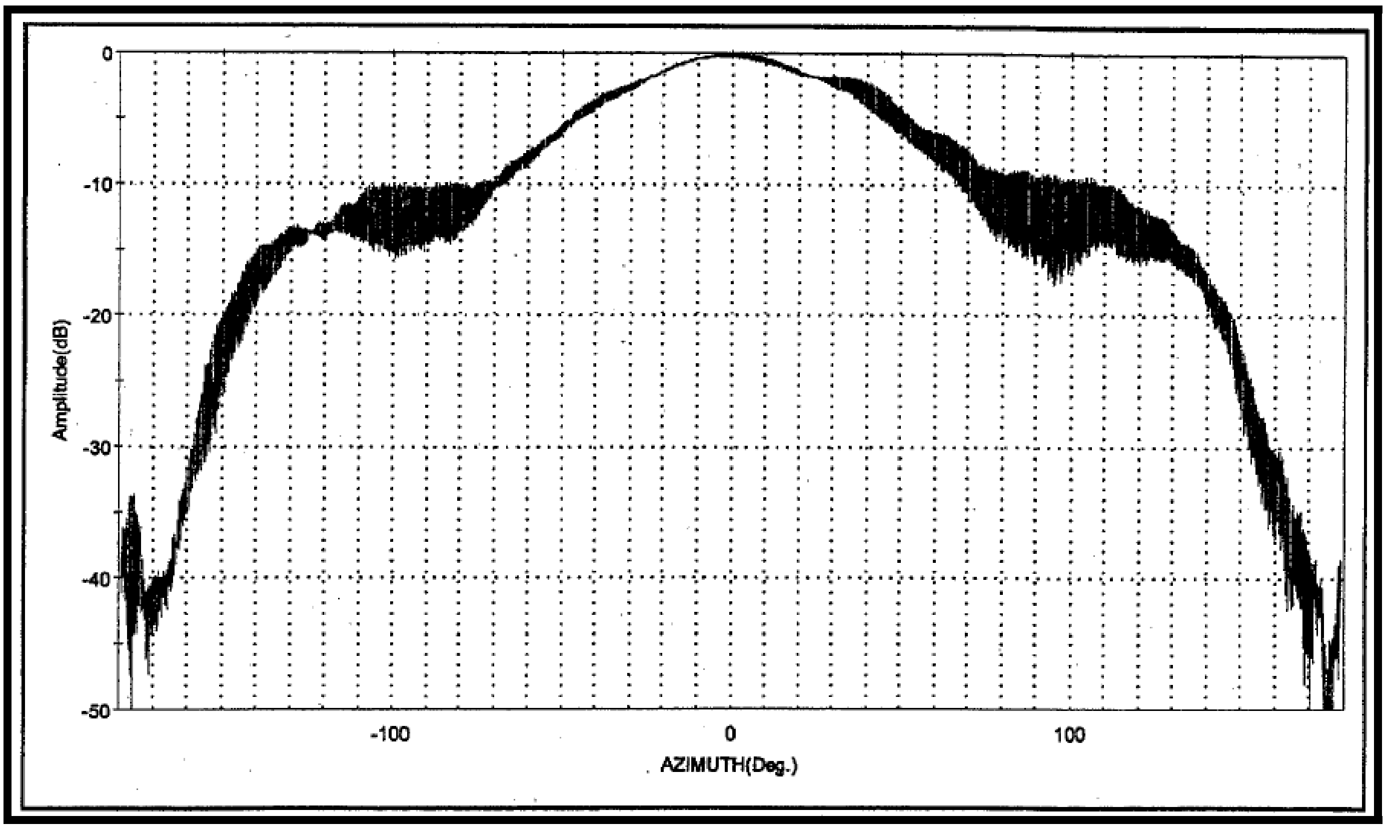


EXHIBIT 5X: C-BAND TELEMETRY TRANSMIT BEAM (on-station)
(Schedule S Beam ID: TLMC)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 20.6 dBi
Peak Beam EIRP: 13.5 dBW

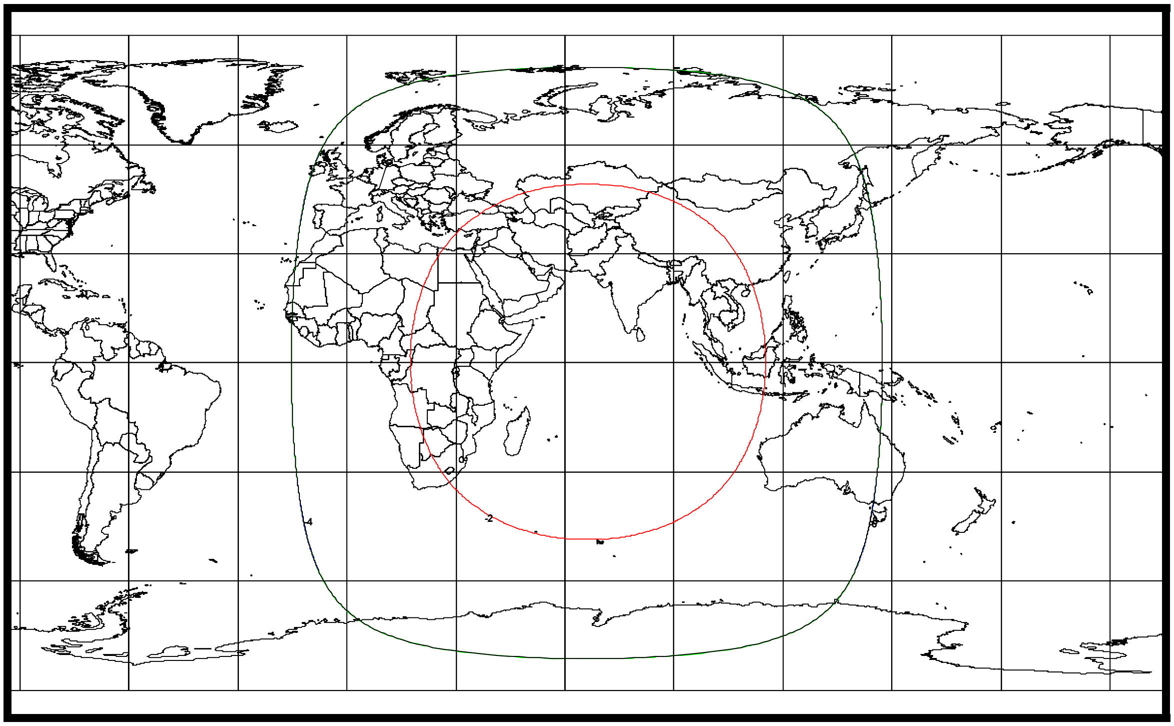


EXHIBIT 5Y: C-BAND TELEMETRY TRANSMIT BEAM (back-up)
(Wide-Beam Antenna)
(Schedule S Beam ID: TLMW)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 2 dBi
Peak Beam EIRP: 13.2 dBW

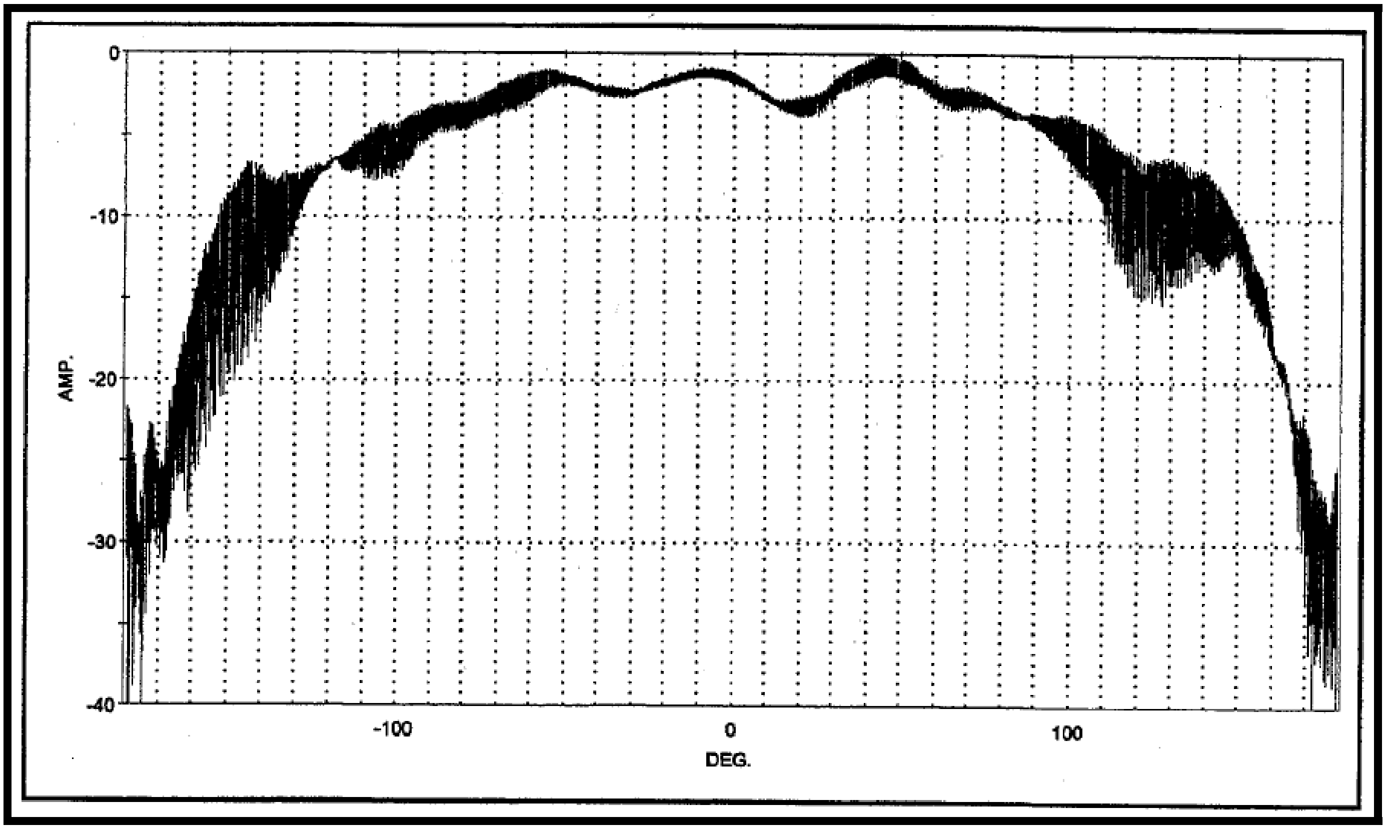


EXHIBIT 5Z: C-BAND TELEMETRY TRANSMIT BEAM (back-up)
(Medium-Beam Antenna)
(Schedule S Beam ID: TLMM)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 6 dBi
Peak Beam EIRP: 10.9 dBW

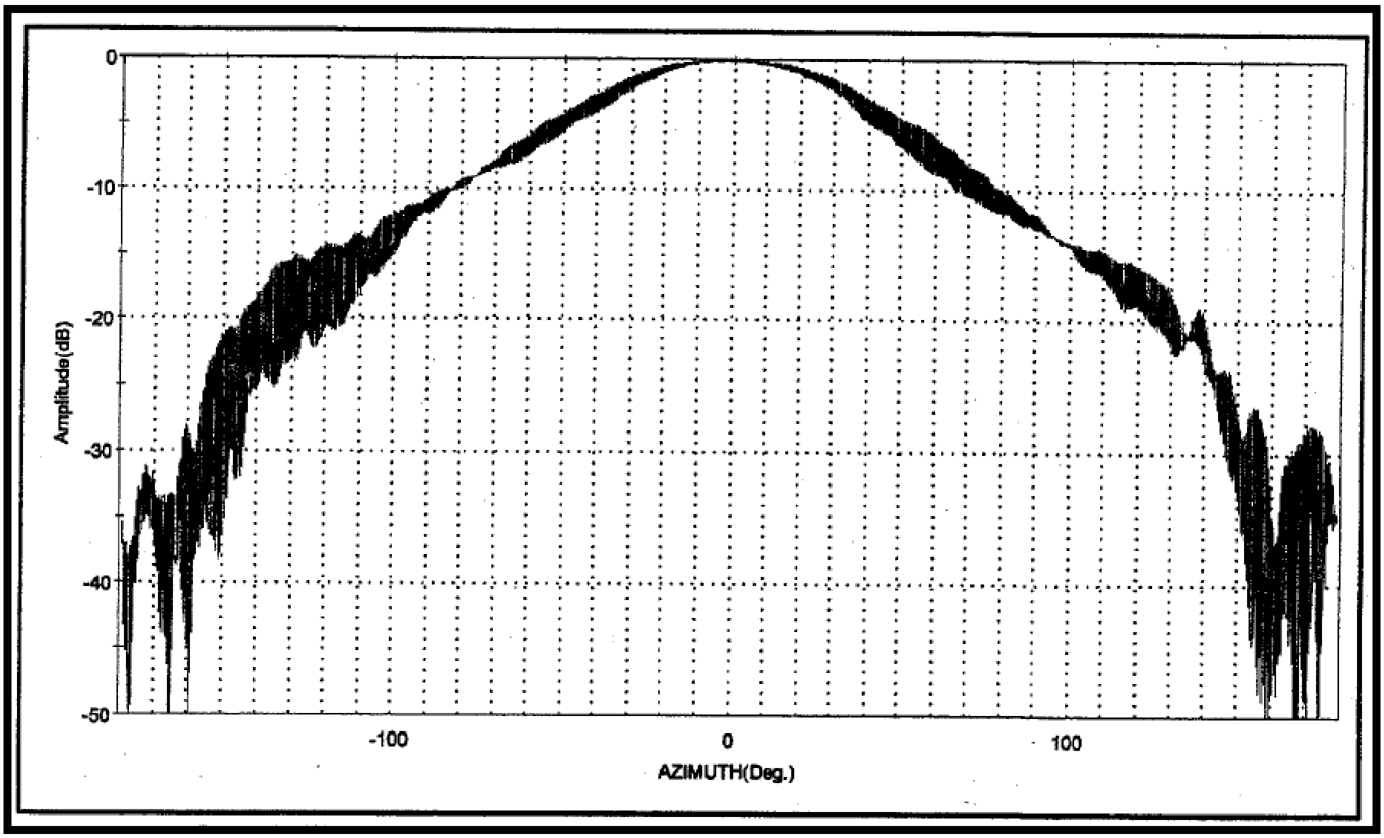


EXHIBIT 5AA-1: C-BAND ULPC TRANSMIT BEAM
(Schedule S Beam ID: UPCH)

Beam Polarization: Horizontal
Peak Beam Gain: 20.5 dBi
Peak Beam EIRP: 12.3 dBW

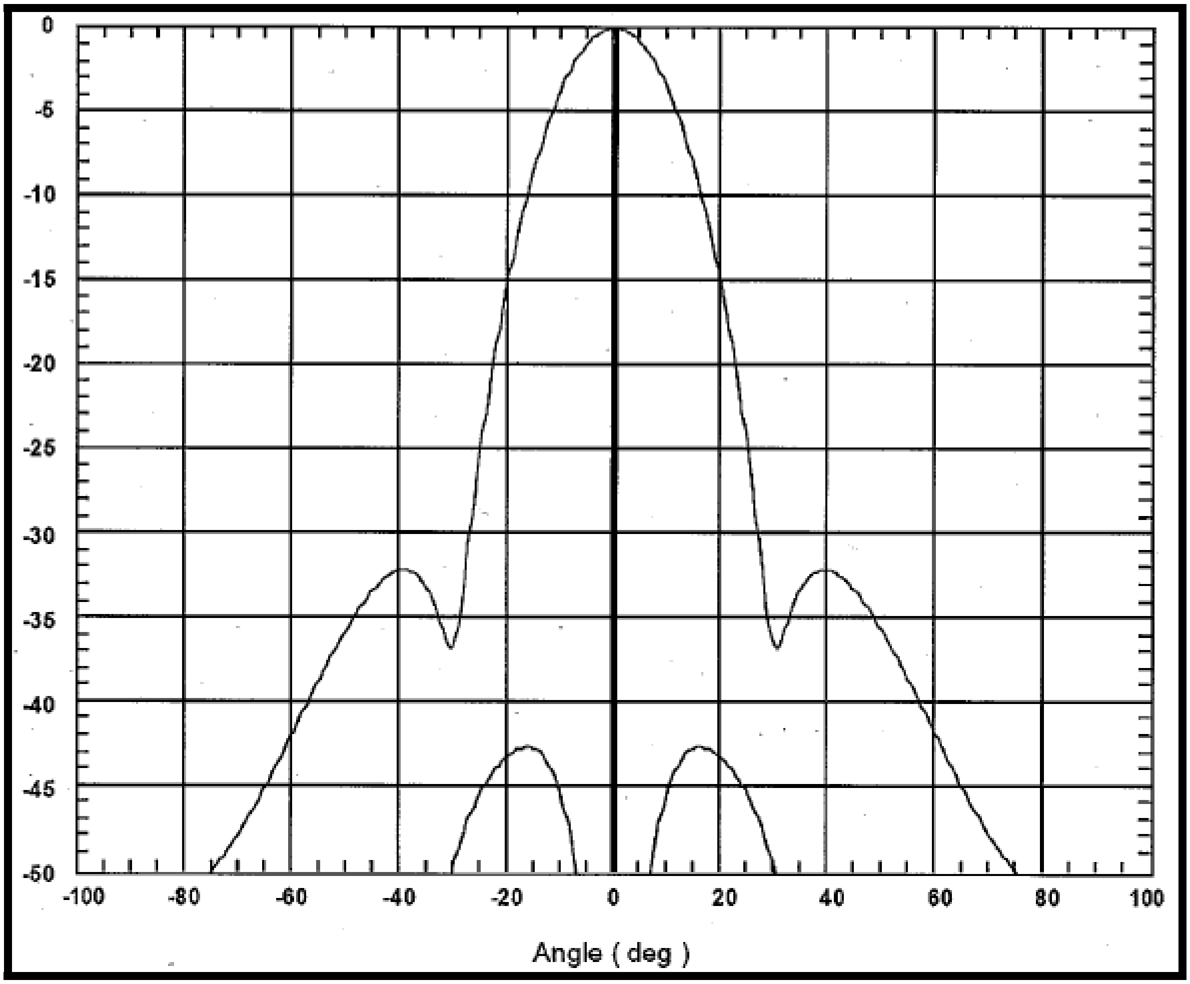


EXHIBIT 5AA-2: C-BAND ULPC TRANSMIT BEAM
(Schedule S Beam ID: UPCV)

Beam Polarization: Vertical
Peak Beam Gain: 20.5 dBi
Peak Beam EIRP: 12.3 dBW

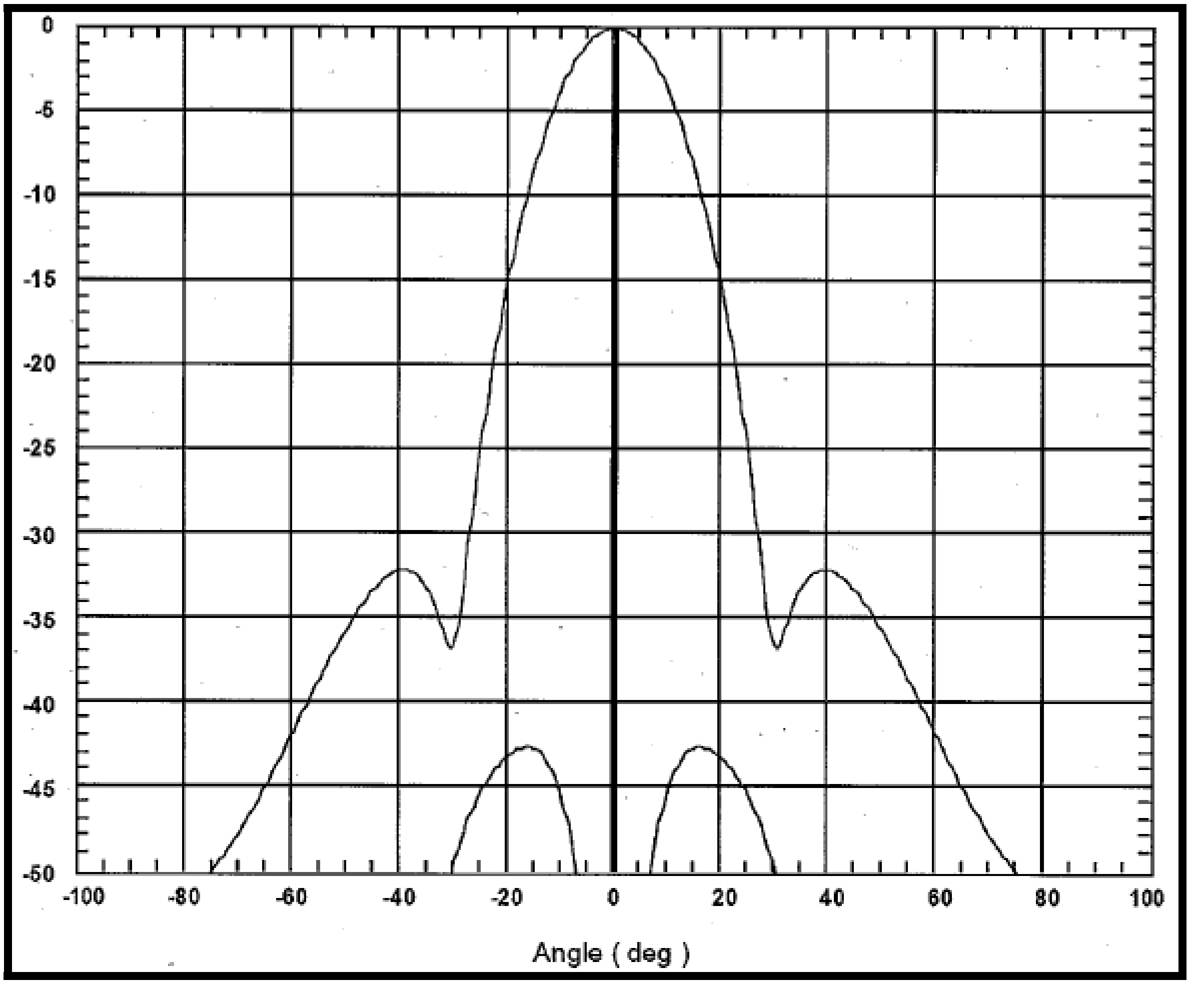


EXHIBIT 5AA-3: Ku-BAND ULPC TRANSMIT BEAM
(Schedule S Beam ID: UPKR)

Beam Polarization: Right Hand Circular
Peak Beam Gain: 22.9 dBi
Peak Beam EIRP: 17.8 dBW

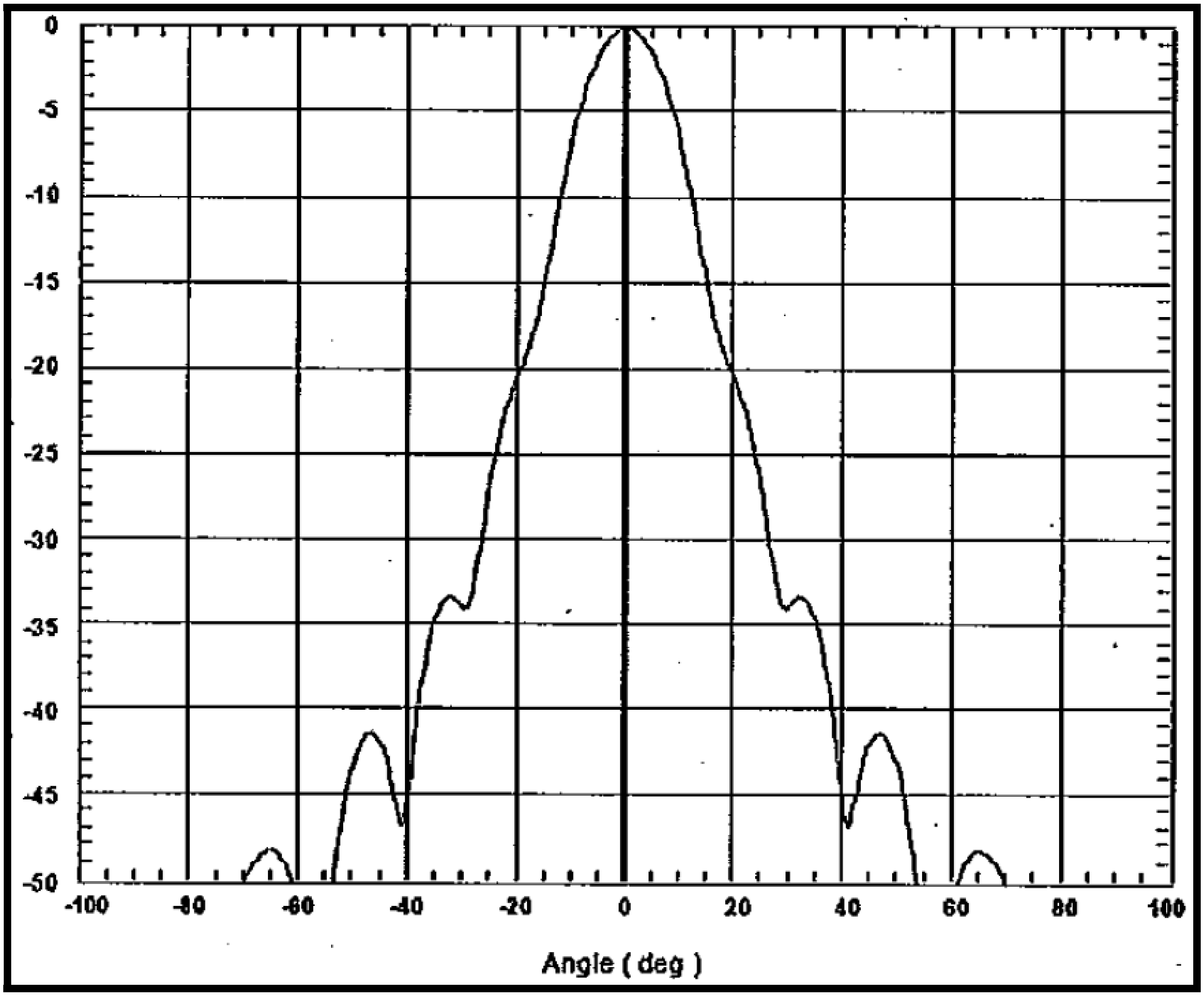
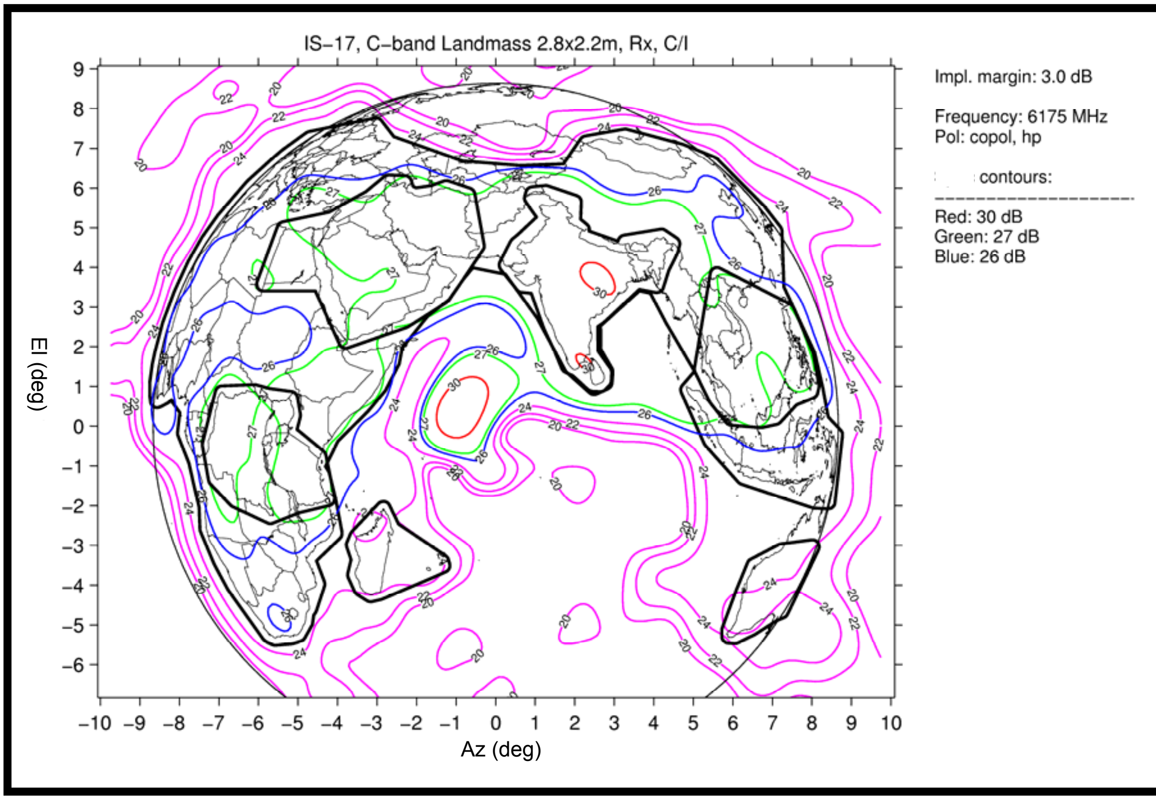
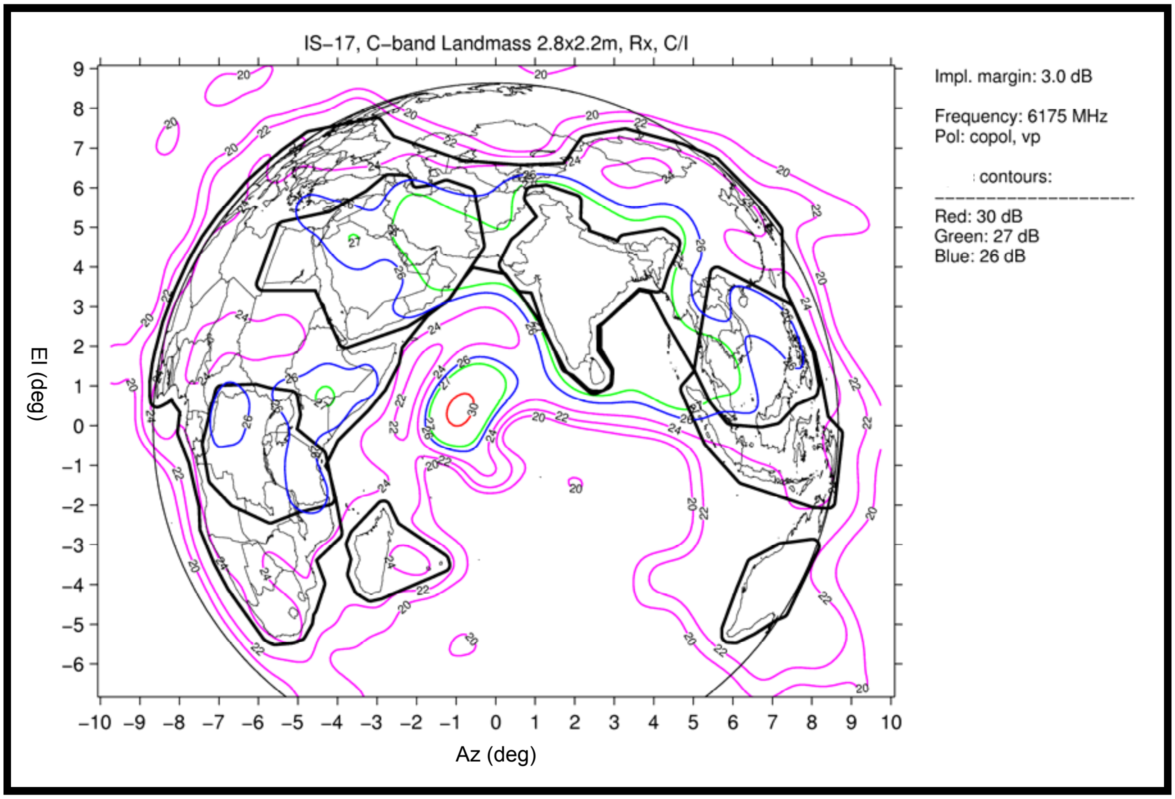


EXHIBIT 5BB-1: C-BAND LANDMASS RECEIVE BEAM CROSS-POLARIZATION PATTERN [BEAM POLARIZATION: Horizontal] (Schedule S Beam ID: LUHX)



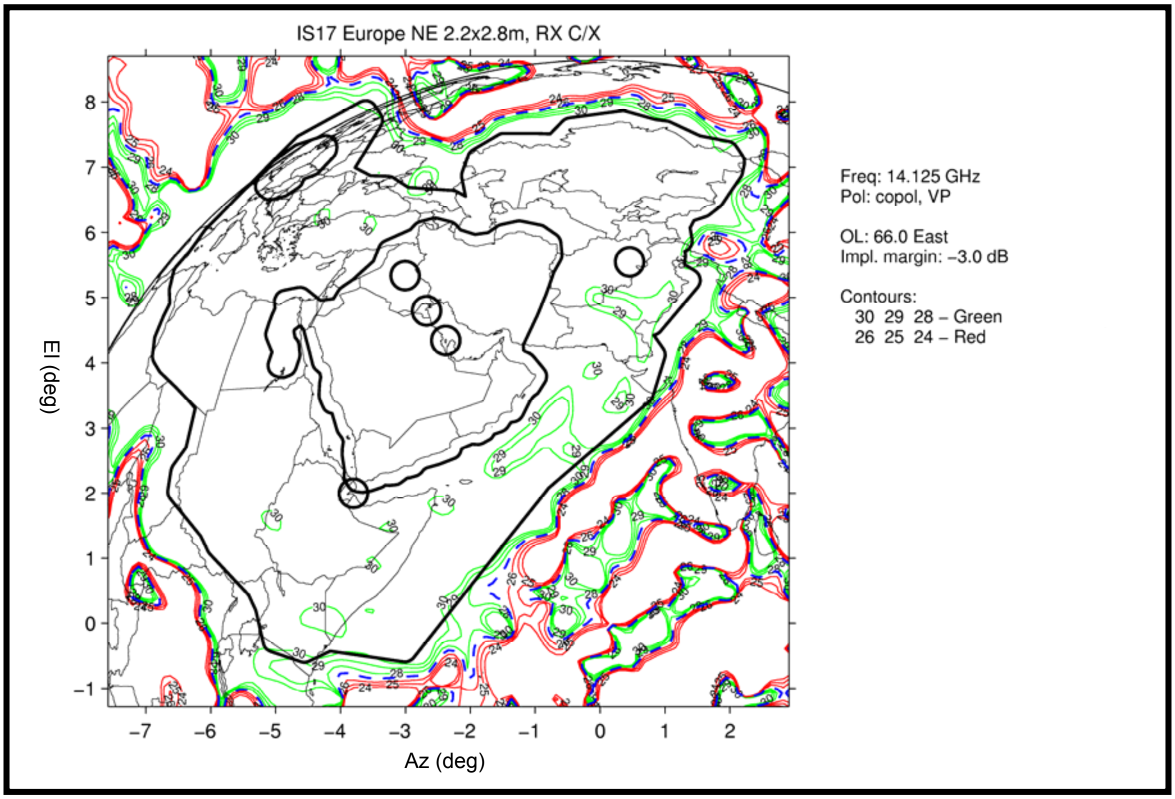
Note: Absolute cross-polarization contour levels are shown

EXHIBIT 5BB-2: C-BAND LANDMASS RECEIVE BEAM CROSS-POLARIZATION PATTERN [BEAM POLARIZATION: Vertical] (Schedule S Beam ID: LUVX)



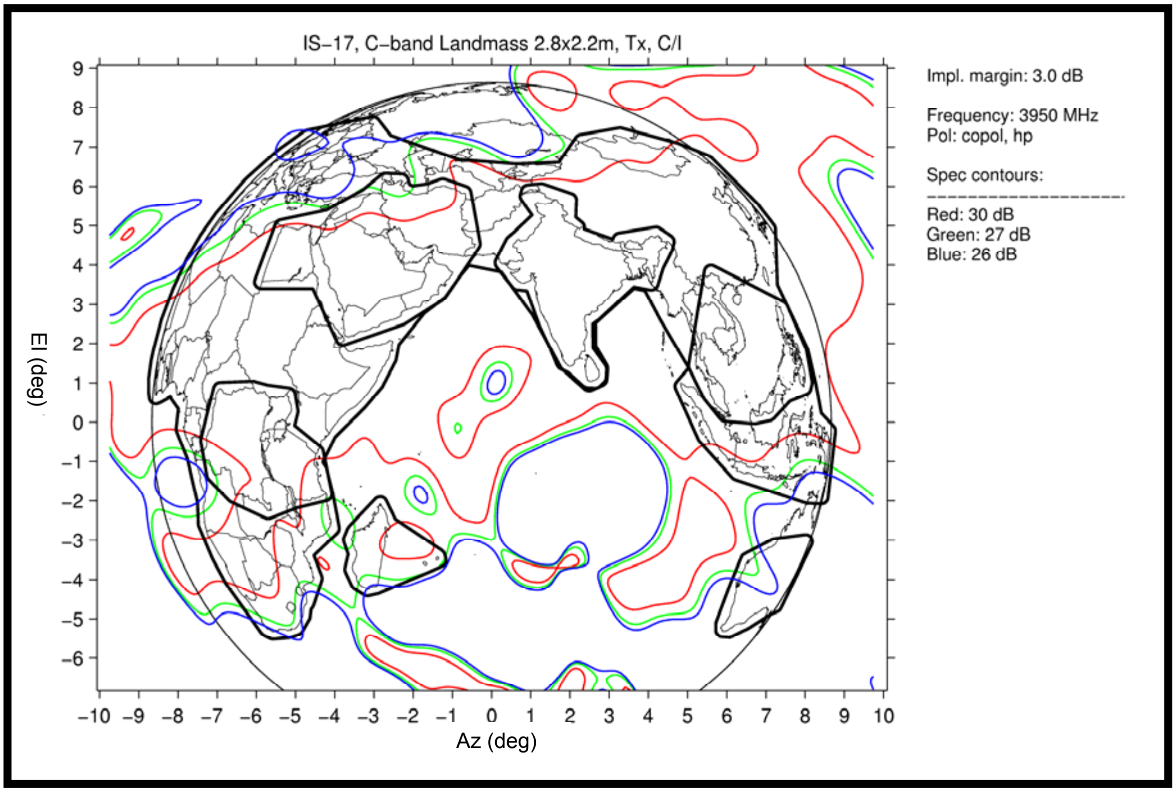
Note: Absolute cross-polarization contour levels are shown

EXHIBIT 5BB-3: Ku-BAND EUROPE – MIDDLE EAST RECEIVE BEAM CROSS-POLARIZATION PATTERN [BEAM POLARIZATION: Horizontal] (Schedule S Beam ID: EUHX)



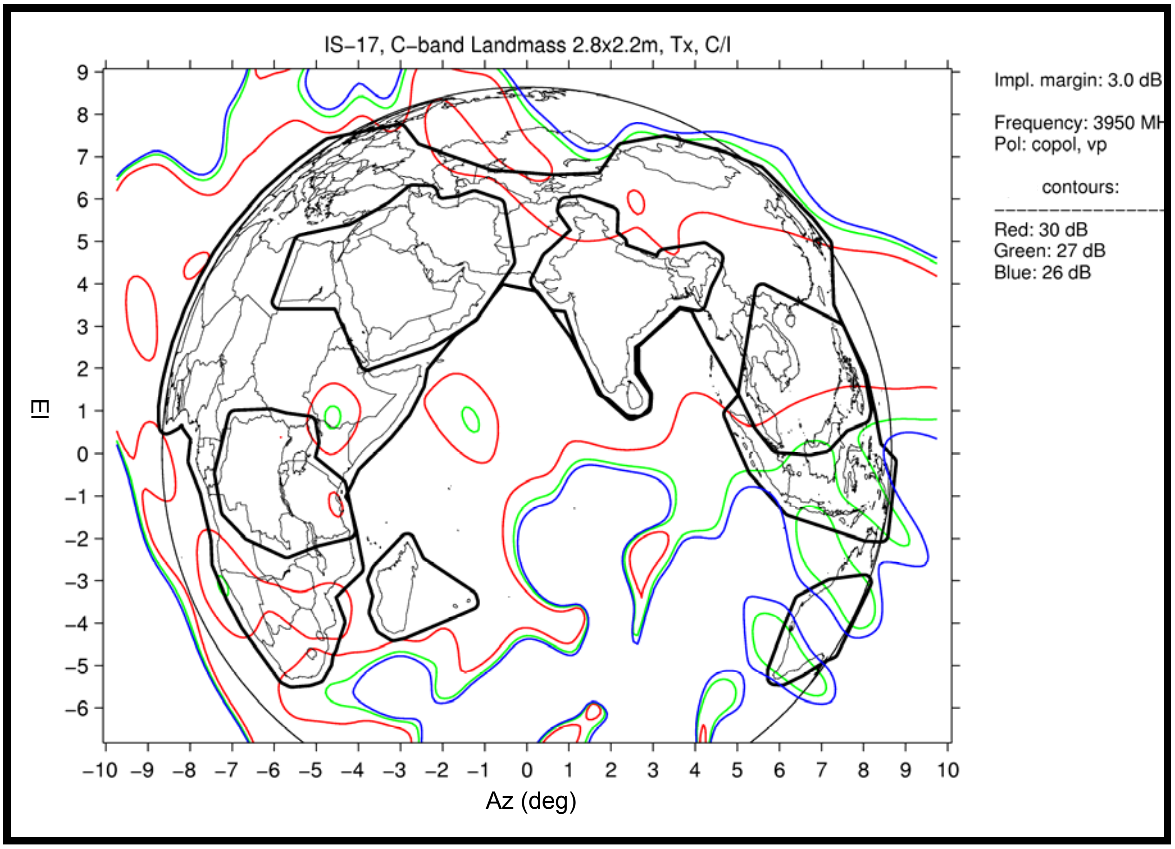
Note: Absolute cross-polarization contour levels are shown

EXHIBIT 5BB-4: C-BAND LANDMASS TRANSMIT BEAM CROSS-POLARIZATION PATTERN [BEAM POLARIZATION: Horizontal] (Schedule S Beam ID: LDHX)



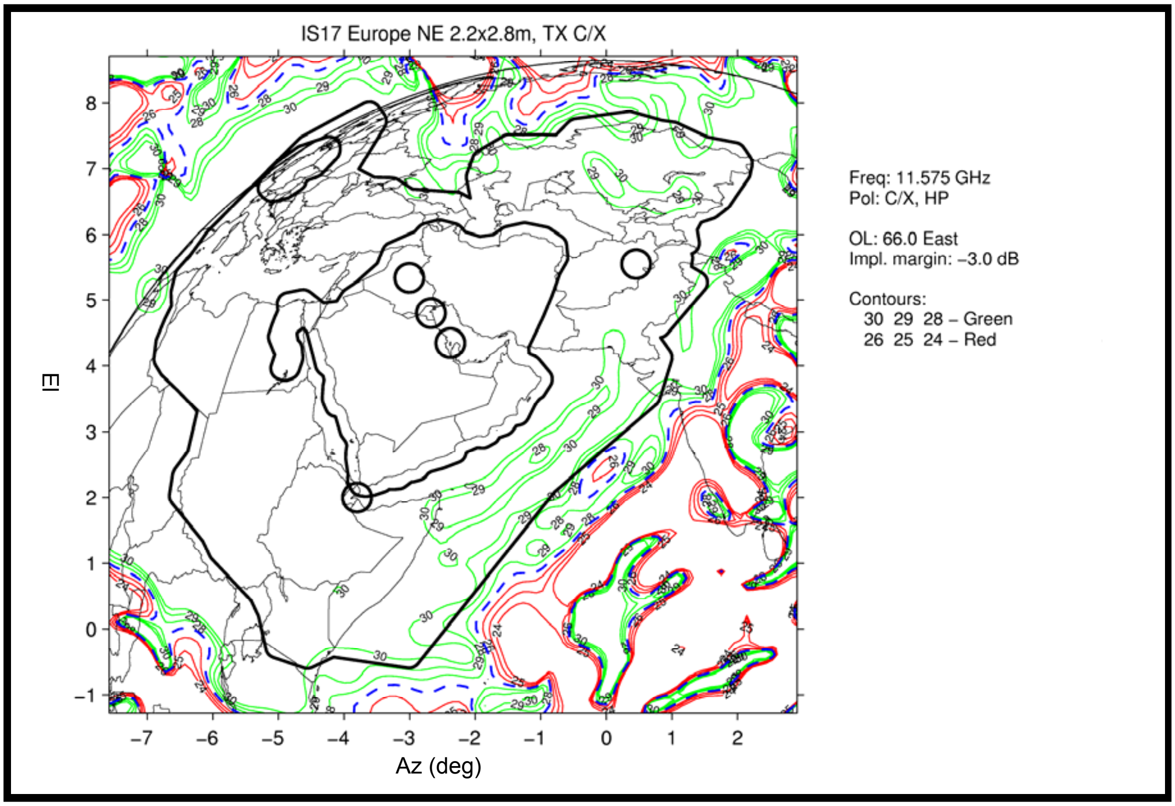
Note: Absolute cross-polarization contour levels are shown

EXHIBIT 5BB-5: C-BAND LANDMASS TRANSMIT BEAM CROSS-POLARIZATION PATTERN [BEAM POLARIZATION: Vertical] (Schedule S Beam ID: LDVX)



Note: Absolute cross-polarization contour levels are shown

EXHIBIT 5BB-6: Ku-BAND EUROPE – MIDDLE EAST TRANSMIT BEAM CROSS-POLARIZATION PATTERN [BEAM POLARIZATION: Vertical] (Schedule S Beam ID: EDVX)



Note: Absolute cross-polarization contour levels are shown

EXHIBIT 6: COMMUNICATION SUBSYSTEM EIRP AND G/T BUDGETS

Beam Name	West Hemi A	West Hemi B	Landmass	Landmass
Frequency Band (MHz)	5850 - 6050	5850 - 6050	6050 - 6260	6050 - 6260
Polarization	LHCP	RHCP	Vertical	Horizontal
Channel Bandwidth (MHz)	72 / 36	72 / 36	36	36
Antenna Noise Temperature (°Kelvin)	290	290	290	290
Receiver Noise Temperature (°Kelvin)	355	355	370	370
Total System Noise Temperature (°Kelvin)	645	645	660	660
Total System Noise Temperature (dB/K)	28.1	28.1	28.2	28.2
Peak Gain of Satellite Receive Antenna (dBi)	27.0	27.0	26.4	26.4
Peak G/T (dB/K)	-1.1	-1.1	-1.8	-1.8
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-103.5	-103.5	-100.2	-100.2
Beam Name	Global A	Global B	Russia	Europe-ME
Frequency Band (MHz)	6260 - 6425	6260 - 6425	13750 - 14420	13750 - 14500
Polarization	LHCP	RHCP	Vertical	Horizontal
Channel Bandwidth (MHz)	36 / 41	36 / 41	72	72 / 36
Antenna Noise Temperature (°Kelvin)	290	290	290	290
Receiver Noise Temperature (°Kelvin)	402	402	340	340
Total System Noise Temperature (°Kelvin)	692	692	630	630
Total System Noise Temperature (dB/K)	28.4	28.4	28.0	28.0
Peak Gain of Satellite Receive Antenna (dBi)	20.6	20.6	34.0	33.2
Peak G/T (dB/K)	-7.8	-7.8	6.0	5.2
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-97.0	-97.0	-102.6	-103.7
Beam Name	Africa	Steerable		
Frequency Band (MHz)	13750 - 14420	14420 - 14500		
Polarization	Vertical	Vertical		
Channel Bandwidth (MHz)	72	36		
Antenna Noise Temperature (°Kelvin)	290	290		
Receiver Noise Temperature (°Kelvin)	355	386		
Total System Noise Temperature (°Kelvin)	645	676		
Total System Noise Temperature (dB/K)	28.1	28.3		
Peak Gain of Satellite Receive Antenna (dBi)	34.8	35.0		
Peak G/T (dB/K)	6.7	6.7		
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-99.8	-103.5		

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

Beam Name	West Hemi A	West Hemi B	Landmass	Landmass
Frequency Band (MHz)	3625 - 3825	3625 - 3825	3825 - 4035	3825 - 4035
Polarization	RHCP	LHCP	Horizontal	Vertical
Channel Bandwidth (MHz)	72 / 36	72 / 36	36	36
Maximum Power At The Output of Last Stage Amplifier (dBW)	18.1	18.1	18.1	18.1
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	3.5	3.5	3.5	3.5
Power Into Transmit Antenna (dBW)	14.6	14.6	14.6	14.6
Peak Gain of Satellite Transmit Antenna (dBi)	25.2	25.2	24.6	24.6
Maximum Downlink EIRP (dBW)	39.8	39.8	39.2	39.2
Beam Name	Global A	Global B	Russia	Europe-ME
Frequency Band (MHz)	4035 - 4200	4035 - 4200	10950 - 12750	10950 - 12750
Polarization	RHCP	LHCP	Horizontal	Vertical
Channel Bandwidth (MHz)	36 / 41	36 / 41	72	72 / 36
Maximum Power At The Output of Last Stage Amplifier (dBW)	18.1	18.1	21.8	21.8
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	2.2	2.2	2.0	3.4
Power Into Transmit Antenna (dBW)	15.9	15.9	19.8	18.4
Peak Gain of Satellite Transmit Antenna (dBi)	20.6	20.6	33.5	32.5
Maximum Downlink EIRP (dBW)	36.5	36.5	53.3	50.9
Beam Name	Africa	Steerable	Global (ULPC 1)	Global (ULPC 2)
Frequency Band (MHz)	10950 - 12750	11620 - 11700	3950	3950.5
Polarization	Horizontal	Horizontal	Vertical	Horizontal
Channel Bandwidth (MHz)	72	36	0.025	0.025
Maximum Power At The Output of Last Stage Amplifier (dBW)	21.8	21.8	-4.0	-4.0
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	3.3	2.0	4.2	4.2
Power Into Transmit Antenna (dBW)	18.5	19.8	-8.2	-8.2
Peak Gain of Satellite Transmit Antenna (dBi)	33.6	33.4	20.5	20.5
Maximum Downlink EIRP (dBW)	52.1	53.2	12.3	12.3
Beam Name	Global (ULPC 3)	Global (ULPC 4)	Global (ULPC 5)	
Frequency Band (MHz)	11198	11452	12502	
Polarization	Right Hand Circular	Right Hand Circular	Right Hand Circular	
Channel Bandwidth (MHz)	0.025	0.025	0.025	
Maximum Power At The Output of Last Stage Amplifier (dBW)	0.0	0.0	0.0	
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	5.1	5.1	5.1	
Power Into Transmit Antenna (dBW)	-5.1	-5.1	-5.1	
Peak Gain of Satellite Transmit Antenna (dBi)	22.9	22.9	22.9	
Maximum Downlink EIRP (dBW)	17.8	17.8	17.8	

EXHIBIT 7: C-BAND and KU-BAND CHANNEL'S RECEIVE AND TRANSMIT SECTION FILTER RESPONSE CHARACTERISTICS

	Attenuation Relative To Peak Level (dB)	
Frequency Offset Relative to Channel Center Frequency (MHz)	Receive Section	Transmit Section
C-Band: 36 MHz Wide Channel		
±8	0.30	0.24
±12	0.39	0.37
±14	0.50	0.45
±16	0.62	0.66
±18	0.92	1.42
C-Band: 41 MHz Wide Channel		
±9	0.33	0.28
±14	0.43	0.43
±16	0.53	0.52
±18	0.66	0.72
±20.5	0.96	1.61
C-Band: 72 MHz Wide Channel		
±16	0.35	0.44
±24	0.50	0.48
±28	0.55	0.58
±32	0.64	0.78
±36	0.75	1.87
Ku-Band: 36 MHz Wide Channel		
±8	0.34	0.31
±12	0.43	0.57
±14	0.62	0.73
±16	0.96	1.25
±18	1.79	3.37
Ku-Band: 72 MHz Channel		
±16	0.44	0.44
±24	0.63	0.63
±28	0.75	0.85
±32	0.92	1.47
±36	1.35	3.95

EXHIBIT 8: TC&R SUBSYSTEM CHARACTERISTICS

	Spacecraft Antenna		
	Global A	**Wide Beam**	**Medium Beam**
Command Frequency (MHz) / Polarization (see note)			
Transfer Orbit / Emergency	n/a	6173.7 (LHCP) 6176.3 (LHCP)	6173.7 (LHCP) 6176.3 (LHCP)
On-Station	6173.7 (LHCP) 6176.3 (LHCP)	n/a	n/a
Command Modulation	FM	FM	FM
Bandwidth of Command Carrier (kHz)			
Occupied Bandwidth	850	850	850
Allocated Bandwidth	1000	1000	1000
Command Threshold (dBW/m^2)			
Beam Peak	-110.2	-97.5	-94.0
Edge of Coverage	-106.2	-94.5	-91.0
Command G/T (dB/K)			
Beam Peak	-22.1	-34.8	-38.3
Edge of Coverage	-26.1	-37.8	-41.3
Telemetry Frequency (MHz) / Polarization (see note)			
Transfer Orbit / Emergency	n/a	3947.5 (RHCP) 3952.5 (RHCP)	3947.5 (RHCP) 3952.5 (RHCP)
On-Station	3947.5 (RHCP) 3952.5 (RHCP)	n/a	n/a
Telemetry Modulation	PM	PM	PM
Bandwidth of Telemetry Carrier (kHz)			
Occupied	250	250	250
Allocated	500	500	500
Telemetry EIRP			
Beam Peak	13.5	13.2	10.9
Edge of Coverage	9.5	10.2	7.9
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 9: TC&R SUBSYSTEM EIRP and G/T BUDGETS

Operating Mode	On-Station	Back-up	Back-up
Antenna Type	Global A	Wide-Beam	Medium-Beam
Frequency Band (MHz)	6173.7 / 6176.3	6173.7 / 6176.3	6173.7 / 6176.3
Polarization (see Note)	LHCP	LHCP	LHCP
Antenna Noise Temperature (°Kelvin)	290	290	290
Receiver Noise Temperature (°Kelvin)	18434	4523	26774
Total System Noise Temperature (°Kelvin)	18724	4813	27064
Total System Noise Temperature (dB/K)	42.7	36.8	44.3
Peak Gain of Satellite Receive Antenna (dBi)	20.6	2	6
Peak G/T (dB/K)	-22.1	-34.8	-38.3
SFD Threshold at Peak G/T (dBW/m^2)	-110.2	-97.5	-94.0
Operating Mode	On-Station	Back-up	Back-up
Antenna Type	Global A	Wide-Beam	Medium-Beam
Frequency Band (MHz)	3947.5 / 3952.5	3947.5 / 3952.5	3947.5 / 3952.5
Polarization (see note)	RHCP	RHCP	RHCP
Maximum Power At The Output of Last Stage Amplifier (dBW)	-1.0	16.5	16.5
Loss From Last Stage Amplifier To Transmit Antenna Interface (dB)	6.1	5.3	11.6
Power Into The Transmit Antenna (dBW)	-7.1	11.2	4.9
Power Into The Transmit Antenna (Watts)	0.2	13.3	3.1
Peak Gain of Satellite Transmit Antenna (dBi)	20.6	2.0	6.0
Maximum Downlink EIRP (dBW)	13.5	13.2	10.9

Note:
H: Linear Horizontal Polarization
V: Linear Vertical Polarization
RHCP: Right Hand Circular Polarization
LHCP: Left Hand Circular Polarization

EXHIBIT 10: EMISSION DESIGNATORS

Signal Type	Emission Designator	Allocated Bandwidth (kHz)
Analog TV/FM Carrier	36M0F3F	36000
76436 kbps Carrier	112MG7W	112000
52550 kbps Carrier	77M0G7W	77000
49138 kbps Carrier	72M0G7W	72000
27981 kbps Carrier	41M0G7W	41000
24575 kbps Carrier	36M0G7W	36000
23204 kbps Carrier	34M0G7W	34000
6000 kbps carrier	10M3G7W	10300
64 kbps Carrier	100KG7W	100
512 kbps Carrier	1M45G7W	1450
128 kbps Carrier	400KG7W	400

EXHIBIT 11: POWER FLUX DENSITY CALCULATIONS

FREQUENCY BAND : 3.4 - 4.2 GHz							
West Hemi A Beam (RHCP): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	39.8	39.8	39.8	39.8	39.8	39.8	39.8
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)	-153.6	-153.5	-153.4	-153.2	-153.1	-153.0	-152.3
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	1.6	1.5	3.9	6.2	8.6	11.0	10.3
West Hemi A Beam (RHCP): 72M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	39.8	39.8	39.8	39.8	39.8	39.8	39.8
Occupied Bandwidth (kHz)	60251	60251	60251	60251	60251	60251	60251
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)	-165.4	-165.3	-165.1	-165.0	-164.9	-164.8	-164.0
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	13.4	13.3	15.6	18.0	20.4	22.8	22.0
West Hemi B Beam (LHCP): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	39.8	39.8	39.8	39.8	39.8	39.8	39.8
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)	-153.6	-153.5	-153.4	-153.2	-153.1	-153.0	-152.3
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	1.6	1.5	3.9	6.2	8.6	11.0	10.3
West Hemi B Beam (LHCP): 72M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	39.8	39.8	39.8	39.8	39.8	39.8	39.8
Occupied Bandwidth (kHz)	60251	60251	60251	60251	60251	60251	60251
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)	-165.4	-165.3	-165.1	-165.0	-164.9	-164.8	-164.0
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	13.4	13.3	15.6	18.0	20.4	22.8	22.0
Landmass Beam (H): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	39.2	39.2	39.2	39.2	39.2	39.2	39.2
Occupied Bandwidth (kHz)	4000	4000	4000	4000	4000	4000	4000
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-154.2	-154.1	-154.0	-153.8	-153.7	-153.6	-152.9
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	2.2	2.1	4.5	6.8	9.2	11.6	10.9

EXHIBIT 11: POWER FLUX DENSITY CALCULATIONS (continued)

Land Mass Beam (H): 36M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	39.2	39.2	39.2	39.2	39.2	39.2	39.2
Occupied Bandwidth (kHz)	30133	30133	30133	30133	30133	30133	30133
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-163.0	-162.8	-162.7	-162.6	-162.5	-162.4	-161.6
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	11.0	10.8	13.2	15.6	18.0	20.4	19.6
Landmass Beam (V): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	39.2	39.2	39.2	39.2	39.2	39.2	39.2
Occupied Bandwidth (kHz)	4000	4000	4000	4000	4000	4000	4000
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-154.2	-154.1	-154.0	-153.8	-153.7	-153.6	-152.9
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	2.2	2.1	4.5	6.8	9.2	11.6	10.9
Land Mass Beam (V): 36M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	39.2	39.2	39.2	39.2	39.2	39.2	39.2
Occupied Bandwidth (kHz)	30133	30133	30133	30133	30133	30133	30133
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-163.0	-162.8	-162.7	-162.6	-162.5	-162.4	-161.6
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	11.0	10.8	13.2	15.6	18.0	20.4	19.6
Global A Beam (RHCP): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	36.5	36.5	36.5	36.5	36.5	36.5	36.5
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)	-156.9	-156.8	-156.7	-156.5	-156.4	-156.3	-155.6
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	4.9	4.8	7.2	9.5	11.9	14.3	13.6
Global A Beam (RHCP): 36M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	36.5	36.5	36.5	36.5	36.5	36.5	36.5
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)	-165.7	-165.5	-165.4	-165.3	-165.2	-165.1	-164.3
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	13.7	13.5	15.9	18.3	20.7	23.1	22.3

EXHIBIT 11: POWER FLUX DENSITY CALCULATIONS (continued)

Global B Beam (RHCP): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	36.5	36.5	36.5	36.5	36.5	36.5	36.5
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)	-156.9	-156.8	-156.7	-156.5	-156.4	-156.3	-155.6
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	4.9	4.8	7.2	9.5	11.9	14.3	13.6
Global B Beam (RHCP): 36M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	36.5	36.5	36.5	36.5	36.5	36.5	36.5
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)	-165.7	-165.5	-165.4	-165.3	-165.2	-165.1	-164.3
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	13.7	13.5	15.9	18.3	20.7	23.1	22.3
Telemetry – Global A Beam (RHCP)							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Occupied Bandwidth (kHz)	250	250	250	250	250	250	250
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-167.8	-167.7	-167.6	-167.5	-167.4	-167.3	-166.5
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	15.8	15.7	18.1	20.5	22.9	25.3	24.5
Telemetry – Wide Beam (RHCP)							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	13.2	13.2	13.2	13.2	13.2	13.2	13.2
Occupied Bandwidth (kHz)	250	250	250	250	250	250	250
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-168.1	-168.0	-167.9	-167.8	-167.7	-167.6	-166.8
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	16.1	16.0	18.4	20.8	23.2	25.6	24.8
Telemetry – Medium Beam (RHCP)							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	10.9	10.9	10.9	10.9	10.9	10.9	10.9
Occupied Bandwidth (kHz)	250	250	250	250	250	250	250
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-170.4	-170.3	-170.2	-170.1	-170.0	-169.9	-169.1
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	18.4	18.3	20.7	23.1	25.5	27.9	27.1

EXHIBIT 11: POWER FLUX DENSITY CALCULATIONS (continued)

ULPC Beam (H)							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	12.3	12.3	12.3	12.3	12.3	12.3	12.3
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)	-159.0	-158.9	-158.8	-158.7	-158.6	-158.5	-157.7
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	7.0	6.9	9.3	11.7	14.1	16.5	15.7
ULPC Beam (V)							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	12.3	12.3	12.3	12.3	12.3	12.3	12.3
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)	-159.0	-158.9	-158.8	-158.7	-158.6	-158.5	-157.7
PFD Limit (dBW/m^2/4kHz)	-152	-152	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	7.0	6.9	9.3	11.7	14.1	16.5	15.7
FREQUENCY BAND : 10.95 – 11.20 GHz and 11.45 – 11.70 GHz							
Russia Beam (H): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	43.4*	43.3*	45.7*	48.0*	50.4*	52.8*	52.1*
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	-145.0	-142.5	-140.0	-140.0
PFD Limit (dBW/m^2/4kHz)	-150	-150	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russia Beam (H): 36M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	53.3	53.3	53.3	53.3	53.3	53.3	53.3
Occupied Bandwidth (kHz)	60251	60251	60251	60251	60251	60251	60251
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)	-151.9	-151.8	-151.6	-151.5	-151.4	-151.3	-150.5
PFD Limit (dBW/m^2/4kHz)	-150	-150	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	1.9	1.8	4.1	6.5	8.9	11.3	10.5
Europe – Middle East Beam (V): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	43.4*	43.3*	45.7*	48.0*	50.4*	50.9	50.9
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	-145.0	-142.5	-141.9	-141.2
PFD Limit (dBW/m^2/4kHz)	-150	-150	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	0.0	0.0	1.9	1.2

EXHIBIT 11: POWER FLUX DENSITY CALCULATIONS (continued)

Europe – Middle East Beam (V): 36M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	50.9	50.9	50.9	50.9	50.9	50.9	50.9
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)	-151.3	-151.1	-151.0	-150.9	-150.8	-150.7	-149.9
PFD Limit (dBW/m^2/4kHz)	-150	-150	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	1.3	1.1	3.5	5.9	8.3	10.7	9.9
Africa Beam (H): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	43.4*	43.3*	45.7*	48.0*	50.4*	52.1	52.1
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	-145.0	-142.5	-140.7	-140.0
PFD Limit (dBW/m^2/4kHz)	-150	-150	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	0.0	0.0	0.7	0.0
Africa Beam (H): 72M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	52.1	52.1	52.1	52.1	52.1	52.1	52.1
Occupied Bandwidth (kHz)	60251	60251	60251	60251	60251	60251	60251
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)	-153.1	-153.0	-152.8	-152.7	-152.6	-152.5	-151.7
PFD Limit (dBW/m^2/4kHz)	-150	-150	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	3.1	3.0	5.3	7.7	10.1	12.5	11.7
Steerable Beam (H): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	43.4*	43.3*	45.7*	48.0*	50.4*	52.8*	52.1*
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	-145.0	-142.5	-140.0	-140.0
PFD Limit (dBW/m^2/4kHz)	-150	-150	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Steerable Beam (H): 36M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	52.2*	52.0*	53.2	53.2	53.2	53.2	53.2
Occupied Bandwidth (kHz)	30133	30133	30133	30133	30133	30133	30133
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-150.0	-150.0	-148.7	-148.6	-148.5	-148.4	-147.6
PFD Limit (dBW/m^2/4kHz)	-150	-150	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	1.2	3.6	6.0	8.4	7.6

EXHIBIT 11: POWER FLUX DENSITY CALCULATIONS (continued)

ULPC Beam (RHCP)							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	17.8	17.8	17.8	17.8	17.8	17.8	17.8
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)	-153.5	-153.4	-153.3	-153.2	-153.1	-153.0	-152.2
PFD Limit (dBW/m^2/4kHz)	-150	-150	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	3.5	3.4	5.8	8.2	10.6	13.0	12.2
FREQUENCY BAND : 12.50 – 12.750 GHz							
Russia Beam (H): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	45.4*	45.3*	47.7*	50.0*	52.4*	53.3	53.3
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)	-148.0	-148.0	-145.5	-143.0	-140.5	-139.5	-138.8
PFD Limit (dBW/m^2/4kHz)	-148	-148	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	0.0	0.0	0.0	0.0	0.0	1.5	0.8
Russia Beam (H): 72M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	53.3	53.3	53.3	53.3	53.3	53.3	53.3
Occupied Bandwidth (kHz)	60251	60251	60251	60251	60251	60251	60251
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)	-151.9	-151.8	-151.6	-151.5	-151.4	-151.3	-150.5
PFD Limit (dBW/m^2/4kHz)	-148	-148	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	3.9	3.8	6.1	8.5	10.9	13.3	12.5
Europe – Middle East Beam (V): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	45.4*	45.3*	47.7*	50.0*	50.9	50.9	50.9
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)	-148.0	-148.0	-145.5	-143.0	-142.0	-141.9	-141.2
PFD Limit (dBW/m^2/4kHz)	-148	-148	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	0.0	0.0	0.0	0.0	1.5	3.9	3.2
Europe – Middle East Beam (V): 72M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	50.9	50.9	50.9	50.9	50.9	50.9	50.9
Occupied Bandwidth (kHz)	60251	60251	60251	60251	60251	60251	60251
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)	-154.3	-154.2	-154.0	-153.9	-153.8	-153.7	-152.9
PFD Limit (dBW/m^2/4kHz)	-148	-148	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	6.3	6.2	8.5	10.9	13.3	15.7	14.9

EXHIBIT 11: POWER FLUX DENSITY CALCULATIONS (continued)

Africa Beam (H): 36M0F3F							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	45.4*	45.3*	47.7*	50.0*	52.1	52.1	52.1
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)	-148.0	-148.0	-145.5	-143.0	-140.8	-140.7	-140.0
PFD Limit (dBW/m^2/4kHz)	-148	-148	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	0.0	0.0	0.0	0.0	0.3	2.7	2.0
Africa Beam (H): 72M0G7W							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	52.1	52.1	52.1	52.1	52.1	52.1	52.1
Occupied Bandwidth (kHz)	60251	60251	60251	60251	60251	60251	60251
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)	-153.1	-153.0	-152.8	-152.7	-152.6	-152.5	-151.7
PFD Limit (dBW/m^2/4kHz)	-148	-148	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	5.1	5.0	7.3	9.7	12.1	14.5	13.7
ULPC Beam (RHCP)							
Elevation Angle (degrees)	0	5	10	15	20	25	90
Assumed EIRP (dBW)	17.8	17.8	17.8	17.8	17.8	17.8	17.8
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)	-153.5	-153.4	-153.3	-153.2	-153.1	-153.0	-152.2
PFD Limit (dBW/m^2/4kHz)	-148	-148	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	5.5	5.4	7.8	10.2	12.6	15.0	14.2

* 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 12: INTELSAT 17 LINK BUDGETS

UPLINK BEAM INFORMATION				
Uplink Beam Name	WEST_HEMI	WEST_HEMI	WEST_HEMI	WEST_HEMI
Uplink Frequency (GHz)	5850 - 6050	5851 - 6050	5852 - 6050	5853 - 6050
Uplink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR	CIRCULAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-7.1	-7.1	-7.1	-7.1
Uplink SFD (dBW/m2)	-81.5	-87.5	-78.5	-78.5
Rain Rate (mm/hr)	N/A	N/A	N/A	N/A
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	WEST_HEMI	WEST_HEMI	WEST_HEMI	WEST_HEMI
Downlink Frequency (GHz)	3625 - 3825	3626 - 3825	3627 - 3825	3628 - 3825
Downlink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR	CIRCULAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	35.8	35.8	35.8	35.8
Rain Rate (mm/hr)	N/A	N/A	N/A	N/A
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E
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)	-42	-42	-42	-42
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	68.0E	68.0E	68.0E	68.0E
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)	-42	-42	-42	-42
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	49138	6000	64
Code Rate	N/A	R1/2	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	36000	60251	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)	10.0	8.1	7.0	7.0
Earth Station Gain (dBi)	54.1	52.8	51.0	51.0
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	8.1	3.0	3.0	3.0
Earth Station Gain (dBi)	49.3	39.7	39.7	39.7
Earth Station G/T (dB/K)	28.4	19.2	19.2	19.2
Earth Station Elevation Angle	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE				
Uplink Earth Station EIRP (dBW)	78.4	75.4	69.4	49.0
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)	-7.1	-7.1	-7.1	-7.1
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)	24.1	18.9	22.4	21.5
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	31.6	35.8	25.5	5.1
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	19.2	19.2
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)	16.2	9.0	8.2	7.3
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	24.1	18.9	22.4	21.5
C/N Downlink (dB)	16.2	9.0	8.2	7.3
C/I Intermodulation (dB)	N/A	N/A	20.1	19.2
C/I Uplink Co-Channel (dB)*	27.0	27.0	28.7	28.4
C/I Downlink Co-Channel (dB)*	27.0	27.0	28.7	28.4
C/I Uplink Adjacent Satellite 1 (dB)	17.5	12.3	15.8	15.0
C/I Downlink Adjacent Satellite 1 (dB)	25.1	11.2	10.4	9.5
C/I Uplink Adjacent Satellite 2 (dB)	17.5	12.3	15.8	15.0
C/I Downlink Adjacent Satellite 2 (dB)	26.5	19.9	19.1	18.3
C/(N+I) Composite (dB)	11.4	4.6	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.4	3.6	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.4	.2	0.0	0.0
Number of Carriers	2	1.0	4.7	521.9
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-41.7	-55.2	-49.9	-50.8
Downlink EIRP Density At Beam Peak (dBW/Hz)	-30.4	-38.0	-38.8	-39.7

EXHIBIT 12: INTELSAT 17 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION				
Uplink Beam Name	LANDMASS	LANDMASS	LANDMASS	LANDMASS
Uplink Frequency (GHz)	6050 - 6260	6051 - 6260	6052 - 6260	6053 - 6260
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-11.8	-11.8	-11.8	-11.8
Uplink SFD (dBW/m2)	-80.2	-84.2	-71.2	-71.2
Rain Rate (mm/hr)	N/A	N/A	N/A	N/A
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	LANDMASS	LANDMASS	LANDMASS	LANDMASS
Downlink Frequency (GHz)	3825 - 4035	3826 - 4035	3827 - 4035	3828 - 4035
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0
Downlink Contour EIRP (dBW)	31.2	31.2	31.2	31.2
Rain Rate (mm/hr)	N/A	N/A	N/A	N/A
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E
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)	-43.6	-43.6	-43.6	-43.6
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	68.0E	68.0E	68.0E	68.0E
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)	-43.6	-43.6	-43.6	-43.6
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
CARRIER INFORMATION				
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4
Allocated Bandwidth(kHz)	36000	36000	10300	100
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79
UPLINK EARTH STATION				
Earth Station Diameter (meters)	15.2	10.0	10.0	10.0
Earth Station Gain (dBi)	58.4	54.1	54.1	54.1
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	11.0	3.0	3.5	3.0
Earth Station Gain (dBi)	51.9	39.7	41.1	39.7
Earth Station G/T (dB/K)	31.0	19.2	21.0	19.2
Earth Station Elevation Angle	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE				
Uplink Earth Station EIRP (dBW)	82.7	78.7	78.0	59.7
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)	-11.8	-11.8	-11.8	-11.8
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8
Uplink C/N(dB)	23.7	20.5	26.3	27.6
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	31.2	31.2	22.2	3.9
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)	31.0	19.2	21.0	19.2
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8
Downlink C / N(dB)	18.4	7.4	6.7	6.1
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	23.7	20.5	26.3	27.6
C/N Downlink (dB)	18.4	7.4	6.7	6.1
C/I Intermodulation (dB)	N/A	N/A	18.4	19.7
C/I Uplink Co-Channel (dB)*	20.0	20.0	20.0	21.8
C/I Downlink Co-Channel (dB)*	20.0	20.0	20.0	21.8
C/I Uplink Adjacent Satellite 1 (dB)	17.8	14.6	20.4	21.7
C/I Downlink Adjacent Satellite 1 (dB)	29.1	11.2	13.8	9.9
C/I Uplink Adjacent Satellite 2 (dB)	17.8	14.6	20.4	21.7
C/I Downlink Adjacent Satellite 2 (dB)	30.1	19.9	18.6	18.7
C/(N+I) Composite (dB)	11.3	4.3	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.3	3.3	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.3	0.0	0.0	0.0
Number of Carriers	1	1.0	3.5	237.3
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-41.7	-50.2	-44.4	-43.1
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.8	-35.6	-38.1	-36.8

UPLINK BEAM INFORMATION				
Uplink Beam Name	GLOBAL	GLOBAL	GLOBAL	GLOBAL
Uplink Frequency (GHz)	6260 - 6425	6261 - 6425	6262 - 6425	6263 - 6425
Uplink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR	CIRCULAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	-11.8	-11.8	-11.8	-11.8
Uplink SFD (dBW/m2)	-84	-90	-78	-78
Rain Rate (mm/hr)	N/A	N/A	N/A	N/A
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	GLOBAL	GLOBAL	GLOBAL	GLOBAL
Downlink Frequency (GHz)	4035 - 4200	4036 - 4200	4037 - 4200	4038 - 4200
Downlink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR	CIRCULAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	32.5	32.5	32.5	32.5
Rain Rate (mm/hr)	N/A	N/A	N/A	N/A
ADJACENT SATELLITE 1				
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E
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)	-42.8	-42.8	-42.8	-42.8
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2				
Satellite 1 Orbital Location	68.0E	68.0E	68.0E	68.0E
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)	-42.8	-42.8	-42.8	-42.8
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0
CARRIER INFORMATION				
Carrier ID	36M0F3F	41M0G7W	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	27981	6000	64
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	36000	34310	6771.1	75.4
Allocated Bandwidth(kHz)	36000	41000	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)	11.0	7.0	7.0	7.0
Earth Station Gain (dBi)	55.4	51.0	51.0	51.0
Earth Station Elevation Angle	20	20	20	20
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	6.1	3.0	3.0	3.0
Earth Station Gain (dBi)	46.5	39.7	39.7	39.7
Earth Station G/T (dB/K)	26.2	19.2	19.2	19.2
Earth Station Elevation Angle	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE				
Uplink Earth Station EIRP (dBW)	78.9	72.9	72.4	52
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)	-11.8	-11.8	-11.8	-11.8
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-75.4	-68.3	-48.8
Uplink C/N(dB)	19.9	14.1	20.7	19.8
DOWNLINK PERFORMANCE				
Downlink EIRP per Carrier (dBW)	32.5	32.5	24.7	4.3
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-196.3	-196.3	-196.3	-196.3
Downlink Rain Attenuation	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	26.2	19.2	19.2	19.2
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-75.4	-68.3	-48.8
Downlink C / N(dB)	14.9	8.1	7.3	6.5
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	19.9	14.1	20.7	19.8
C/N Downlink (dB)	14.9	8.1	7.3	6.5
C/I Intermodulation (dB)	N/A	N/A	20.2	19.3
C/I Uplink Co-Channel (dB)*	27.6	27.0	28.7	28.4
C/I Downlink Co-Channel (dB)*	27.6	27.0	28.7	28.4
C/I Uplink Adjacent Satellite 1 (dB)	20.0	14.2	20.8	19.9
C/I Downlink Adjacent Satellite 1 (dB)	23.8	11.1	10.4	9.5
C/I Uplink Adjacent Satellite 2 (dB)	20.0	14.2	20.8	19.9
C/I Downlink Adjacent Satellite 2 (dB)	25.6	19.9	19.1	18.2
C/(N+I) Composite (dB)	11.4	4.4	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	10.4	3.4	3.9	3.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.4	.1	0.0	0.0
Number of Carriers	1	1.0	2.7	295.6
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	-42.5	-53.5	-46.9	-47.8
Downlink EIRP Density At Beam Peak (dBW/Hz)	-29.5	-38.9	-39.6	-40.5

EXHIBIT 12: INTELSAT 17 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	RUSSIA	RUSSIA	RUSSIA	RUSSIA	RUSSIA	RUSSIA
Uplink Frequency (GHz)	13750 - 14500	13750 - 14500	13750 - 14500	13750 - 14500	13750 - 14500	13750 - 14500
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	0	.0	.0	.0	.0	.0
Uplink SFD (dBW/m2)	-74.6	-74.6	-89.6	-89.6	-89.6	-79.6
Rain Rate (mm/hr)	22.0	22.0	22.0	22.0	22.0	22.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	RUSSIA	RUSSIA	RUSSIA	RUSSIA	RUSSIA	RUSSIA
Downlink Frequency (GHz)	10950 - 12750	10950 - 12750	10950 - 12750	10950 - 12750	10950 - 12750	10950 - 12750
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	47.3	47.3	47.3	47.3	47.3	47.3
Rain Rate (mm/hr)	22.0	22.0	22.0	22.0	22.0	22.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E	64.0E	64.0E
Uplink Power Density (dBW/Hz)	-50	-50	-50	-50	-50	-50
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-26	-26	-26	-26	-26
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	68.0E	68.0E	68.0E	68.0E	68.0E	68.0E
Uplink Power Density (dBW/Hz)	-50	-50	-50	-50	-50	-50
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-26	-26	-26	-26	-26
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	72M0G7W	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	49138	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	60251	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	72000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	46.4
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	1.2	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	55.5	41.3	44.8	44.8	44.8	55.5
Earth Station G/T (dB/K)	33.1	18.8	22.3	22.3	22.3	33.1
Earth Station Elevation Angle	20	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE						
Uplink Earth Station EIRP (dBW)	74.8	81.5	58.1	37.8	49.8	44.7
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	.0	.0	.0	.0	.0
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	20.4	24.8	10.9	10.1	10.0	10.9
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	39.3	45.8	35.2	14.9	26.9	11.8
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)	33.1	18.8	22.3	22.3	22.3	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.0	8.9	11.3	10.5	10.4	12.2
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	20.4	24.8	10.9	10.1	10.0	10.9
C/N Downlink (dB)	19.0	8.9	11.3	10.5	10.4	12.2
C/I Intermodulation (dB)	N/A	N/A	26.3	25.6	25.5	16.4
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.4	25.2	25.6	16.1
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.4	25.2	25.6	16.1
C/I Uplink Adjacent Satellite 1 (dB)	25.2	29.7	15.8	15.0	14.9	15.8
C/I Downlink Adjacent Satellite 1 (dB)	23.5	11.8	15.1	14.3	14.2	16.6
C/I Uplink Adjacent Satellite 2 (dB)	25.2	29.7	15.8	15.0	14.9	15.8
C/I Downlink Adjacent Satellite 2 (dB)	24.1	15.3	17.2	16.4	16.3	17.2
C/(N+I) Composite (dB)	13.6	6.3	5.7	5.0	4.9	5.1
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	12.6	5.3	4.7	4.0	3.9	4.1
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	2.6	1.9	.9	1.0	.5	.7
Number of Carriers	2	1.0	5.1	541.9	34.0	180.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-48.1	-53.2	-67.1	-67.9	-68.0	-56.6
Downlink EIRP Density At Beam Peak (dBW/Hz)	-20.7	-26.0	-27.1	-27.9	-28.0	-37.1

EXHIBIT 12: INTELSAT 17 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	AFRICA	AFRICA	AFRICA	AFRICA	AFRICA	AFRICA
Uplink Frequency (GHz)	13750 - 14000	13750 - 14000	13750 - 14000	13750 - 14000	13750 - 14000	13750 - 14000
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	0.7	0.7	0.7	0.7	0.7	0.7
Uplink SFD (dBW/m2)	-71.8	-75.8	-87.5	-87.5	-87.5	-87.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	22.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	RUSSIA	RUSSIA	RUSSIA	RUSSIA	RUSSIA	RUSSIA
Downlink Frequency (GHz)	12500 - 12750	12500 - 12750	12500 - 12750	12500 - 12750	12500 - 12750	12500 - 12750
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	47.3	47.3	47.3	47.3	47.3	47.3
Rain Rate (mm/hr)	22.0	22.0	22.0	22.0	22.0	42.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E	64.0E	64.0E
Uplink Power Density (dBW/Hz)	-50	-50	-50	-50	-50	-50
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-26	-26	-26	-26	-26
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	68.0E	68.0E	68.0E	68.0E	68.0E	68.0E
Uplink Power Density (dBW/Hz)	-50	-50	-50	-50	-50	-50
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-26	-26	-26	-26	-26
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	72M0G7W	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	49138	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	60251	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	72000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	46.4
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	55.5	44.8	44.8	44.8	44.8	55.5
Earth Station G/T (dB/K)	33.1	22.3	22.3	22.3	22.3	33.1
Earth Station Elevation Angle	20	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE						
Uplink Earth Station EIRP (dBW)	77.6	80.3	59.7	39.5	51.5	41.4
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)	0.7	0.7	0.7	0.7	0.7	0.7
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	23.9	24.3	13.3	12.5	12.4	8.4
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	39.3	45.8	34.7	14.5	26.5	16.4
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)	33.1	22.3	22.3	22.3	22.3	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.0	12.4	10.9	10.1	10.0	16.8
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	23.9	24.3	13.3	12.5	12.4	8.4
C/N Downlink (dB)	19.0	12.4	10.9	10.1	10.0	16.8
C/I Intermodulation (dB)	N/A	N/A	25.9	25.2	25.1	21.0
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.0	24.8	25.2	20.8
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.0	24.8	25.2	20.8
C/I Uplink Adjacent Satellite 1 (dB)	28.0	28.5	17.4	16.7	16.6	12.5
C/I Downlink Adjacent Satellite 1 (dB)	23.5	16.2	14.6	13.9	13.8	21.2
C/I Uplink Adjacent Satellite 2 (dB)	28.0	28.5	17.4	16.7	16.6	12.5
C/I Downlink Adjacent Satellite 2 (dB)	24.1	18.3	16.7	16.0	15.9	21.9
C/(N+I) Composite (dB)	14.4	9.6	6.4	5.7	5.6	5.0
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.4	8.6	5.4	4.7	4.6	4.0
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.4	5.2	1.5	1.7	1.2	.6
Number of Carriers	2	1.0	5.6	593.4	37.3	180.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-45.3	-54.4	-65.5	-66.2	-66.3	-59.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-20.7	-26.0	-27.6	-28.3	-28.4	-32.4

EXHIBIT 12: INTELSAT 17 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	AFRICA	AFRICA	AFRICA	AFRICA	AFRICA	AFRICA
Uplink Frequency (GHz)	13750 - 14500	13750 - 14500	13750 - 14500	13750 - 14500	13750 - 14500	13750 - 14500
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	0.7	.7	.7	.7	.7	.7
Uplink SFD (dBW/m2)	-74.8	-78.8	-82.8	-82.8	-82.8	-82.8
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	AFRICA	AFRICA	AFRICA	AFRICA	AFRICA	AFRICA
Downlink Frequency (GHz)	10950 - 12750	10950 - 12750	10950 - 12750	10950 - 12750	10950 - 12750	10950 - 12750
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	46.1	46.1	46.1	46.1	46.1	46.1
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E	64.0E	64.0E
Uplink Power Density (dBW/Hz)	-50	-50.0	-50.0	-50.0	-50.0	-50.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-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	68.0E	68.0E	68.0E	68.0E	68.0E	68.0E
Uplink Power Density (dBW/Hz)	-50	-50.0	-50.0	-50.0	-50.0	-50.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-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	72M0G7W	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	49138	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	60251	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	72000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	46.4
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	4.6	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	53.5	44.8	44.8	44.8	44.8	55.5
Earth Station G/T (dB/K)	31.0	22.3	22.3	22.3	22.3	33.1
Earth Station Elevation Angle	20	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE						
Uplink Earth Station EIRP (dBW)	80.4	80.2	64.9	44.6	56.6	43.9
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)	0.7	.7	.7	.7	.7	.7
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	26.7	24.2	18.4	17.7	17.5	10.9
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.3	45.8	34.0	13.7	25.7	13.0
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)	31.0	22.3	22.3	22.3	22.3	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	18.9	12.5	10.1	9.4	9.3	13.4
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	26.7	24.2	18.4	17.7	17.5	10.9
C/N Downlink (dB)	18.9	12.5	10.1	9.4	9.3	13.4
C/I Intermodulation (dB)	N/A	N/A	26.3	25.6	25.5	18.8
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.4	25.3	25.7	18.6
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.4	25.3	25.7	18.6
C/I Uplink Adjacent Satellite 1 (dB)	30.8	28.4	22.6	21.8	21.7	15.0
C/I Downlink Adjacent Satellite 1 (dB)	23.4	16.3	13.9	13.1	13.0	17.8
C/I Uplink Adjacent Satellite 2 (dB)	30.8	28.4	22.6	21.8	21.7	15.0
C/I Downlink Adjacent Satellite 2 (dB)	24.2	18.3	16.0	15.2	15.1	18.5
C/(N+I) Composite (dB)	14.8	9.6	7.0	6.3	6.2	5.8
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.8	8.6	6.0	5.3	5.2	4.8
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.8	5.2	2.2	2.3	1.8	1.4
Number of Carriers	2	1.0	5.1	536.9	33.8	180.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.5	-54.5	-60.3	-61.1	-61.2	-57.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.7	-26.0	-28.3	-29.1	-29.2	-35.9

EXHIBIT 12: INTELSAT 17 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	RUSSIA	RUSSIA	RUSSIA	RUSSIA	RUSSIA	RUSSIA
Uplink Frequency (GHz)	13750 - 14000	13750 - 14000	13750 - 14000	13750 - 14000	13750 - 14000	13750 - 14000
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	0	0	0	0	0	0
Uplink SFD (dBW/m2)	-74.6	-78.6	-85.6	-85.6	-85.6	-85.6
Rain Rate (mm/hr)	22.0	22.0	22.0	22.0	22.0	42.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	AFRICA	AFRICA	AFRICA	AFRICA	AFRICA	AFRICA
Downlink Frequency (GHz)	12500 - 12750	12500 - 12750	12500 - 12750	12500 - 12750	12500 - 12750	12500 - 12750
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	46.1	46.1	46.1	46.1	46.1	46.1
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	22.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E	64.0E	64.0E
Uplink Power Density (dBW/Hz)	-50	-50.0	-50.0	-50.0	-50.0	-50.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-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	68.0E	68.0E	68.0E	68.0E	68.0E	68.0E
Uplink Power Density (dBW/Hz)	-50	-50.0	-50.0	-50.0	-50.0	-50.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-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	72M0G7W	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	49138	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	60251	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	72000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	46.4
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	3.7	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	51.1	44.8	44.8	44.8	44.8	55.5
Earth Station G/T (dB/K)	28.6	22.3	22.3	22.3	22.3	33.1
Earth Station Elevation Angle	20	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE						
Uplink Earth Station EIRP (dBW)	80.6	80.4	62.1	41.8	53.8	43.1
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	0	0	0	0	0
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	26.2	23.7	14.9	14.2	14.1	9.3
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	41.3	45.8	34.0	13.7	25.8	15.0
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)	28.6	22.3	22.3	22.3	22.3	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	16.5	12.5	10.2	9.4	9.3	15.4
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	26.2	23.7	14.9	14.2	14.1	9.3
C/N Downlink (dB)	16.5	12.5	10.2	9.4	9.3	15.4
C/I Intermodulation (dB)	N/A	N/A	26.4	25.6	25.5	20.8
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.5	25.3	25.7	20.5
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.5	25.3	25.7	20.5
C/I Uplink Adjacent Satellite 1 (dB)	31.0	28.6	19.8	19.1	18.9	14.2
C/I Downlink Adjacent Satellite 1 (dB)	20.9	16.3	13.9	13.2	13.1	19.8
C/I Uplink Adjacent Satellite 2 (dB)	31.0	28.6	19.8	19.1	18.9	14.2
C/I Downlink Adjacent Satellite 2 (dB)	21.9	18.3	16.0	15.3	15.2	20.4
C/(N+I) Composite (dB)	13.1	9.6	6.5	5.8	5.7	5.7
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	12.1	8.6	5.5	4.8	4.7	4.7
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	2.1	5.2	1.6	1.8	1.3	1.3
Number of Carriers	2	1.0	5.0	534.2	33.5	180.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-42.3	-54.3	-63.1	-63.9	-64.0	-58.2
Downlink EIRP Density At Beam Peak (dBW/Hz)	-18.7	-26.0	-28.3	-29.0	-29.1	-33.9

EXHIBIT 12: INTELSAT 17 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME
Uplink Frequency (GHz)	13750 - 14500	13750 - 14500	13750 - 14500	13750 - 14500	13750 - 14500	13750 - 14500
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Uplink Contour G/T (dB/K)	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8
Uplink SFD (dBW/m2)	-73.7	-82.7	-84.7	-84.7	-84.7	-84.7
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME
Downlink Frequency (GHz)	10950 - 12750	10950 - 12750	10950 - 12750	10950 - 12750	10950 - 12750	10950 - 12750
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	44.9	44.9	44.9	44.9	44.9	44.9
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E	64.0E	64.0E
Uplink Power Density (dBW/Hz)	-50	-50.0	-50.0	-50.0	-50.0	-50.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-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	68.0E	68.0E	68.0E	68.0E	68.0E	68.0E
Uplink Power Density (dBW/Hz)	-50	-50.0	-50.0	-50.0	-50.0	-50.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-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	72M0G7W	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	49138	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	60251	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	72000	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)	77.4	80.2	62.8	42.6	54.6	45.5
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)	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-77.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	20.2	20.7	12.9	12.1	12.0	9.0
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	38.3	44.9	32.6	12.4	24.4	15.3
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	-77.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.5	11.5	11.5	10.7	10.6	15.7
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	20.2	20.7	12.9	12.1	12.0	9.0
C/N Downlink (dB)	19.5	11.5	11.5	10.7	10.6	15.7
C/I Intermodulation (dB)	N/A	N/A	26.2	25.5	25.4	22.3
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.3	25.1	25.5	22.1
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.3	25.1	25.5	22.1
C/I Uplink Adjacent Satellite 1 (dB)	25.8	26.4	18.5	17.8	17.7	14.6
C/I Downlink Adjacent Satellite 1 (dB)	24.0	15.3	15.5	14.8	14.7	20.1
C/I Uplink Adjacent Satellite 2 (dB)	25.8	26.4	18.5	17.8	17.7	14.6
C/I Downlink Adjacent Satellite 2 (dB)	24.5	17.4	17.1	16.4	16.2	20.8
C/(N+I) Composite (dB)	13.8	8.6	6.8	6.1	6.0	5.9
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	12.8	7.6	5.8	5.1	5.0	4.9
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	2.8	4.2	2.0	2.1	1.6	1.5
Number of Carriers	2	1.0	5.2	554.9	34.9	180.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-45.5	-54.5	-62.4	-63.1	-63.2	-58.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-21.7	-26.9	-29.7	-30.4	-30.5	-33.5

EXHIBIT 12: INTELSAT 17 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	STEERABLE	STEERABLE	STEERABLE	STEERABLE	STEERABLE	STEERABLE
Uplink Frequency (GHz)	14420 - 14500	14420 - 14500	14420 - 14500	14420 - 14500	14420 - 14500	14420 - 14500
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	2.7	2.7	2.7	2.7	2.7	2.7
Uplink SFD (dBW/m2)	-77.5	-77.5	-93.5	-93.5	-93.5	-93.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME
Downlink Frequency (GHz)	11620 - 11700	11620 - 11700	11620 - 11700	11620 - 11700	11620 - 11700	11620 - 11700
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-6.0	-6.0	-6.0	-6.0	-6.0	-6.0
Downlink Contour EIRP (dBW)	44.9	44.9	44.9	44.9	44.9	44.9
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E	64.0E	64.0E
Uplink Power Density (dBW/Hz)	-50	-50.0	-50.0	-50.0	-50.0	-50.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-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	68.0E	68.0E	68.0E	68.0E	68.0E	68.0E
Uplink Power Density (dBW/Hz)	-50	-50.0	-50.0	-50.0	-50.0	-50.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-26.0	-26.0	-26.0	-26.0	-26.0
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.8
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	46.4
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	7.0	1.8	1.8	1.8	1.8	6.1
Earth Station Gain (dBi)	57.0	44.8	44.8	44.8	44.8	55.5
Earth Station G/T (dB/K)	34.6	22.3	22.3	22.3	22.3	33.1
Earth Station Elevation Angle	20	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE						
Uplink Earth Station EIRP (dBW)	73.6	77.7	57.2	36.9	48.9	40.1
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)	2.7	2.7	2.7	2.7	2.7	2.7
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	21.9	26.7	12.7	12.0	11.9	9.0
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	38.3	42.8	35.8	15.6	27.6	18.7
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	22.3	22.3	22.3	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.5	12.4	11.9	11.2	11.1	19.1
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	21.9	26.7	12.7	12.0	11.9	9.0
C/N Downlink (dB)	19.5	12.4	11.9	11.2	11.1	19.1
C/I Intermodulation (dB)	N/A	N/A	26.3	25.6	25.5	22.7
C/I Uplink Co-Channel (dB)*	24.0	24.0	25.4	25.3	25.7	22.4
C/I Downlink Co-Channel (dB)*	24.0	24.0	25.4	25.3	25.7	22.4
C/I Uplink Adjacent Satellite 1 (dB)	26.0	30.9	16.9	16.2	16.1	13.2
C/I Downlink Adjacent Satellite 1 (dB)	24.0	16.2	15.7	15.0	14.9	23.5
C/I Uplink Adjacent Satellite 2 (dB)	26.0	30.9	16.9	16.2	16.1	13.2
C/I Downlink Adjacent Satellite 2 (dB)	24.5	18.3	17.8	17.1	17.0	24.1
C/(N+I) Composite (dB)	14.2	9.7	6.7	6.1	6.0	5.9
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	13.2	8.7	5.7	5.1	5.0	4.9
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	3.2	5.3	1.9	2.1	1.6	1.5
Number of Carriers	2	1.0	2.5	266.4	16.8	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-49.3	-54.0	-68.0	-68.7	-68.8	-61.2
Downlink EIRP Density At Beam Peak (dBW/Hz)	-21.7	-26.0	-26.5	-27.2	-27.3	-30.2

EXHIBIT 12: INTELSAT 17 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	STEERABLE	STEERABLE	STEERABLE	STEERABLE	STEERABLE	STEERABLE
Uplink Frequency (GHz)	14420 - 14500	14420 - 14500	14420 - 14500	14420 - 14500	14420 - 14500	14420 - 14500
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	2.7	2.7	2.7	2.7	2.7	2.7
Uplink SFD (dBW/m2)	-77.5	-77.5	-89.5	-89.5	-89.5	-89.5
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	STEERABLE	STEERABLE	STEERABLE	STEERABLE	STEERABLE	STEERABLE
Downlink Frequency (GHz)	11620 - 11700	11620 - 11700	11620 - 11700	11620 - 11700	11620 - 11700	11620 - 11700
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	49.2	49.2	49.2	49.2	49.2	49.2
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E	64.0E	64.0E
Uplink Power Density (dBW/Hz)	-50	-50	-50	-50	-50	-50
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-26	-26	-26	-26	-26
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	68.0E	68.0E	68.0E	68.0E	68.0E	68.0E
Uplink Power Density (dBW/Hz)	-50	-50	-50	-50	-50	-50
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-26	-26	-26	-26	-26
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.2
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	42.9
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	1.2	1.2	1.2	1.2	6.1
Earth Station Gain (dBi)	47.5	41.3	41.3	41.3	41.3	55.5
Earth Station G/T (dB/K)	25.0	18.8	18.8	18.8	18.8	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)	79.1	75.1	59.4	39.2	51.2	40.4
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)	2.7	2.7	2.7	2.7	2.7	2.7
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	27.4	24.1	15.0	14.2	14.1	9.4
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	48.0	44.8	38.4	18.1	30.1	19.3
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	25.0	18.8	18.8	18.8	18.8	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.6	10.9	11.0	10.3	10.1	19.7
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	27.4	24.1	15.0	14.2	14.1	9.4
C/N Downlink (dB)	19.6	10.9	11.0	10.3	10.1	19.7
C/I Intermodulation (dB)	N/A	N/A	24.6	23.9	23.8	19.0
C/I Uplink Co-Channel (dB)*	24.0	24.0	23.7	23.6	24.0	18.8
C/I Downlink Co-Channel (dB)*	24.0	24.0	23.7	23.6	24.0	18.8
C/I Uplink Adjacent Satellite 1 (dB)	31.5	28.3	19.1	18.4	18.3	13.5
C/I Downlink Adjacent Satellite 1 (dB)	23.6	13.8	13.9	13.2	13.0	24.1
C/I Uplink Adjacent Satellite 2 (dB)	31.5	28.3	19.1	18.4	18.3	13.5
C/I Downlink Adjacent Satellite 2 (dB)	25.2	17.2	17.3	16.6	16.5	24.8
C/(N+I) Composite (dB)	15.3	8.1	6.8	6.1	6.0	5.8
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	14.3	7.1	5.8	5.1	5.0	4.8
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.3	3.7	2.0	2.1	1.6	1.4
Number of Carriers	1	1.0	3.5	360.0	24.8	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-43.8	-56.6	-65.8	-66.5	-66.6	-57.4
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.0	-26.0	-26.0	-26.7	-26.8	-31.6

EXHIBIT 12: INTELSAT 17 LINK BUDGETS (continued)

UPLINK BEAM INFORMATION						
Uplink Beam Name	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME	EUROPE_ME
Uplink Frequency (GHz)	14420 - 14500	14420 - 14500	14420 - 14500	14420 - 14500	14420 - 14500	14420 - 14500
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Uplink Contour G/T (dB/K)	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8
Uplink SFD (dBW/m2)	-73.7	-73.7	-83.7	-83.7	-83.7	-83.7
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION						
Downlink Beam Name	STEERABLE	STEERABLE	STEERABLE	STEERABLE	STEERABLE	STEERABLE
Downlink Frequency (GHz)	11620 - 11700	11620 - 11700	11620 - 11700	11620 - 11700	11620 - 11700	11620 - 11700
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	49.2	49.2	49.2	49.2	49.2	49.2
Rain Rate (mm/hr)	42.0	42.0	42.0	42.0	42.0	42.0
ADJACENT SATELLITE 1						
Satellite 1 Orbital Location	64.0E	64.0E	64.0E	64.0E	64.0E	64.0E
Uplink Power Density (dBW/Hz)	-50	-50	-50	-50	-50	-50
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-26	-26	-26	-26	-26
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2						
Satellite 1 Orbital Location	68.0E	68.0E	68.0E	68.0E	68.0E	68.0E
Uplink Power Density (dBW/Hz)	-50	-50	-50	-50	-50	-50
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-26	-26	-26	-26	-26	-26
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION						
Carrier ID	36M0F3F	36M0G7W	10M3G7W	100KG7W	1M45G7W	400KG7W
Carrier Modulation	TV/FM	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	4	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	N/A	24575	6000	64	512	128
Code Rate	N/A	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	36000	30133	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	36000	36000	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	10.0	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	10.0	3.36	3.57	2.79	2.7	2.7
UPLINK EARTH STATION						
Earth Station Diameter (meters)	6.1	6.1	6.1	6.1	6.1	1.2
Earth Station Gain (dBi)	56.9	56.9	56.9	56.9	56.9	42.9
Earth Station Elevation Angle	20	20	20	20	20	20
DOWNLINK EARTH STATION						
Earth Station Diameter (meters)	2.4	1.2	1.2	1.2	1.2	6.1
Earth Station Gain (dBi)	47.5	41.3	41.3	41.3	41.3	55.5
Earth Station G/T (dB/K)	25.0	18.8	18.8	18.8	18.8	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)	82.9	78.9	65.1	44.8	56.8	45.5
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)	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	25.7	22.4	15.1	14.3	14.2	9.0
DOWNLINK PERFORMANCE						
Downlink EIRP per Carrier (dBW)	48.0	44.8	38.2	17.9	29.9	18.6
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	25.0	18.8	18.8	18.8	18.8	33.1
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-75.6	-74.8	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	19.6	10.9	10.8	10.1	9.9	19.0
COMPOSITE LINK PERFORMANCE						
C/N Uplink (dB)	25.7	22.4	15.1	14.3	14.2	9.0
C/N Downlink (dB)	19.6	10.9	10.8	10.1	9.9	19.0
C/I Intermodulation (dB)	N/A	N/A	24.4	23.7	23.6	18.3
C/I Uplink Co-Channel (dB)*	24.0	24.0	23.5	23.4	23.7	18.1
C/I Downlink Co-Channel (dB)*	24.0	24.0	23.5	23.4	23.7	18.1
C/I Uplink Adjacent Satellite 1 (dB)	31.3	28.1	20.8	20.0	19.9	14.6
C/I Downlink Adjacent Satellite 1 (dB)	23.6	13.8	13.7	13.0	12.8	23.4
C/I Uplink Adjacent Satellite 2 (dB)	31.3	28.1	20.8	20.0	19.9	14.6
C/I Downlink Adjacent Satellite 2 (dB)	25.2	17.2	17.1	16.4	16.3	24.1
C/(N+I) Composite (dB)	15.1	8.0	6.9	6.2	6.1	5.8
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	14.1	7.0	5.9	5.2	5.1	4.8
Minimum Required C/N (dB)	-10.0	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.1	3.7	2.0	2.2	1.7	1.4
Number of Carriers	1	1.0	3.5	360.0	24.8	90.0
CARRIER DENSITY LEVELS						
Uplink Power Density (dBW/Hz)	-40.0	-52.8	-60.2	-60.9	-61.0	-52.3
Downlink EIRP Density At Beam Peak (dBW/Hz)	-14.0	-26.0	-26.1	-26.9	-27.0	-32.3