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FILED ELECTRONICALLY VIA IBFS

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW
Washington, D.C. 20554

Re: Supplement to Application of Intelsat License LLC to Launch and Operate Intelsat 29e, a Replacement Satellite with New Frequencies, at 50.0° W.L., File No. SAT-LOA-20130722-00097 (Call Sign S2913)

Dear Ms. Dortch:

Intelsat License LLC ("Intelsat"), by counsel, and at the request of the International Bureau staff, hereby clarifies and supplements its above-referenced pending application to launch and operate Intelsat 29e, a replacement satellite with new frequencies, at 50.0° W.L. This letter describes the changes to the above-referenced application and, for the Commission's convenience, attaches an updated Engineering Statement and Schedule S.

First, Intelsat 29e will not provide TV-FM services in the 3700-4200 MHz band. The link budget analysis submitted with the above referenced-application used TV-FM carriers for illustrative purposes. The updated Schedule S and Engineering statement attached to this letter remove all references to TV-FM services. More specifically, references to TV-FM services have been removed from Table S.12 of the Schedule S, Section 3.0 on page 7 of the Engineering Statement and Exhibits 7, 8, 10, 11, and 12 of the Engineering Statement.

Second, Item 6B of the Schedule S filed in connection with the above-referenced application inadvertently included an "S" in Item 6B rather than an "E." The updated Schedule S attached to this letter lists an "E" to indicate that Intelsat 29e will communicate with earth stations in all service areas.

Third, the 500 MHz of Ka-band on Intelsat 29e is capable of being switched in polarization. As a result, all of the frequencies can be used in either Right Hand Circular Polarization (RHCP) or Left Hand Circular Polarization (LHCP). This capability to switch polarization was added after the above-referenced application

was filed. The attached updated Schedule S reflects this change, as does Exhibit 4 of the updated Engineering Statement.

Fourth, Intelsat included a request for waiver of Section 25.204(g) out of an abundance of caution. Intelsat understands that this rule section applies to earth station applications and thus Intelsat removes its request for waiver of Section 25.204(g) from the Intelsat 29e space station application. Pages 4-5 of the attached updated Engineering Statement have been revised to remove the waiver request as well.

Fifth, 11951.3 MHz is a Ku-band Uplink Power Control (ULPC) channel center frequency. A description of the Intelsat 29e satellite's ULPC frequencies is provided in Section 2.4 of the Engineering Statement.[1] Table S9(f) of the Schedule S filed in connection with the above-referenced application inadvertently included a "T" rather than a "C" for this frequency channel designated UPKL. The updated Schedule S correctly lists this frequency with a "C".

Request for Waiver of Section 25.210(a)

To the extent necessary or practicable, Intelsat seeks a waiver of Section 25.210(a) of the FCC's rules setting forth technical requirements for space stations "used for domestic service in the 3700-4200 MHz and 5925-6425 MHz frequency bands."[2] Intelsat understood Section 25.210(a) to be inapplicable here because, while Intelsat 29e has uplink spectrum in Gateway Beam 1 using 5850-6725 MHz, there is no downlink in 3700-4200 MHz over the United States. As a result, the C-band frequency pair identified in Section 25.210(a) will not be used for U.S. domestic service. The C-band uplink frequencies will be used to provide international service. To the extent the requirements of Section 25.201(a) can be interpreted to apply to only Intelsat 29e's use of the 5925-6425 MHz band, Intelsat seeks a waiver.

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[1] Intelsat 29e Engineering Statement, Section 2.4, File No. SAT-LOA-20130722-00097.

[2] 47 C.F.R. § 25.210(a).

The Commission may grant a waiver for good cause shown.[3] The Commission typically grants a waiver where the particular facts make strict compliance inconsistent with the public interest.[4] In granting a waiver, the Commission may take into account considerations of hardship, equity, or more effective implementation of overall policy on an individual basis.[5] Waiver therefore is appropriate where special circumstances warrant a deviation from the general rule, and such a deviation will serve the public interest.

Good cause exists for the Commission to grant Intelsat's request for a waiver of Section 25.210(a)'s technical requirements. Section 25.210(a) was originally adopted to govern TV-FM services.[6] As noted above, Intelsat 29e will not provide TV-FM services. Furthermore, Intelsat will not utilize both the C-band uplink and downlink to provide services in the United States. As a result, a waiver in this instance will not undermine the interests Section 25.210(a) was designed to protect.

Please contact the undersigned with any questions.

Sincerely,

/s/ Jennifer D. Hindin

Jennifer D. Hindin
Counsel to Intelsat License LLC

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3 47 C.F.R. § 1.3.

4 *N.E. Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990) ("*Northeast Cellular*").

5 *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969); *Northeast Cellular*, 897 F.2d at 1166.

6 *See Comprehensive Review of Licensing and Operating Rules for Satellite Services*, Notice of Proposed Rulemaking, IB Docket No. 12-267, FCC 12-117 at ¶ 120 (rel. Sept. 28, 2012) (noting that "[t]he Commission adopted [Section 25.210(a)] to minimize interference between adjacent space stations providing analog video services and to be able to reassign space stations to other orbital locations.").

Engineering Statement

1) Introduction

Intelsat License LLC ("Intelsat") seeks authority in this application to launch and operate a new satellite designated as Intelsat 29e. This spacecraft will operate from 50° W.L and will replace the Intelsat 1R spacecraft currently operating at that location. After commencement of Intelsat 29e's operation, Intelsat 1R will be relocated to another orbital location.

The characteristics of the Intelsat 29e 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 29 is a Boeing model 702MP spacecraft that operates on the C-band frequencies of 5850 – 6725 MHz, 3700 – 4200 MHz; and Ku-band frequencies of 12750 – 13250 MHz, 13750 – 14500 MHz and 10700 – 12500 MHz; and Ka-band frequencies of 17300 – 17550 MHz, 19700 – 20200 MHz and 29500 – 30000 MHz. The spacecraft provides C-band coverage of South America; Ku-band coverage of North America, Europe, Mexico, Central America, the Caribbean, South America, and the North Atlantic Ocean region; and global Ka-band coverage.

2.1) Spacecraft Characteristics

Intelsat 29e is a three-axis stabilized type spacecraft that has a rectangular outer body structure. Intelsat 29e utilizes two deployable solar array wings and a number of deployable and non-deployable antennas.

The Intelsat 29e spacecraft is comprised of the following subsystems:

1) Thermal
2) Power
3) Attitude Control
4) Propulsion
5) Telemetry, Command and Ranging ("TC&R")
6) Uplink Power Control ("ULPC")
7) Communication

These subsystems maintain the correct position and attitude of the spacecraft, ensure that all internal units are maintained within the required

temperature range, and that the spacecraft can be commanded and controlled with a high level of reliability from launch to the end of its useful life. The spacecraft design incorporates redundancy in each of the various subsystems in order to avoid single point failures.

The structural design of Intelsat 29e provides mechanical support for all subsystems. The structure externally supports the communication antennas, solar arrays, and the thrusters. It also provides a stable platform for preserving the alignment of critical elements of the spacecraft.

A summary of the basic spacecraft characteristics is provided in Exhibit 1. The Intelsat 29e mass, power and fuel budgets are provided in Exhibits 2 and 3, respectively.

2.2) Communication Subsystem

Intelsat 29e provides 12 active communication channels at C-band frequencies, 46 active channels at Ku-band frequencies and 1 active channel at Ka-band frequencies. The C-band payload employs channels having a bandwidth of 36 MHz, 72 MHz, 112, 375 and 500 MHz. The Ku-band payload employs channels having bandwidths of 36, 62.5, 125, 187.5, 250, 300, 375 and 500 MHz. The Ka-band payload employs one 500 MHz wide channel.

The Intelsat 29e frequency and polarization plan is provided in the Schedule S and represents the beam switching that Intelsat envisions implementing, at the outset, at 50° W.L.

The coverage beams of the Intelsat 29e antennas are provided in the Schedule S in the format prescribed in Section 25.114(d)(3) of the Commission's rules. The performance characteristics for each beam are also provided in the Schedule S. Intelsat 29e utilizes a multiple spot beam architecture.

In view of the large number of Ku-band spot beams, only the coverage contours of a single representative spot beam type are provided in the Schedule S. Additionally, Intelsat has included in the Schedule S the beam designation of each spot beam as well as the latitude and longitude of each beam's maximum gain point on the Earth. Intelsat understands that this procedure is sufficient to show compliance with the provisions of Section 25.114(d)(3) with respect to all of the spacecraft's spot beams. However, to the extent necessary, Intelsat requests a waiver of the provisions of Section

25.114(d)(3) of the rules with respect to the aforementioned spot beams. For the reasons set forth in the legal narrative, good cause exists for a waiver in this case.

For the uplink beams, the SFD at any G/T contour may be determined using the following formula:

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

where

SFD_D: SFD at desired G/T level (dBW/m^2)
SFD_P: Minimum SFD at peak G/T (dBW/m^2)
$(G/T)_D$: Desired G/T level (dB/K)
$(G/T)_P$: Peak G/T (dB/K)
A = Transponder attenuator setting (dB), ranging from 0 to 28 dB for all C, Ku and Ka-band channels.

Exhibit 4 provides a detailed calculation of the EIRP, G/T and SFD of the Intelsat 29e uplink and downlink beams.

The Intelsat 29e antennas are designed to have a cross-polarization isolation of 30 dB within its primary coverage area. Accordingly, Intelsat 29e is compliant with the provisions of Sections 25.210(i)(1) of the Commission's rules.

Section 25.202(e) of the rules requires that the carrier frequency of each space station transmitter be maintained within 0.002% of the reference frequency. Intelsat 29e is designed to be compliant with the provisions of this rule.

Intelsat 29e employs full frequency reuse through the use of orthogonal polarization within the same beam and/or through the use of spatially isolated beams. Accordingly, Intelsat 29e is compliant with Section 25.210(d) and (f) of the Commission's rules.

Section 25.210(c) of the rules requires that all space stations in the fixed satellite service have the minimum capability to change transponder saturation densities by ground command in 4 dB steps over a range of 12 dB. Intelsat 29e is compliant with the provisions of this rule.

The provisions of Section 25.210(a) are not applicable, since Intelsat 29e does not provide domestic coverage in the 3700 – 4200 MHz band.

With respect to the use of the 10700 – 11700 MHz band in the space-to-earth direction, Section 25.202(a)(1) of the Commission's rules and footnote NG 104 of the United States Table of Frequency Allocations, as contained in Section 2.106 of the Commission's rules, permits the use of this band by non-federal fixed satellite service for international systems only. Similarly, for the 5850 – 5925 MHz band in the earth-to-space direction, Section 2.106(a)(1) of the Commission's rules and footnote US 245 of the Table of Frequency Allocation permits the use of this band for international inter-continental systems. Intelsat 29e utilizes the 5850 – 5925 MHz and 10700 – 11700 MHz bands to provide service both domestically and internationally.

In those cases in the 5850 – 5925 MHz and 10700 – 11700 bands where the link is domestic, or in the case of the 5850 – 5925 MHz band where the international link is not intercontinental, Intelsat requests a waiver of Section 25.202(a)(1) and footnotes NG 104 and US 245 of the United States Table of Frequency Allocations, as appropriate, to operate in these bands domestically on a non-interference, non-protected basis with respect to any domestic terrestrial station that is authorized to operate in the 5850 – 5925 MHz or 10700 – 11700 MHz bands.

With respect to the use of the 12750 – 13250 MHz band, footnote NG 104 of the United States Table of Frequency Allocations, as contained in Section 2.106 of the Commission's rules, permits the use of this band by non-federal fixed satellite service for international systems only. Intelsat 29e utilizes the 12750 – 13250 MHz band in links which may originate within U.S. territory or outside of U.S. territory to provide downlink service to U.S. territory or outside of U.S. territory.

In those cases where the associated downlink serves non-U.S. territory, Intelsat 29e would be compliant with the provisions of footnote NG 104. However, with respect to the cases where the link is domestic, Intelsat requests a waiver of footnote NG 104, to operate in these bands on a non-interference, non-protected basis with respect to any terrestrial service that is authorized to operate in the 12750 – 13250 MHz band.

2.3) Telemetry, Command and Ranging Subsystem

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

1) Acquisition, processing and transmission of spacecraft telemetry data;

2) Reception and retransmission of ground station generated ranging signals; and

3) Reception, processing and distribution of telecommands.

Intelsat 29e can be commanded through the use of two of four available command channels centered at the frequencies 5850.5 MHz, 5853.0 MHz, 6422 MHz and 6424.5 MHz. The spacecraft telemetry is received through two of four telemetry channels centered at the frequencies 3701.25 MHz, 3701.75 MHz, 3702.25 MHz and 3702.75 MHz.

The coverage patterns of the command and telemetry beams are provided in the Schedule S in the format prescribed in Section 25.114(d) (3) of the Commission's rules. The Intelsat 29e command and telemetry subsystem performance is summarized in Exhibit 5. Detailed calculation of the G/T, command threshold flux density and EIRP for each of the Intelsat 29e TC&R beams, as appropriate, is provided in Exhibit 6.

Section 25.202(e) of the rules requires that the carrier frequency of each space station transmitter be maintained within 0.002% of the reference frequency. Intelsat 29e is designed to be compliant with the provisions of this rule as it pertains to the transmissions of the telemetry channels.

2.4) Uplink Power Control Subsystem

Intelsat 29e utilizes one C-band and two Ku-band ULPC channels. The C-band ULPC channel center frequency is 3700.25 MHz. The Ku-band ULPC channel center frequencies are 11451.3 MHz and 11951.3 MHz.

The coverage patterns of the C and Ku-band ULPC beams are provided in the Schedule S in the format prescribed in Section 25.114(d) (3) of the Commission's rules. Detailed calculation of the EIRP for each of the Intelsat 29e ULPC beam is provided in Exhibit 4.

Section 25.202(e) of the rules requires that the carrier frequency of each space station transmitter be maintained within 0.002% of the reference

frequency. Intelsat 29e is designed to be compliant with the provisions of this rule as it pertains to the transmissions in the uplink power control channels.

2.5) Satellite Station-Keeping

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

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

2.6) Satellite Useful Lifetime

The design lifetime of the satellite in orbit is 12 years. This has been determined by a conservative evaluation of the effect of the synchronous orbit environment on the solar array, the amount of fuel aboard the spacecraft, the effect of the charge-discharge cycling on the life of the battery, and the wear-out of the amplifiers and other active units. The mass allocation of propellant for spacecraft station keeping is 12 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.

2.7) Spacecraft Reliability

Intelsat 29e is designed for an operational and mission life of at least 12 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 12 years. Redundancy concepts are applied to all critical components. All avoidable single-point failure modes have been eliminated.

The projected reliability of the C-, Ku- and Ka-band payloads is 65%. The projected reliability of the bus system is 88%. The overall reliability of the Intelsat 29e spacecraft is projected to be 57.2%. The subsystem reliability assessments were based upon the use of failure rates, modeling assumptions

from previous spacecraft programs and those specific to Intelsat 29e. Failure rates for spacecraft equipment have been calculated using actual electrical stress and operating temperature conditions for each part.

3.0) Services and Emission Designators

Intelsat 29e is to be a general purpose communications satellite and has been designed to support various services offered within the Intelsat's satellite system. Depending upon the needs of the users, the transponders on Intelsat 29e can accommodate television, radio, voice and data communications. Typical communication services to be offered at C-band include:

a) Compressed digital video

b) High speed digital data

c) Digital single channel per carrier ("SCPC") data channels

d) Digital SCPC with 64 kbps and T1 data rates

Emission designators and allocated bandwidths for representative communication carriers are provided in Exhibit 7.

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. The PFD limits for the 19700 – 20200 MHz band are contained in Section 25.138(a)(6) of the Commission's rules. With respect to the frequency bands 10700 – 10950 MHz, 11200 – 11450 MHz and 12200 – 12500 MHz, there are PFD limits specified in No. 21.16 of the ITU Radio Regulations. Neither the Commission's rules nor the ITU Radio Regulations specify any PFD limits for the 11700 – 12200 MHz band applicable to geostationary satellites operating in the fixed satellite service.

The maximum PFD levels for the Intelsat 29e transmissions were calculated for a number of digital carriers listed in Exhibit 7 operating in the 3700 - 4200 MHz, 10700 – 11700 MHz, 12200 – 12500 MHz and 19700 – 20200 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 29e telemetry and ULPC carriers. The results are provided in Exhibit 8 and show that the downlink power flux density levels of the Intelsat 29e carriers do not exceed the limits specified in Sections 25.138(a)(6) or 25.208 of the Commission's rules, as appropriate; nor the limits specified in No. 21.16 of the ITU Radio Regulations.

5.0) Emission Limitations

The Intelsat 29e receiver and transmitter channel filter response characteristics are provided in Exhibit 9, as required under Section 25.114 (c)(4)(vii) of the Commission's rules.

Intelsat will comply with the provisions of Section 25.202(f) of the Commission's rules with regard to Intelsat 29e emissions.

6.0) Service Area

At C-band, Intelsat 29e provides service to South America. At Ku-band, Intelsat 29e provides service to North America, Europe, Mexico, Central America, the Caribbean, South America, and the North Atlantic Ocean region. At Ka-band, global service is provided.

7.0) Orbital Location

Intelsat requests that it be assigned the 50° W.L orbital location for Intelsat 29e. The 50° W.L location satisfies Intelsat 29e requirements for optimizing coverage, elevation angles and service availability and ensures that maximum operational, economic and public interest benefits will be derived.

As previously indicated, Intelsat 29e will replace Intelsat 1R at 50° W.L. These two satellites will be nominally collocated during transfer of traffic and Intelsat shall then ensure that sufficient spatial separation is achieved between these two satellites through the use of orbit eccentricity and inclination offsets.

8.0) Orbital Arc Limitations

Intelsat 29e is intended to provide video, audio and data services to satellite users within its coverage area. The 50° W.L position affords reasonable earth station angles to the region. The attractiveness of Intelsat 29e to this market would be severely diminished if service to this area is not possible.

9.0) Intelsat 29e Link Budgets and Interference Analysis

Link analysis for Intelsat 29e was conducted for a number of representative carriers at non-planned C-, Ku- and Ka-band frequencies. For each of these frequency bands it was assumed that the nearest satellites to Intelsat 29e were a hypothetical satellite operating at 48° W.L. and a hypothetical satellite operating at 52° W.L. The hypothetical satellites were assumed to have the same operational parameters as Intelsat 29e.[1]

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 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- and Ka-band frequencies rain attenuation predictions are derived using Recommendation ITU-R P.618.
e) At Ku- and Ka-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.

As listed in the Schedule S, the Intelsat 29e beam connectivities are extensive. In order to keep the number of Intelsat 29e link calculations to a manageable number, worst-case performance values were assumed for each beam type that operated in C-band and in non-planned Ku-band frequencies. The worst-case beam parameters were derived from the beam parameters listed in the Schedule S and chosen in such a manner that would make carrier links utilizing any specific uplink/downlink beam combination as sensitive to adjacent satellite interference as possible. This would ensure that the link performance objectives would be achieved for all possible Intelsat 29e uplink/downlink beam combinations. The worst-case beam performance for each Intelsat 29e beam type is provided below:

[1] TDRS 3 is located at 49° W.L. and has an orbital inclination of 14°. The operational status of this satellite is unknown. The orbital separation between Intelsat 29 and TDRS 3 is one degree and would be inconsistent with a two degree orbital separation environment. Accordingly, for the purposes of interference analysis, the interference impact due to TDRS 3 was not considered.

Beam Name	Aggregate Beam Designation	Worst-Case Beam Peak G/T (dB/K)	Worst-Case Beam SFD Range @ Peak G/T (dBW/m^2)	Worst-Case Beam EIRP (dBW)
South America (H)	South America	2.1	-80.1 to -108.1	42.9
South America (V)				
C-band Gateway (H)	C-Band Gateway	6.1	-82.1 to -110.1	n/a
C-Band Gateway (V)				
Ku-Band Gateway and User (H)	Ku-Band Spot	15.3	-87.3 to -115.3	57.6
Ku-Band Gateway and User (V)				

As listed in the Schedule S, Intelsat 29e utilizes 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 largest channel size for each possible beam combination.

The results of the C-, Ku- and Ka-band analyses are shown in Exhibit 10 and demonstrate that operation of the Intelsat 29e satellite from 50° W.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 10 comply with the FCC limits contained in Section 25.138(a), 25.212(c) and 25.212(d) of the Commission's rules.

For the operation of Intelsat 29e in the ITU Appendix 30B FSS Plan frequencies 12750 – 13250 MHz, 10700 – 10950 MHz and 11200 – 11450 MHz, Intelsat is submitting together with this application the corresponding Appendix 4 information of an additional system (see No. 2.4 of Appendix 30B of the ITU Radio Regulations) to be forwarded by the FCC to the ITU. Because these frequencies will be used with relatively large gateway earth stations with low downlink EIRP densities and low power densities at the earth station input no coordination will be triggered with Plan allotments or assignments resulting from the conversion of Plan Allotments.

Intelsat will coordinate its proposed network with any other additional system with which coordination is triggered, under the rules contained in Appendix 30B of the ITU Radio Regulations. If coordination is not completed with any of these networks, operation of Intelsat 29e in the FSS Plan frequencies vis-à-vis such network will be conducted on a non-interference, non-protected basis.

It is noted that the currently operational satellite closest to 50° W.L. that utilizes the frequency bands of 12750 – 13250 MHz, 10700 – 10950 MHz or 11200 – 11450 MHz is Intelsat 11, located at 43.1° W.L. (see FCC file No. SAT-MOD-20090108-00004). Intelsat will internally coordinate the operation of Intelsat 29e and Intelsat 11.

Intelsat 29e operation in the BSS Plan frequency band 11700 – 12200 MHz in ITU Region 1 will be conducted on a non-interference-non-protected basis in view of the limitations contained in Annex 7 of Appendix 30 of the ITU Radio Regulations. However, no interference to any BSS operation in Region 1 is expected to occur as the orbital separation with respect to any such operation will be at least 12.8°.

For the operation of Intelsat 29e in the ITU Appendices 30/30A BSS Plan frequencies 12200 – 12500 MHz, 17300-17550 MHz in Region 2, Intelsat is submitting together with this application the corresponding Appendix 4 information for a modification of the ITU BSS Region 2 Plan, to be forwarded by the FCC to the ITU. Because these frequencies will be used with relatively large gateway earth stations with low downlink EIRP densities and low power densities at the earth station input, coordination is expected to be triggered with a very limited number of assignments or proposed modifications. Intelsat will endeavor to complete all the required coordinations. In case any of these coordinations is not completed, the corresponding operation of Intelsat 29e in the Region 2 BSS Plan frequencies will be conducted on a non-interference, non-protected basis.

It is noted that the currently operational satellites closest to 50° W.L. that utilizes the frequency bands 12200–12500 MHz, 17300-17550 MHz in Region 2 are located at 61.5°W.

10.0) Adjacent Satellite Link Analysis

At non-planned C-, Ku- and Ka-bands, the impact of the proposed Intelsat 29e emissions on the transmissions of adjacent satellites located at 48° W.L and 52º W.L was analyzed. It was assumed that a hypothetical satellite

having the same operating characteristics as Intelsat 29 occupied the orbital locations 48° W.L and 52° W.L.

For the satellite located at 48º W.L, it was assumed that the adjacent satellites were Intelsat 29e, located at 50º W.L, and a hypothetical satellite having the same operating characteristics as Intelsat 29e located at 46º W.L.[2] For the satellite located at 52º W.L, it was assumed that the adjacent satellites were Intelsat 29e, located at 50º W.L, and a hypothetical satellite having the same operating characteristics as Intelsat 29e located at 54º W.L.[3]

The results of the analysis are given in Exhibits 11 and 12. The Intelsat 29e transmissions will be limited to those levels contained in Sections 25.212(c) and (d) and Section 25.138 of the Commission's rules, as applicable, unless higher levels are coordinated with affected adjacent satellite operators. In any case, pursuant to the results in Exhibits 11 and 12, the uplink power density of the Intelsat 29e digital carriers will not exceed the levels specified below:

a) 5850 – 6725 MHz: -38.7 dBW/Hz
b) 13750 – 14500 MHz: -45.0 dBW/Hz
c) 29500 – 30000 MHz: -56.6 dBW/Hz

The downlink EIRP density of Intelsat 29e digital carriers will not exceed the levels specified below:

a) 3700 – 4200 MHz: -31.9 dBW/Hz
b) 10950 – 11200 MHz: -16.4 dBW/Hz
c) 11450 – 11700 MHz: -16.4 dBW/Hz
d) 11700 – 12200 MHz: -16.4 dBW/Hz
e) 19700 – 20200 MHz: -15.9 dBW/Hz

11.0) Schedule S Submission

[2] TDRS 6 is located at 46° W.L. and has an orbital inclination of 12°. NSS 703 is located at 47.05° W.L. with an orbital inclination of 3.1°. The operational status of TDRS 6 satellite is unknown. The orbital separation between a hypothetical satellite located at 48° W.L. and NSS 703 is approximately one degree and would be inconsistent with a two degree orbital separation environment. For the purposes of the interference analysis, the interference impact due to TDRS 6 and NSS 703 was not considered.

[3] Intelsat 23 is located at 53° W.L. The orbital separation between a hypothetical satellite located at 52° W.L. and Intelsat 23 is one degree and would be inconsistent with a two degree orbital separation environment. Accordingly, for the purposes of the interference analysis, the interference impact due to Intelsat 23 was not considered.

Intelsat is providing with its application a Schedule S for the operations of Intelsat 29e from 50º W.L. In column "g" of Section S13 of the Schedule S, a link budget file has been included for the first link (i.e., the first row of data) contained in that section. This link budget file is applicable to all the links listed in Section S13 and should have been included with each row of data in that section of the Schedule S. However, given that the link budget file is rather large and its inclusion with each link (or data row) would lead to the Schedule S file having an unmanageable size, all other links (or rows of data) contain a small ASCII file that references the link budget file that is attached to the first link (i.e., the link budget file attached to the first row of data).

Additionally, the latitude and longitude of the maximum gain point on the Earth of each (non-C-band) gateway and user beam has been included in the Schedule S. This information has been attached in column "e" of Section S8 of the Schedule S for each beam that such information applies.

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 1R during the transition of traffic period, Intelsat 29e will not be located at the same orbital location as another satellite or at an orbital location that has an overlapping station keeping volume with another satellite.

During the transition of traffic from Intelsat 1R, Intelsat will take all the necessary steps, e.g., "pass-in-the-night maneuver" or slight relocation of Intelsat 1R and/or Intelsat 29e, to minimize the risk of collision between Intelsat 1R and Intelsat 29e.

With the exception of Intelsat 1R, Intelsat 29e will not be located at the same orbital location as another satellite or at an orbital location that has an overlapping station keeping volume with another satellite. Intelsat is not aware of any other FCC licensed system, or any other system applied for and under consideration by the FCC, having an overlapping station-keeping volume with Intelsat 29e. Intelsat is also not aware of any system with an overlapping station-keeping volume with Intelsat 29e that is the subject of an ITU filing and that is either in orbit or progressing towards launch.

12.4) Post Mission Disposal

At the end of the mission, Intelsat will dispose of the spacecraft by moving it to a minimum altitude of 300 kilometers above the geostationary arc, which is above the altitude established by the IADC formula. Intelsat has reserved 70.6 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 29e

spacecraft is 0.045 m^2/kg, resulting in a minimum perigee disposal altitude under the IADC formula of at most 285 kilometers above the geostationary arc. Accordingly, the Intelsat 29e 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 bands of 6425 - 6725 MHz, 11950 – 12200 MHz, 19700 – 20200 MHz and 29500 – 30000 MHz at the nominal orbital location of 50° W.L. Intelsat will submit to the Commission the Advanced Publication Information ("API"), for a new satellite network that utilizes these frequency bands at the nominal orbital of 50° W.L., to be forwarded to the ITU.

Intelsat currently has no filing with the ITU for a satellite network that specifies operation on the frequency bands of 10700 – 10950 MHz, 11200 – 11450 MHz and 12750 – 13250 MHz at the nominal orbital location of 50° W.L. Intelsat will submit to the Commission Appendix 4 information for a new satellite network that utilizes these frequency bands at the nominal orbital of 50° W.L., to be forwarded to the ITU (see also Section 9 above).

Intelsat currently has no filing with the ITU for a satellite network that specifies operation in Region 1 on the frequency bands of 17300 – 17550 MHz and 12200 – 12500 MHz at the nominal orbital location of 50° W.L. Intelsat will submit to the Commission Appendix 4 information for a new satellite network that utilizes these frequency bands at the nominal orbital of 50° W.L. (see also Section 9 above).

14) TC&R Control Earth Stations

Intelsat will conduct TC&R operations through one or more of the following earth stations: Mountainside, Maryland; Atlanta, Georgia; Castle Rock, Colorado; Riverside, California; or Fillmore, California. Additionally, Intelsat is capable of remotely controlling Intelsat 29e from its facilities in Washington D.C.

Certification Statement

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

/s/	July 9, 2014
Roya Shambayati Intelsat Director, Spectrum Strategy	Date

EXHIBIT 1: SUMMARY OF SPACECRAFT CHARACTERISTICS

GENERAL	
Spacecraft Name	Intelsat 29e
Orbital Location	50° W.L.
Spacecraft Manufacturer	Boeing
Spacecraft Model	702 MP
Spacecraft Type	3-axis stabilized
Spacecraft Dimensions	
Length	43.7 meters
Width	9.2 meters
Depth	6.7 meters
Spacecraft Expected Lifetime	12 years
Eclipse Capability	100%
Station-keeping	
North-South	±0.05°
East-West	±0.05°
Antenna Pointing Accuracy	
North-South, East-West, Rotational	0.07°, 0.07º, 0.2º
Spacecraft Reliability	57.2%
Payload Reliability	65.0%
Bus Reliability	88.0%
Propulsion Type	Liquid Propulsion
Deployed Area of Solar Array	70.3 m^2
Ranging Accuracy	≤ 20 m

EXHIBIT 2: SPACECRAFT MASS BUDGET

Mass of Spacecraft without Fuel (kg)	2946
Mass of Fuel and Disposables (kg)	3354
Launch Mass (kg)	6300
Mass of Fuel at Beginning of Life (kg)	874

EXHIBIT 3: SPACECRAFT POWER BUDGET

	BEGINNING OF LIFE		END OF LIFE	
	AUTUMN EQUINOX	SUMMER SOLSTICE	AUTUMN EQUINOX	SUMMER SOLSTICE
PAYLOAD (WATTS)	10900	10900	10900	10900
BUS (WATTS)	2976	1940	2910	1698
TOTAL LOAD (WATTS)	13876	12840	13810	12598
SOLAR ARRAY POWER (WATTS)	15996	14927	15922	14700
DEPTH OF BATTERY DISCHARGE (%)	65.7	N/A	73	N/A

EXHIBIT 4: COMMUNICATION SUBSYSTEM
EIRP AND G/T BUDGETS

Beam Name	C-Band South America	C-Band South America	Ka-Band Global	Trans-Atlantic
Frequency Band (MHz)	5925 - 6425	5925 - 6425	29500 - 30000	14000 - 14500
Polarization	Horizontal	Vertical	RHCP/LHCP	Vertical
Beam Peak Gain (dBi)	29.9	29.9	22.8	31.5
Antenna Noise Temperature (ºKelvin)	290.0	290.0	290.0	290.0
Receiver Noise Temperature (ºKelvin)	312.6	312.6	355.7	326.6
Total System Noise Temperature (ºKelvin)	602.6	602.6	645.7	616.6
Total System Noise Temperature (ºdB/K)	27.8	27.8	28.1	27.9
G/T (dB/K)	2.1	2.1	-5.3	3.6
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m2)	-108.10	-108.10	-114.8	-112.6
Beam Name	C-Band Gateway	C-Band Gateway	Ku-Band Gateway 1	Ku-Band Gateway 2
Frequency Band (MHz)	5850 - 6725	5850 - 6725	12750 – 13250 13750 – 14000	12750 - 13250
Polarization	Horizontal	Vertical	Horizontal	Horizontal
Beam Peak Gain (dBi)	33.4	33.4	40.8	40.0
Antenna Noise Temperature (ºKelvin)	290.0	290.0	290.0	290.0
Receiver Noise Temperature (ºKelvin)	247.0	247.0	341.0	326.6
Total System Noise Temperature (ºKelvin)	537.0	537.0	631.0	616.6
Total System Noise Temperature (ºdB/K)	27.3	27.3	28.0	27.9
G/T (dB/K)	6.1	6.1	12.8	12.1
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-110.1	-110.1	-112.8	-112.1
Beam Name	Ku-Band Gateway 3	Ku-Band Gateway 4	Ka-Band Gateway 6	Ku-Band User 1-12
Frequency Band (MHz)	12750 - 13250	12750 - 13250	17300 - 17550	14000 - 14500
Polarization	Horizontal	Horizontal	Horizontal	Horizontal
Beam Peak Gain (dBi)	40.0	40.0	41.8	43.0
Antenna Noise Temperature (ºKelvin)	290.0	290.0	290.0	290.0
Receiver Noise Temperature (ºKelvin)	326.6	326.6	434.4	298.8
Total System Noise Temperature (ºKelvin)	616.6	616.6	724.4	588.8
Total System Noise Temperature (ºdB/K)	27.9	27.9	28.6	27.7
G/T (dB/K)	12.1	12.1	13.2	15.3
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-112.1	-112.1	-113.2	-115.3
Beam Name	Ku-Band User 13-38	Ku-Band User 39-45		
Frequency Band (MHz)	14000 - 14500	14000 - 14500		
Polarization	Horizontal	Horizontal		
Beam Peak Gain (dBi)	42.3	43.0		
Antenna Noise Temperature (ºKelvin)	290.0	290.0		
Receiver Noise Temperature (ºKelvin)	370.7	298.8		
Total System Noise Temperature (ºKelvin)	660.7	588.8		
Total System Noise Temperature (ºdB/K)	28.2	27.7		
G/T (dB/K)	14.1	15.3		
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-114.1	-115.3		
Beam Name	Ku-Band Gateway 1	Ku-Band Gateway 2	Ku-Band Gateway 3	Ka-Band Gateway 5
Frequency Band (MHz)	12750 – 13250 13750 – 14000	12750 – 13250 13750 – 14000	12750 - 13250	17300 - 17550
Polarization	Vertical	Vertical	Vertical	Vertical
Beam Peak Gain (dBi)	40.9	40.0	40.0	41.1
Antenna Noise Temperature (ºKelvin)	290.0	290.0	290.0	290.0
Receiver Noise Temperature (ºKelvin)	341.0	341.0	341.0	401.8
Total System Noise Temperature (ºKelvin)	631.0	631.0	631.0	691.8
Total System Noise Temperature (ºdB/K)	28.0	28.0	28.0	28.4
G/T (dB/K)	12.9	12.0	12.0	12.7
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-112.9	-112.0	-112.0	-112.7
Beam Name	Ku-Band User 1-12	Ku-Band User 13-38	Ku-Band User 39-45	
Frequency Band (MHz)	14000 - 14500	14000 - 14500	14000 - 14500	
Polarization	Vertical	Vertical	Vertical	
Beam Peak Gain (dBi)	42.5	41.9	42.5	
Antenna Noise Temperature (ºKelvin)	290.0	290.0	290.0	
Receiver Noise Temperature (ºKelvin)	259.5	341.0	259.5	
Total System Noise Temperature (ºKelvin)	549.5	631.0	549.5	
Total System Noise Temperature (ºdB/K)	27.4	28.0	27.4	
G/T (dB/K)	15.1	13.9	15.1	
Minimum SFD [G/T: Peak, Attn: 0 dB] -- (dBW/m^2)	-115.1	-113.9	-115.1	

Note:

RHCP: Right Hand Circular Polarization, LHCP: Left Hand Circular Polarization

EXHIBIT 4: COMMUNICATION SUBSYSTEM
EIRP AND G/T BUDGETS (continued)

Beam Name	C-Band South America	C-band South America	Ka-Band Global	Trans-Atlantic
Frequency Band (MHz)	3700 - 4200	3700 - 4200	19700 - 20200	11700 – 12200
Polarization	Horizontal	Vertical	RHCP/LHCP	Horizontal
Maximum Power At The Output of Last Stage Amplifier (dBW)	18.5	18.5	21.0	21.8
Loss Between Transmitter and Input of Transmit Antenna (dB)	2.4	2.4	2.5	2.4
Power IntoTransmit Antenna (dBW)	16.1	16.1	18.5	19.4
Power Into Transmit Antenna (Watts)	40.3	40.3	70.3	86.3
Peak Antenna Gain (dBi)	26.8	26.8	21.4	29.7
EIRP (dBW)	42.9	42.9	39.9	49.1
Beam Name	Ku-band Gateway 1	Ku-band Gateway 2	Ku-band Gateway 3	Ku-band Gateway 5
Frequency Band (MHz)	10700 - 10950 11200 - 11450 12200 - 12500	10950 - 11200 11200 - 11450	11200 - 11450	12200 - 12500
Polarization	Horizontal	Horizontal	Horizontal	Horizontal
Maximum Power At The Output of Last Stage Amplifier (dBW)	21.8	21.8	21.8	21.8
Loss Between Transmitter and Input of Transmit Antenna (dB)	2.0	2.1	2.1	5.2
Power IntoTransmit Antenna (dBW)	19.8	19.7	19.7	16.6
Power Into Transmit Antenna (Watts)	94.6	92.5	92.5	45.3
Peak Antenna Gain (dBi)	40.6	37.9	37.9	39.0
EIRP (dBW)	60.4	57.6	57.6	55.6
Beam Name	Ku-band User 1-12	Ku-band User 13-38	Ku-band User 39-45	
Frequency Band (MHz)	10950 - 11200 11450 - 11700 11700 - 12200	11450 – 11700 11700 – 12200	11700 - 12200	
Polarization	Horizontal	Horizontal	Horizontal	
Maximum Power At The Output of Last Stage Amplifier (dBW)	21.8	21.8	21.8	
Loss Between Transmitter and Input of Transmit Antenna (dB)	2.0	2.0	2.0	
Power IntoTransmit Antenna (dBW)	19.8	19.8	19.8	
Power Into Transmit Antenna (Watts)	94.6	94.6	94.6	
Peak Antenna Gain (dBi)	40.5	41.0	40.5	
EIRP (dBW)	60.3	60.8	60.3	
Beam Name	Ku-band Gateway 1	Ku-band Gateway 2	Ku-band Gateway 3	Ku-band Gateway 4
Frequency Band (MHz)	10700 - 10950 11200 - 11450 12200 - 12500	10950 - 11200 11200 - 11450	11200 - 11450	10700 - 10950
Polarization	Vertical	Vertical	Vertical	Vertical
Maximum Power At The Output of Last Stage Amplifier (dBW)	21.8	21.8	21.8	21.8
Loss Between Transmitter and Input of Transmit Antenna (dB)	2.0	2.0	2.0	2.0
Power IntoTransmit Antenna (dBW)	19.8	19.8	19.8	19.8
Power Into Transmit Antenna (Watts)	94.6	94.6	94.6	94.6
Peak Antenna Gain (dBi)	40.9	39.8	39.8	39.8
EIRP (dBW)	60.7	59.6	59.6	59.6
Beam Name	Ku-band Gateway 6	Ku-band User 1-12	Ku-band User 13-38	Ku-band User 39-45
Frequency (MHz)	12200 - 12500	11700 - 12200	11450 - 11700 11700 - 12200	11700 - 12200
Polarization	Vertical	Vertical	Vertical	Vertical
Maximum Power At The Output of Last Stage Amplifier (dBW)	21.8	21.8	21.8	21.8
Loss Between Transmitter and Input of Transmit Antenna (dB)	5.1	2.0	3.8	2.0
Power IntoTransmit Antenna (dBW)	16.7	19.8	18.0	19.8
Power Into Transmit Antenna (Watts)	46.4	94.6	62.5	94.6
Peak Antenna Gain (dBi)	38.8	42.7	42.3	42.7
EIRP (dBW)	55.5	62.5	60.3	62.5
Beam Name	C-Band ULPC	Ku-Band ULPC	Ku-Band ULPC	
Frequency (MHz)	3700.25	11451.3	11951.3	
Polarization	Right Hand Circular	Right Hand Circular	Left Hand Circular	
Maximum Power At The Output of Last Stage Amplifier (dBW)	1.5	-1.0	-1.0	
Loss Between Transmitter and Input of Transmit Antenna (dB)	1.3	1.0	1.0	
Power IntoTransmit Antenna (dBW)	0.3	-2.0	-2.0	
Power Into Transmit Antenna (Watts)	1.1	0.6	0.6	
Peak Antenna Gain (dBi)	20.6	26.0	26.0	
EIRP (dBW)	20.9	24.0	24.0	

Note:

RHCP: Right Hand Circular Polarization, LHCP: Left Hand Circular Polarization

EXHIBIT 5: TC&R SUBSYSTEM CHARACTERISTICS

	Global	Global
Command Frequency (MHz) / Polarization (see note)		
Transfer Orbit / Emergency	n/a	5850.5 (LHCP) 5853.0 (LHCP) 6422.0 (LHCP) 6424.5 (LHCP)
On-Station	5850.5 (LHCP) 5853.0 (LHCP) 6422.0 (V) 6424.5 (V)	n/a
Command Modulation	FM	FM
Bandwidth of Command Carrier (kHz)		
Occupied Bandwidth	800	800
Allocated Bandwidth	1000	1000
Command Threshold (dBW/m^2)		
Beam Peak	-101.0	-80.0
Edge of Coverage	-98.4	-77.4
Command G/T (dB/K)		
Beam Peak	-31.0	-52.9
Edge of Coverage	-33.6	-55.5
Telemetry Frequency (MHz) / Polarization (see note)		
Transfer Orbit / Emergency	n/a	3701.25 (LHCP) 3701.75 (LHCP) 3702.25 (LHCP) 3702.75 (LHCP)
On-Station	3701.25 (V) 3701.75 (V) 3702.25 (V) 3702.75 (V)	n/a
Telemetry Modulation	PM	PM
Bandwidth of Telemetry Carrier (kHz)		
Occupied	300	300
Allocated	500	500
Telemetry EIRP		
Beam Peak	13.4	16.1
Edge of Coverage	10.8	13.5
On-Station Ranging Accuracy (meters)	≤ 30	≤ 30

Note:

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

EXHIBIT 6: TC&R SUBSYSTEM EIRP and G/T BUDGETS

Antenna	**Global**	**Global**	**Global**
Frequency (MHz)	6422.0 6424.5	6422.0 6424.5	5850.5 5853.0
Polarization	V	LHCP	LHCP
Peak Antenna Gain -- includes antenna loss (dBi)	20.9	20.9	13.0
Antenna Noise Temperature (°K)	93.0	93.0	290.0
Receiver Noise Temperature (°K)	152607	152607	3911702
Total System Noise Temperature (°K)	152700	152700	3911992
Total System Noise Temperature (dB-K)	51.9	51.9	65.9
G/T (dB/K)	-31.0	-31.0	-52.9
Command Threshold Flux Density (dBW/m^2)	-101.0	-101.0	-80.0
Antenna	**Global**	**Global**	
Frequency (MHz)	3701.25 3701.75 3702.25 3702.75	3701.25 3701.75 3702.25 3702.75	
Polarization	V	LHCP	
Transmitter Output Power (dBW)	-2.4	10.0	
Loss between transmitter output and the input of transmit telemetry antenna (dB)	4.8	7.0	
Power into telemetry transmit antenna (dBW)	-7.2	3.1	
Power into telemetry transmit antenna (Watts)	0.2	2.0	
Peak Antenna Gain -- including antenna loss (dB)	20.6	13.0	
EIRP (dBW)	13.4	16.1	

EXHIBIT 7: EMISSION DESIGNATORS

Signal Type	Emission Designator	Allocated Bandwidth (kHz)
64 kbps Carrier	100KG7W	100
6000 kbps carrier	10M3G7W	10300
24575 kbps carrier	36M0G7W	36000
42665 kbps carrier	62M5G7W	62500
85329 kbps carrier	125MG7W	125000
127994 kbps carrier	188MG7W	187500
170659 kbps carrier	250MG7W	250000
204791 kbps carrier	300MG7W	300000
341318 kbps carrier	500MG7W	500000

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS

FREQUENCY BAND : 3700 - 4200 MHz							
South America (H) - 112MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	42.9	42.9	42.9	42.9	42.9	42.9	42.9
Carrier Occupied Bandwidth (kHz)	93747.0	93747.0	93747.0	93747.0	93747.0	93747.0	93747.0
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density ($dBW/m^2/4kHz$)	-164.2	-164.1	-164.0	-163.8	-163.7	-163.6	-162.9
FCC Limit ($dBW/m^2/4Hz$)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	12.2	12.1	14.5	16.8	19.2	21.6	20.9

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 3700 – 4200 MHz							
South America (V) - 36M0G7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	42.9	42.9	42.9	42.9	42.9	42.9	42.9
Carrier Occupied Bandwidth (kHz)	30133.0	30133.0	30133.0	30133.0	30133.0	30133.0	30133.0
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-159.3	-159.1	-159.0	-158.9	-158.8	-158.7	-157.9
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	7.3	7.1	9.5	11.9	14.3	16.7	15.9

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 3700 – 4200 MHz							
ULPC (RHCP) - 25K0G7D							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	19.3*	19.2*	20.9	20.9	20.9	20.9	20.9
Carrier Occupied Bandwidth (kHz)	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-152.0	-152.0	-150.2	-150.1	-150.0	-149.9	-149.1
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	0.0	0.0	0.7	3.1	5.5	7.9	7.1
Telemetry (V) - 500KG7D							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	13.4	13.4	13.4	13.4	13.4	13.4	13.4
Carrier Occupied Bandwidth (kHz)	300.0	300.0	300.0	300.0	300.0	300.0	300.0
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-168.7	-168.6	-168.5	-168.4	-168.3	-168.2	-167.4
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	16.7	16.6	19.0	21.4	23.8	26.2	25.4

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 3700 - 4200 MHz							
Telemetry (LHCP) - 500KG7D							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Carrier Occupied Bandwidth (kHz)	300.0	300.0	300.0	300.0	300.0	300.0	300.0
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-166.0	-165.9	-165.8	-165.7	-165.6	-165.5	-164.7
FCC Limit (dBW/m^2/4Hz)	-152.0	-152.0	-149.5	-147.0	-144.5	-142.0	-142.0
Margin (dB)	14.0	13.9	16.3	18.7	21.1	23.5	22.7
FREQUENCY BAND : 10700 - 10950 MHz							
Gateway 1 Beam (H) - 250MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	60.4	60.4	60.4	60.4	60.4	60.4	60.4
Carrier Occupied Bandwidth (kHz)	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9
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)	-150.2	-150.1	-149.9	-149.8	-149.7	-149.6	-148.9
ITU Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.2	0.1	2.4	4.8	7.2	9.6	8.9

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 10700 - 10950 MHz							
Gateway 1 Beam (V) - 250MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	60.6*	60.5*	60.7	60.7	60.7	60.7	60.7
Carrier Occupied Bandwidth (kHz)	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-150.0	-150.0	-149.6	-149.5	-149.4	-149.3	-148.6
ITU Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	2.1	4.5	6.9	9.3	8.6
FREQUENCY BAND : 10950 - 11200 MHz							
Gateway Beam 2 (H) - 500MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	57.6	57.6	57.6	57.6	57.6	57.6	57.6
Carrier Occupied Bandwidth (kHz)	418513.9	418513.9	418513.9	418513.9	418513.9	418513.9	418513.9
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)	-156.0	-155.9	-155.8	-155.6	-155.5	-155.4	-154.7
FCC Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	6.0	5.9	8.3	10.6	13.0	15.4	14.7

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 10950 – 11200 MHz							
User Beam 1 - 12 (H) - 62M5G7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	54.6*	54.4*	56.8*	59.2*	60.3	60.3	60.3
Carrier Occupied Bandwidth (kHz)	52314.0	52314.0	52314.0	52314.0	52314.0	52314.0	52314.0
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-150.0	-150.0	-147.5	-145.0	-143.8	-143.7	-142.9
FCC Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	0.0	1.3	3.7	2.9
Gateway 2 Beam (V) - 500MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	59.6	59.6	59.6	59.6	59.6	59.6	59.6
Carrier Occupied Bandwidth (kHz)	418513.9	418513.9	418513.9	418513.9	418513.9	418513.9	418513.9
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)	-154.0	-153.9	-153.8	-153.6	-153.5	-153.4	-152.7
FCC Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	4.0	3.9	6.3	8.6	11.0	13.4	12.7

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11200 - 11450 MHz							
Gateway 1 Beam (H) - 250MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	60.4	60.4	60.4	60.4	60.4	60.4	60.4
Carrier Occupied Bandwidth (kHz)	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9
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)	-150.2	-150.1	-149.9	-149.8	-149.7	-149.6	-148.9
ITU Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.2	0.1	2.4	4.8	7.2	9.6	8.9
Gateway 1 Beam (V) - 250MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	60.6*	60.4	60.4	60.4	60.4	60.4	60.4
Carrier Occupied Bandwidth (kHz)	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9
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	-150.1	-149.9	-149.8	-149.7	-149.6	-148.9
ITU Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.1	2.4	4.8	7.2	9.6	8.9

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11200 - 11450 MHz							
Gateway 3 Beam (V) - 125MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	57.6*	57.5*	59.6	59.6	59.6	59.6	59.6
Carrier Occupied Bandwidth (kHz)	104628.5	104628.5	104628.5	104628.5	104628.5	104628.5	104628.5
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	-147.7	-147.6	-147.5	-147.4	-146.6
ITU Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.2	2.6	5.0	7.4	6.6
FREQUENCY BAND : 11450 - 11700 MHz							
User Beam 1 - 12 (H) - 125MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	57.6*	57.5*	59.8*	60.3	60.3	60.3	60.3
Carrier Occupied Bandwidth (kHz)	104628.5	104628.5	104628.5	104628.5	104628.5	104628.5	104628.5
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	-146.9	-146.8	-146.7	-145.9
FCC Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	1.9	4.3	6.7	5.9

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11450 – 11700 MHz							
User Beam 13 - 38 (H) - 62M5G7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	54.6*	54.4*	56.8*	59.2*	60.8	60.8	60.8
Carrier Occupied Bandwidth (kHz)	52314.2	52314.2	52314.2	52314.2	52314.2	52314.2	52314.2
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	-143.3	-143.2	-142.4
FCC Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	0.0	0.8	3.2	2.4
User Beam 13 - 38 (V) - 125MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	57.6*	57.5*	59.8*	60.3	60.3	60.3	60.3
Carrier Occupied Bandwidth (kHz)	104628.5	104628.5	104628.5	104628.5	104628.5	104628.5	104628.5
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	-146.9	-146.8	-146.7	-145.9
FCC Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	1.9	4.3	6.7	5.9

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 11450 – 11700 MHz							
ULPC (RHCP) - 125MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	21.3*	21.2*	23.6*	24.0	24.0	24.0	24.0
Carrier Occupied Bandwidth (kHz)	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-150.0	-150.0	-147.5	-147.0	-146.9	-146.8	-146.0
FCC Limit (dBW/m^2/4Hz)	-150.0	-150.0	-147.5	-145.0	-142.5	-140.0	-140.0
Margin (dB)	0.0	0.0	0.0	2.0	4.4	6.8	6.0
FREQUENCY BAND : 12200 – 12500 MHz							
Gateway Beam 1 (H) - 300MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	60.4	60.4	60.4	60.4	60.4	60.4	60.4
Carrier Occupied Bandwidth (kHz)	251108.3	251108.3	251108.3	251108.3	251108.3	251108.3	251108.3
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)	-151.0	-150.9	-150.7	-150.6	-150.5	-150.4	-149.6
ITU Limit (dBW/m^2/4Hz)	-148.0	-148.0	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	3.0	2.9	5.2	7.6	10.0	12.4	11.6

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 12200 – 12500 MHz							
Gateway Beam 5 (H) - 250MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	55.6	55.6	55.6	55.6	55.6	55.6	55.6
Carrier Occupied Bandwidth (kHz)	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-155.0	-154.9	-154.7	-154.6	-154.5	-154.4	-153.7
ITU Limit (dBW/m^2/4Hz)	-148.0	-148.0	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	7.0	6.9	9.2	11.6	14.0	16.4	15.7
Gateway Beam 1 (V) - 300MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	60.7	60.7	60.7	60.7	60.7	60.7	60.7
Carrier Occupied Bandwidth (kHz)	251108.3	251108.3	251108.3	251108.3	251108.3	251108.3	251108.3
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)	-150.7	-150.6	-150.4	-150.3	-150.2	-150.1	-149.3
ITU Limit (dBW/m^2/4Hz)	-148.0	-148.0	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	2.7	2.6	4.9	7.3	9.7	12.1	11.3

EXHIBIT 8: POWER FLUX DENSITY CALCULATIONS (continued)

FREQUENCY BAND : 12200 – 12500 MHz							
Gateway Beam 6 (V) - 250MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	55.5	55.5	55.5	55.5	55.5	55.5	55.5
Carrier Occupied Bandwidth (kHz)	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9	209256.9
Spreading Loss (dB/m^2)	163.4	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/4kHz)	-155.1	-155.0	-154.8	-154.7	-154.6	-154.5	-153.8
ITU Limit (dBW/m^2/4Hz)	-148.0	-148.0	-145.5	-143.0	-140.5	-138.0	-138.0
Margin (dB)	7.1	7.0	9.3	11.7	14.1	16.5	15.8
FREQUENCY BAND : 19700 – 20200 MHz							
Global (LHCP/RHCP) - 500MG7W							
Elevation Angle (degrees)	0.0	5.0	10.0	15.0	20.0	25.0	90.0
Assumed EIRP	39.9	39.9	39.9	39.9	39.9	39.9	39.9
Carrier Occupied Bandwidth (kHz)	418513.9	418513.9	418513.9	418513.9	418513.9	418513.9	418513.9
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)	-173.7	-173.6	-173.5	-173.3	-173.2	-173.1	-172.4
FCC Limit (dBW/m^2/MHz)	-118.0	-118.0	-118.0	-118.0	-118.0	-118.0	-118.0
Margin (dB)	55.7	55.6	55.5	55.3	55.2	55.1	54.4

* 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 9: RECEIVE AND TRANSMIT SECTION FILTER RESPONSE CHARACTERISTICS

	Attenuation Relative To Peak Level (dB)	
Frequency Offset Relative to Channel Center Frequency (MHz)	Input Section	Output Section
C-Band: 36 MHz Channel		
±8	0.3	0.1
±12	0.4	0.4
±14	0.5	0.5
±16	0.7	0.5
±18	1.1	1.2
C-Band: 72 MHz Channel		
±16	0.4	0.1
±24	0.5	0.4
±28	0.6	0.5
±32	0.8	0.5
±36	1.2	0.9
C-Band: 112 MHz Channel		
±25	0.5	0.1
±37	0.7	0.2
±44	0.8	0.3
±50	0.9	0.4
±56	1.2	0.9
C-Band: 375 MHz Channel		
±94	0.9	n/a
±113	1.1	n/a
±150	1.3	n/a
±169	1.5	n/a
±187	1.6	n/a
C-Band: 500 MHz Channel		
±125	1.1	n/a
±150	1.3	n/a
±200	1.7	n/a
±225	2.0	n/a
±250	2.5	n/a

EXHIBIT 9: RECEIVE AND TRANSMIT SECTION FILTER RESPONSE CHARACTERISTICS (continued)

	Attenuation Relative To Peak Level (dB)	
Frequency Offset Relative to Channel Center Frequency (MHz)	Input Section	Output Section
±125	0.7	0.2
±150	0.8	0.2
±200	1.2	0.1
±225	1.4	0.6
±250	6.4	5.0
Ku-Band: 36 MHz Channel		
±8	0.4	0.3
±12	0.5	0.5
±14	0.6	0.7
±16	1.1	1.3
±18	2.1	2.6
Ku-Band: 62.5 MHz Channel		
±14	0.5	0.3
±21	0.6	0.6
±24	0.7	0.9
±28	1.2	2.6
±31	2.0	5.4
Ku-Band: 125 MHz Channel		
±28	0.2	0.2
±41	0.4	0.4
±49	0.5	0.5
±56	1.6	1.2
±62	7.5	6.0
Ku-Band: 187.5 MHz Channel		
±42	0.2	0.2
±61.5	0.4	0.4
±73.5	0.5	0.5
±84	1.6	1.2
±93.75	7.5	6.0

EXHIBIT 9: RECEIVE AND TRANSMIT SECTION FILTER RESPONSE CHARACTERISTICS (continued)

	Attenuation Relative To Peak Level (dB)	
Frequency Offset Relative to Channel Center Frequency (MHz)	Input Section	Output Section
Ku-Band: 250 MHz Channel		
±56	0.8	0.3
±82	1.1	0.5
±98	1.2	0.8
±112	1.5	1.9
±125	2.3	10.0
Ku-Band: 300MHz Channel		
±67	n/a	0.3
±98	n/a	0.5
±118	n/a	0.6
±134	n/a	0.9
±150	n/a	7.1
Ku-Band: 375 MHz Channel		
±94	0.9	n/a
±113	1.1	n/a
±150	1.3	n/a
±169	1.5	n/a
±187	1.6	n/a
Ku-Band: 500 MHz Channel		
±125	1.1	0.1
±150	1.3	0.1
±200	1.7	0.2
±225	2.0	0.4
±250	2.5	4.0

EXHIBIT 10: INTELSAT 29e LINK BUDGETS

UPLINK BEAM INFORMATION			
Uplink Beam Name	SOUTH_AMERICA	SOUTH_AMERICA	SOUTH_AMERICA
Uplink Frequency (GHz)	6.175	6.175	6.175
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.9	-3.9	-3.9
Uplink SFD (dBW/m2)	-87.1	-80.1	-80.1
Rain Rate (mm/hr)	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	LINEAR	LINEAR	LINEAR
Downlink Frequency (GHz)	3.950	3.950	3.950
Downlink Beam Polarization	ANY	ANY	ANY
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	38.9	38.9	38.9
Rain Rate (mm/hr)	42.0	42.0	42.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	48.0W	48.0W	48.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-35.9	-35.9	-35.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 2 Orbital Location	52.0W	52.0W	52.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-35.9	-35.9	-35.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	112MG7W	10M3G7W	100KG7
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	76455	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	93747	6771.1	75.4
Allocated Bandwidth(kHz)	112000	10300	100
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99
Minimum C/N, Rain (dB)	3.36	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	8.1	6.1	6.1
Earth Station Gain (dBi)	52.8	49.4	49.4
Earth Station Elevation Angle	20	20	20
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	3.5	3.5	3.5
Earth Station Gain (dBi)	41.1	41.1	41.1
Earth Station G/T (dB/K)	21.0	21.0	21.0
Earth Station Elevation Angle	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	75.8	65.9	45.5
Uplink Path Loss, Clear Sky (dB)	-200.2	-200.2	-200.2
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.9	-3.9	-3.9
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-79.7	-68.3	-48.8
Uplink C/N(dB)	20.6	22.1	21.2
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	38.9	26.7	6.3
Antenna Pointing Error (dB)	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-196.3	-196.3	-196.3
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	21.0	21.0	21.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-79.7	-68.3	-48.8
Downlink C / N(dB)	11.9	11.2	10.3
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	20.6	22.1	21.2
C/N Downlink (dB)	11.9	11.2	10.3
C/I Intermodulation (dB)	N/A	20.2	19.3
C/I Uplink Co-Channel (dB)*	27.0	28.7	28.4
C/I Downlink Co-Channel (dB)*	27.0	28.7	28.4
C/I Uplink Adjacent Satellite 1 (dB)	10.8	12.3	11.5
C/I Downlink Adjacent Satellite 1 (dB)	11.4	10.7	9.8
C/I Uplink Adjacent Satellite 2 (dB)	10.8	12.3	11.5
C/I Downlink Adjacent Satellite 2 (dB)	16.2	15.4	14.5
C/(N+I) Composite (dB)	4.7	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	3.7	3.9	3.0
Minimum Required C/N (dB)	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.3	0.0	0.0
Number of Carriers	1.0	7.3	807.5
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-56.7	-51.8	-52.6
Downlink EIRP Density At Beam Peak (dBW/Hz)	-36.8	-37.6	-38.5

EXHIBIT 10: INTELSAT 29e LINK BUDGETS (continued)

UPLINK BEAM INFORMATION					
Uplink Beam Name	SPOT	SPOT	SPOT	SPOT	SPOT
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	11.3	11.3	11.3	11.3	11.3
Uplink SFD (dBW/m2)	-83.3	-84.3	-84.3	-84.3	-84.3
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION					
Downlink Beam Name	SPOT	SPOT	SPOT	SPOT	SPOT
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	53.6	53.6	53.6	53.6	53.6
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1					
Satellite 1 Orbital Location	48.0W	48.0W	48.0W	48.0W	48.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2					
Satellite 2 Orbital Location	52.0W	52.0W	52.0W	52.0W	52.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION					
Carrier ID	62M5G7W	10M3G7W	100KG7W	1M45G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	42665	6000	64	512	128
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	52314	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	62500	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	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	2.4
Earth Station Gain (dBi)	56.8	56.8	56.8	56.8	48.9
Earth Station Elevation Angle	20	20	20	20	20
DOWNLINK EARTH STATION					
Earth Station Diameter (meters)	3.7	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	50.8	47.2	47.2	47.2	55.2
Earth Station G/T (dB/K)	28.3	24.7	24.7	24.7	32.8
Earth Station Elevation Angle	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE					
Uplink Earth Station EIRP (dBW)	67.3	60.2	39.9	52.0	43.9
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	11.3	11.3	11.3	11.3	11.3
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-77.2	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	22.6	24.4	23.7	23.6	21.5
DOWNLINK PERFORMANCE					
Downlink EIRP per Carrier (dBW)	47.2	38.3	18.1	30.1	22.0
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	28.3	24.7	24.7	24.7	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-77.2	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	20.7	17.2	16.4	16.3	22.4
COMPOSITE LINK PERFORMANCE					
C/N Uplink (dB)	22.6	24.4	23.7	23.6	21.5
C/N Downlink (dB)	20.7	17.2	16.4	16.3	22.4
C/I Intermodulation (dB)	N/A	22.6	21.9	21.7	19.7
C/I Uplink Co-Channel (dB)*	27.0	24.7	24.5	24.9	22.4
C/I Downlink Co-Channel (dB)*	27.0	24.7	24.5	24.9	22.4
C/I Uplink Adjacent Satellite 1 (dB)	13.1	14.9	14.2	14.1	12.0
C/I Downlink Adjacent Satellite 1 (dB)	19.2	15.4	14.6	14.5	21.0
C/I Uplink Adjacent Satellite 2 (dB)	13.1	14.9	14.2	14.1	12.0
C/I Downlink Adjacent Satellite 2 (dB)	20.2	16.9	16.2	16.1	21.6
C/(N+I) Composite (dB)	8.6	8.3	7.5	7.5	7.6
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	7.6	7.3	6.5	6.5	6.6
Minimum Required C/N (dB)	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.3	3.4	3.6	3.1	3.2
Number of Carriers	1.0	6.1	625.0	43.1	156.3
CARRIER DENSITY LEVELS					
Uplink Power Density (dBW/Hz)	-66.7	-64.9	-65.6	-65.8	-59.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.0	-26.0	-26.7	-26.8	-28.9

EXHIBIT 10: INTELSAT 29e LINK BUDGETS (continued)

UPLINK BEAM INFORMATION			
Uplink Beam Name	C_BAND	C_BAND	C_BAND
Uplink Frequency (GHz)	6.2875	6.2875	6.2875
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-3.9	-3.9	-3.9
Uplink SFD (dBW/m2)	-72.1	-75.1	-75.1
Rain Rate (mm/hr)	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	SPOT	SPOT	SPOT
Downlink Frequency (GHz)	11.950	11.950	11.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	53.6	53.6	53.6
Rain Rate (mm/hr)	95.0	95.0	95.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	48.0W	48.0W	48.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 2 Orbital Location	52.0W	52.0W	52.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	125MG7W	10M3G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	85329	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	104628	6771.1	75.4
Allocated Bandwidth(kHz)	125000	10300	100
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99
Minimum C/N, Rain (dB)	3.36	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	15.2	6.1	6.1
Earth Station Gain (dBi)	58.6	49.6	49.6
Earth Station Elevation Angle	20	20	20
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	1.8	1.8	1.8
Earth Station Gain (dBi)	44.8	44.8	44.8
Earth Station G/T (dB/K)	22.3	22.3	22.3
Earth Station Elevation Angle	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	81.6	69.4	49.1
Uplink Path Loss, Clear Sky (dB)	-200.4	-200.4	-200.4
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.9	-3.9	-3.9
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-80.2	-68.3	-48.8
Uplink C/N(dB)	25.7	25.5	24.7
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	50.2	38.3	18.0
Antenna Pointing Error (dB)	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	22.3	22.3	22.3
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-80.2	-68.3	-48.8
Downlink C / N(dB)	14.5	14.5	13.7
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	25.7	25.5	24.7
C/N Downlink (dB)	14.5	14.5	13.7
C/I Intermodulation (dB)	N/A	25.6	24.8
C/I Uplink Co-Channel (dB)*	27.0	27.7	27.5
C/I Downlink Co-Channel (dB)*	27.0	27.7	27.5
C/I Uplink Adjacent Satellite 1 (dB)	12.1	11.8	11.0
C/I Downlink Adjacent Satellite 1 (dB)	12.6	12.6	11.9
C/I Uplink Adjacent Satellite 2 (dB)	12.1	11.8	11.0
C/I Downlink Adjacent Satellite 2 (dB)	14.7	14.7	14.0
C/(N+I) Composite (dB)	6.0	5.8	5.0
Required System Margin (dB)	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	5.0	4.8	4.0
Minimum Required C/N (dB)	-3.4	-3.9	-3.0
Excess Link Margin (dB)	1.6	.9	1.0
Number of Carriers	1.0	10.4	1117.9
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-57.2	-48.4	-49.2
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.0	-26.0	-26.7

EXHIBIT 10: INTELSAT 29e LINK BUDGETS (continued)

UPLINK BEAM INFORMATION			
Uplink Beam Name	SPOT	SPOT	SPOT
Uplink Frequency (GHz)	13.875	13.875	13.875
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	11.3	11.3	11.3
Uplink SFD (dBW/m2)	-83.3	-88.3	-88.3
Rain Rate (mm/hr)	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	TRANS	TRANS	TRANS
Downlink Frequency (GHz)	12.010	12.010	12.010
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	45.1	45.1	45.1
Rain Rate (mm/hr)	42.0	42.0	42.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	48.0W	48.0W	48.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-16.4	-16.4	-16.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 2 Orbital Location	52.0W	52.0W	52.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-16.4	-16.4	-16.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	36M0G7W	10M3G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	24575	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	30133	6771.1	75.4
Allocated Bandwidth(kHz)	36000	10300	100
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99
Minimum C/N, Rain (dB)	3.36	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	6.1	6.1	6.1
Earth Station Gain (dBi)	56.7	56.7	56.7
Earth Station Elevation Angle	20	20	20
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	1.8	2.4	2.4
Earth Station Gain (dBi)	44.8	47.5	47.5
Earth Station G/T (dB/K)	22.3	25.0	25.0
Earth Station Elevation Angle	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	75.6	62.7	42.5
Uplink Path Loss, Clear Sky (dB)	-207.2	-207.2	-207.2
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	11.3	11.3	11.3
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-74.8	-68.3	-48.8
Uplink C/N(dB)	33.5	27.0	26.4
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	44.8	36.3	16.1
Antenna Pointing Error (dB)	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-206.0	-206.0	-206.0
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	22.3	25.0	25.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-74.8	-68.3	-48.8
Downlink C / N(dB)	14.5	15.1	14.5
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	33.5	27.0	26.4
C/N Downlink (dB)	14.5	15.1	14.5
C/I Intermodulation (dB)	N/A	26.6	26.0
C/I Uplink Co-Channel (dB)*	27.0	28.7	28.7
C/I Downlink Co-Channel (dB)*	27.0	28.7	28.7
C/I Uplink Adjacent Satellite 1 (dB)	23.8	17.4	16.8
C/I Downlink Adjacent Satellite 1 (dB)	8.7	9.6	9.0
C/I Uplink Adjacent Satellite 2 (dB)	23.8	17.4	16.8
C/I Downlink Adjacent Satellite 2 (dB)	10.8	11.2	10.6
C/(N+I) Composite (dB)	5.7	5.8	5.2
Required System Margin (dB)	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	4.7	4.8	4.2
Minimum Required C/N (dB)	-3.4	-3.9	-3.0
Excess Link Margin (dB)	1.4	1.0	1.3
Number of Carriers	1.0	2.4	244.2
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-55.9	-62.3	-62.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.0	-28.0	-28.6

EXHIBIT 10: INTELSAT 29e LINK BUDGETS (continued)

UPLINK BEAM INFORMATION			
Uplink Beam Name	KA	KA	KA
Uplink Frequency (GHz)	29.8	29.8	29.8
Uplink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR
Uplink Relative Contour Level (dB)	-5.0	-5.0	-5.0
Uplink Contour G/T (dB/K)	-10.3	-10.3	-10.3
Uplink SFD (dBW/m2)	-81.8	-81.8	-81.8
Rain Rate (mm/hr)	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	KA	KA	KA
Downlink Frequency (GHz)	20.0	20.0	20.0
Downlink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR
Downlink Relative Contour Level (dB)	-3.0	-3.0	-3.0
Downlink Contour EIRP (dBW)	36.9	36.9	36.9
Rain Rate (mm/hr)	42.0	42.0	42.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	48.0W	48.0W	48.0W
Uplink Power Density (dBW/Hz)	-56.5	-56.5	-56.5
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-18.9	-18.9	-18.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 1 Orbital Location	52.0W	52.0W	52.0W
Uplink Power Density (dBW/Hz)	-56.5	-56.5	-56.5
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-18.9	-18.9	-18.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	67M7G7W	10M3G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	60052.2	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	65163.0	6771.1	75.4
Allocated Bandwidth(kHz)	67711.0	10300	100
Minimum C/N, Clear Sky (dB)	3.4	3.87	2.99
Minimum C/N, Rain (dB)	3.4	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	9.0	9.0	9.0
Earth Station Gain (dBi)	67.1	67.1	67.1
Earth Station Elevation Angle	54.8	54.8	54.8
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	7.2	7.2	7.2
Earth Station Gain (dBi)	61.7	61.7	61.7
Earth Station G/T (dB/K)	39.3	39.3	39.3
Earth Station Elevation Angle	54.8	54.8	54.8
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	80.5	70.4	56.2
Uplink Path Loss, Clear Sky (dB)	213.2	213.2	213.2
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	-10.3	-10.3	-10.3
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-78.1	-68.3	-48.8
Uplink C/N(dB)	16.0	6.8	12.2
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	36.9	28.8	4.6
Antenna Pointing Error (dB)	-0.5	-0.5	-0.5
Downlink Path Loss, Clear Sky (dB)	209.8	209.8	209.8
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	39.3	39.3	39.3
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-78.1	-68.3	-48.8
Downlink C / N(dB)	16.0	17.7	13.1
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	7.1	6.8	12.2
C/N Downlink (dB)	16.0	17.7	13.1
C/I Intermodulation (dB)	N/A	16.7	16.7
C/I Uplink Co-Channel (dB)*	27.0	27.0	27.0
C/I Downlink Co-Channel (dB)*	27.0	27.0	27.0
C/I Uplink Adjacent Satellite 1 (dB)	37.7	37.4	42.8
C/I Downlink Adjacent Satellite 1 (dB)	18.2	19.9	15.3
C/I Uplink Adjacent Satellite 2 (dB)	38.3	38.0	43.4
C/I Downlink Adjacent Satellite 2 (dB)	18.7	20.4	15.8
C/(N+I) Composite (dB)	5.9	5.7	7.2
Required System Margin (dB)	-1.0	1.0	1.0
Net C/(N+I) Composite (dB)	4.9	4.7	6.2
Minimum Required C/N (dB)	3.4	3.9	3.0
Excess Link Margin (dB)	1.5	0.8	3.2
Number of Carriers	1.0	6.0	1688.0
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-64.7	-65.0	-59.6
Downlink EIRP Density At Beam Peak (dBW/Hz)	-38.2	-36.5	-41.1

EXHIBIT 11: ADJACENT SATELLITE (48º W.L) LINK BUDGETS

UPLINK BEAM INFORMATION			
Uplink Beam Name	SOUTH_AMERICA	SOUTH_AMERICA	SOUTH_AMERICA
Uplink Frequency (GHz)	6.175	6.175	6.175
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.9	-3.9	-3.9
Uplink SFD (dBW/m2)	-87.1	-80.1	-80.1
Rain Rate (mm/hr)	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	LINEAR	LINEAR	LINEAR
Downlink Frequency (GHz)	3.950	3.950	3.950
Downlink Beam Polarization	ANY	ANY	ANY
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	38.9	38.9	38.9
Rain Rate (mm/hr)	42.0	42.0	42.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	50.0W	50.0W	50.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-35.9	-35.9	-35.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 2 Orbital Location	46.0W	46.0W	46.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-35.9	-35.9	-35.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	112MG7W	10M3G7W	100KG7
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	76455	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	93747	6771.1	75.4
Allocated Bandwidth(kHz)	112000	10300	100
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99
Minimum C/N, Rain (dB)	3.36	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	8.1	6.1	6.1
Earth Station Gain (dBi)	52.8	49.4	49.4
Earth Station Elevation Angle	20	20	20
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	3.5	3.5	3.5
Earth Station Gain (dBi)	41.1	41.1	41.1
Earth Station G/T (dB/K)	21.0	21.0	21.0
Earth Station Elevation Angle	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	75.8	65.9	45.5
Uplink Path Loss, Clear Sky (dB)	-200.2	-200.2	-200.2
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.9	-3.9	-3.9
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-79.7	-68.3	-48.8
Uplink C/N(dB)	20.6	22.1	21.2
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	38.9	26.7	6.3
Antenna Pointing Error (dB)	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-196.3	-196.3	-196.3
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	21.0	21.0	21.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-79.7	-68.3	-48.8
Downlink C / N(dB)	11.9	11.2	10.3
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	20.6	22.1	21.2
C/N Downlink (dB)	11.9	11.2	10.3
C/I Intermodulation (dB)	N/A	20.2	19.3
C/I Uplink Co-Channel (dB)*	27.0	28.7	28.4
C/I Downlink Co-Channel (dB)*	27.0	28.7	28.4
C/I Uplink Adjacent Satellite 1 (dB)	10.8	12.3	11.5
C/I Downlink Adjacent Satellite 1 (dB)	11.4	10.7	9.8
C/I Uplink Adjacent Satellite 2 (dB)	10.8	12.3	11.5
C/I Downlink Adjacent Satellite 2 (dB)	16.2	15.4	14.5
C/(N+I) Composite (dB)	4.7	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	3.7	3.9	3.0
Minimum Required C/N (dB)	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.3	0.0	0.0
Number of Carriers	1.0	7.3	807.5
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-56.7	-51.8	-52.6
Downlink EIRP Density At Beam Peak (dBW/Hz)	-36.8	-37.6	-38.5

EXHIBIT 11: ADJACENT SATELLITE (48º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION					
Uplink Beam Name	SPOT	SPOT	SPOT	SPOT	SPOT
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	11.3	11.3	11.3	11.3	11.3
Uplink SFD (dBW/m2)	-83.3	-84.3	-84.3	-84.3	-84.3
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION					
Downlink Beam Name	SPOT	SPOT	SPOT	SPOT	SPOT
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	53.6	53.6	53.6	53.6	53.6
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1					
Satellite 1 Orbital Location	50.0W	50.0W	50.0W	50.0W	50.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2					
Satellite 2 Orbital Location	46.0W	46.0W	46.0W	46.0W	46.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION					
Carrier ID	62M5G7W	10M3G7W	100KG7W	1M45G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	42665	6000	64	512	128
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	52314	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	62500	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	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	2.4
Earth Station Gain (dBi)	56.8	56.8	56.8	56.8	48.9
Earth Station Elevation Angle	20	20	20	20	20
DOWNLINK EARTH STATION					
Earth Station Diameter (meters)	3.7	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	50.8	47.2	47.2	47.2	55.2
Earth Station G/T (dB/K)	28.3	24.7	24.7	24.7	32.8
Earth Station Elevation Angle	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE					
Uplink Earth Station EIRP (dBW)	67.3	60.2	39.9	52.0	43.9
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	11.3	11.3	11.3	11.3	11.3
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-77.2	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	22.6	24.4	23.7	23.6	21.5
DOWNLINK PERFORMANCE					
Downlink EIRP per Carrier (dBW)	47.2	38.3	18.1	30.1	22.0
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	28.3	24.7	24.7	24.7	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-77.2	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	20.7	17.2	16.4	16.3	22.4
COMPOSITE LINK PERFORMANCE					
C/N Uplink (dB)	22.6	24.4	23.7	23.6	21.5
C/N Downlink (dB)	20.7	17.2	16.4	16.3	22.4
C/I Intermodulation (dB)	N/A	22.6	21.9	21.7	19.7
C/I Uplink Co-Channel (dB)*	27.0	24.7	24.5	24.9	22.4
C/I Downlink Co-Channel (dB)*	27.0	24.7	24.5	24.9	22.4
C/I Uplink Adjacent Satellite 1 (dB)	13.1	14.9	14.2	14.1	12.0
C/I Downlink Adjacent Satellite 1 (dB)	19.2	15.4	14.6	14.5	21.0
C/I Uplink Adjacent Satellite 2 (dB)	13.1	14.9	14.2	14.1	12.0
C/I Downlink Adjacent Satellite 2 (dB)	20.2	16.9	16.2	16.1	21.6
C/(N+I) Composite (dB)	8.6	8.3	7.5	7.5	7.6
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	7.6	7.3	6.5	6.5	6.6
Minimum Required C/N (dB)	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.3	3.4	3.6	3.1	3.2
Number of Carriers	1.0	6.1	625.0	43.1	156.3
CARRIER DENSITY LEVELS					
Uplink Power Density (dBW/Hz)	-66.7	-64.9	-65.6	-65.8	-59.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.0	-26.0	-26.7	-26.8	-28.9

EXHIBIT 11: ADJACENT SATELLITE (48º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION			
Uplink Beam Name	C_BAND	C_BAND	C_BAND
Uplink Frequency (GHz)	6.2875	6.2875	6.2875
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-3.9	-3.9	-3.9
Uplink SFD (dBW/m2)	-72.1	-75.1	-75.1
Rain Rate (mm/hr)	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	SPOT	SPOT	SPOT
Downlink Frequency (GHz)	11.950	11.950	11.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	53.6	53.6	53.6
Rain Rate (mm/hr)	95.0	95.0	95.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	50.0W	46.0W	46.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 2 Orbital Location	46.0W	46.0W	46.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	125MG7W	10M3G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	85329	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	104628	6771.1	75.4
Allocated Bandwidth(kHz)	125000	10300	100
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99
Minimum C/N, Rain (dB)	3.36	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	15.2	6.1	6.1
Earth Station Gain (dBi)	58.6	49.6	49.6
Earth Station Elevation Angle	20	20	20
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	1.8	1.8	1.8
Earth Station Gain (dBi)	44.8	44.8	44.8
Earth Station G/T (dB/K)	22.3	22.3	22.3
Earth Station Elevation Angle	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	81.6	69.4	49.1
Uplink Path Loss, Clear Sky (dB)	-200.4	-200.4	-200.4
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.9	-3.9	-3.9
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-80.2	-68.3	-48.8
Uplink C/N(dB)	25.7	25.5	24.7
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	50.2	38.3	18.0
Antenna Pointing Error (dB)	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	22.3	22.3	22.3
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-80.2	-68.3	-48.8
Downlink C / N(dB)	14.5	14.5	13.7
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	25.7	25.5	24.7
C/N Downlink (dB)	14.5	14.5	13.7
C/I Intermodulation (dB)	N/A	25.6	24.8
C/I Uplink Co-Channel (dB)*	27.0	27.7	27.5
C/I Downlink Co-Channel (dB)*	27.0	27.7	27.5
C/I Uplink Adjacent Satellite 1 (dB)	12.1	11.8	11.0
C/I Downlink Adjacent Satellite 1 (dB)	12.6	12.6	11.9
C/I Uplink Adjacent Satellite 2 (dB)	12.1	11.8	11.0
C/I Downlink Adjacent Satellite 2 (dB)	14.7	14.7	14.0
C/(N+I) Composite (dB)	6.0	5.8	5.0
Required System Margin (dB)	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	5.0	4.8	4.0
Minimum Required C/N (dB)	-3.4	-3.9	-3.0
Excess Link Margin (dB)	1.6	.9	1.0
Number of Carriers	1.0	10.4	1117.9
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-57.2	-48.4	-49.2
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.0	-26.0	-26.7

EXHIBIT 11: ADJACENT SATELLITE (48º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION			
Uplink Beam Name	SPOT	SPOT	SPOT
Uplink Frequency (GHz)	13.875	13.875	13.875
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	11.3	11.3	11.3
Uplink SFD (dBW/m2)	-83.3	-88.3	-88.3
Rain Rate (mm/hr)	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	TRANS	TRANS	TRANS
Downlink Frequency (GHz)	12.010	12.010	12.010
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	45.1	45.1	45.1
Rain Rate (mm/hr)	42.0	42.0	42.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	50.0W	50.0W	50.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-16.4	-16.4	-16.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 2 Orbital Location	46.0W	46.0W	46.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-16.4	-16.4	-16.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	36M0G7W	10M3G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	24575	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	30133	6771.1	75.4
Allocated Bandwidth(kHz)	36000	10300	100
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99
Minimum C/N, Rain (dB)	3.36	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	6.1	6.1	6.1
Earth Station Gain (dBi)	56.7	56.7	56.7
Earth Station Elevation Angle	20	20	20
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	1.8	2.4	2.4
Earth Station Gain (dBi)	44.8	47.5	47.5
Earth Station G/T (dB/K)	22.3	25.0	25.0
Earth Station Elevation Angle	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	75.6	62.7	42.5
Uplink Path Loss, Clear Sky (dB)	-207.2	-207.2	-207.2
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	11.3	11.3	11.3
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-74.8	-68.3	-48.8
Uplink C/N(dB)	33.5	27.0	26.4
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	44.8	36.3	16.1
Antenna Pointing Error (dB)	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-206.0	-206.0	-206.0
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	22.3	25.0	25.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-74.8	-68.3	-48.8
Downlink C / N(dB)	14.5	15.1	14.5
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	33.5	27.0	26.4
C/N Downlink (dB)	14.5	15.1	14.5
C/I Intermodulation (dB)	N/A	26.6	26.0
C/I Uplink Co-Channel (dB)*	27.0	28.7	28.7
C/I Downlink Co-Channel (dB)*	27.0	28.7	28.7
C/I Uplink Adjacent Satellite 1 (dB)	23.8	17.4	16.8
C/I Downlink Adjacent Satellite 1 (dB)	8.7	9.6	9.0
C/I Uplink Adjacent Satellite 2 (dB)	23.8	17.4	16.8
C/I Downlink Adjacent Satellite 2 (dB)	10.8	11.2	10.6
C/(N+I) Composite (dB)	5.7	5.8	5.2
Required System Margin (dB)	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	4.7	4.8	4.2
Minimum Required C/N (dB)	-3.4	-3.9	-3.0
Excess Link Margin (dB)	1.4	1.0	1.3
Number of Carriers	1.0	2.4	244.2
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-55.9	-62.3	-62.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.0	-28.0	-28.6

EXHIBIT 11: ADJACENT SATELLITE (48º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION			
Uplink Beam Name	KA	KA	KA
Uplink Frequency (GHz)	29.8	29.8	29.8
Uplink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR
Uplink Relative Contour Level (dB)	-5.0	-5.0	-5.0
Uplink Contour G/T (dB/K)	-10.3	-10.3	-10.3
Uplink SFD (dBW/m2)	-81.8	-81.8	-81.8
Rain Rate (mm/hr)	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	KA	KA	KA
Downlink Frequency (GHz)	20.0	20.0	20.0
Downlink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR
Downlink Relative Contour Level (dB)	-3.0	-3.0	-3.0
Downlink Contour EIRP (dBW)	36.9	36.9	36.9
Rain Rate (mm/hr)	42.0	42.0	42.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	50.0W	50.0W	50.0W
Uplink Power Density (dBW/Hz)	-56.5	-56.5	-56.5
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-18.9	-18.9	-18.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 1 Orbital Location	46.0W	46.0W	46.0W
Uplink Power Density (dBW/Hz)	-56.5	-56.5	-56.5
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-18.9	-18.9	-18.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	67M7G7W	10M3G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	60052.2	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	65163.0	6771.1	75.4
Allocated Bandwidth(kHz)	67711.0	10300	100
Minimum C/N, Clear Sky (dB)	3.4	3.87	2.99
Minimum C/N, Rain (dB)	3.4	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	9.0	9.0	9.0
Earth Station Gain (dBi)	67.1	67.1	67.1
Earth Station Elevation Angle	54.8	54.8	54.8
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	7.2	7.2	7.2
Earth Station Gain (dBi)	61.7	61.7	61.7
Earth Station G/T (dB/K)	39.3	39.3	39.3
Earth Station Elevation Angle	54.8	54.8	54.8
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	80.5	70.4	56.2
Uplink Path Loss, Clear Sky (dB)	213.2	213.2	213.2
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	-10.3	-10.3	-10.3
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-78.1	-68.3	-48.8
Uplink C/N(dB)	16.0	6.8	12.2
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	36.9	28.8	4.6
Antenna Pointing Error (dB)	-0.5	-0.5	-0.5
Downlink Path Loss, Clear Sky (dB)	209.8	209.8	209.8
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	39.3	39.3	39.3
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-78.1	-68.3	-48.8
Downlink C / N(dB)	16.0	17.7	13.1
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	7.1	6.8	12.2
C/N Downlink (dB)	16.0	17.7	13.1
C/I Intermodulation (dB)	N/A	16.7	16.7
C/I Uplink Co-Channel (dB)*	27.0	27.0	27.0
C/I Downlink Co-Channel (dB)*	27.0	27.0	27.0
C/I Uplink Adjacent Satellite 1 (dB)	37.7	37.4	42.8
C/I Downlink Adjacent Satellite 1 (dB)	18.2	19.9	15.3
C/I Uplink Adjacent Satellite 2 (dB)	38.3	38.0	43.4
C/I Downlink Adjacent Satellite 2 (dB)	18.7	20.4	15.8
C/(N+I) Composite (dB)	5.9	5.7	7.2
Required System Margin (dB)	-1.0	1.0	1.0
Net C/(N+I) Composite (dB)	4.9	4.7	6.2
Minimum Required C/N (dB)	3.4	3.9	3.0
Excess Link Margin (dB)	1.5	0.8	3.2
Number of Carriers	1.0	6.0	1688.0
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-64.7	-65.0	-59.6
Downlink EIRP Density At Beam Peak (dBW/Hz)	-38.2	-36.5	-41.1

EXHIBIT 12: ADJACENT SATELLITE (52º W.L) LINK BUDGETS

UPLINK BEAM INFORMATION			
Uplink Beam Name	SOUTH_AMERICA	SOUTH_AMERICA	SOUTH_AMERICA
Uplink Frequency (GHz)	6.175	6.175	6.175
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-6.0	-6.0	-6.0
Uplink Contour G/T (dB/K)	-3.9	-3.9	-3.9
Uplink SFD (dBW/m2)	-87.1	-80.1	-80.1
Rain Rate (mm/hr)	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	LINEAR	LINEAR	LINEAR
Downlink Frequency (GHz)	3.950	3.950	3.950
Downlink Beam Polarization	ANY	ANY	ANY
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	38.9	38.9	38.9
Rain Rate (mm/hr)	42.0	42.0	42.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	50.0W	50.0W	50.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-35.9	-35.9	-35.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 2 Orbital Location	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-35.9	-35.9	-35.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	112MG7W	10M3G7W	100KG7
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	76455	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	93747	6771.1	75.4
Allocated Bandwidth(kHz)	112000	10300	100
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99
Minimum C/N, Rain (dB)	3.36	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	8.1	6.1	6.1
Earth Station Gain (dBi)	52.8	49.4	49.4
Earth Station Elevation Angle	20	20	20
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	3.5	3.5	3.5
Earth Station Gain (dBi)	41.1	41.1	41.1
Earth Station G/T (dB/K)	21.0	21.0	21.0
Earth Station Elevation Angle	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	75.8	65.9	45.5
Uplink Path Loss, Clear Sky (dB)	-200.2	-200.2	-200.2
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.9	-3.9	-3.9
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-79.7	-68.3	-48.8
Uplink C/N(dB)	20.6	22.1	21.2
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	38.9	26.7	6.3
Antenna Pointing Error (dB)	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-196.3	-196.3	-196.3
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	21.0	21.0	21.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-79.7	-68.3	-48.8
Downlink C / N(dB)	11.9	11.2	10.3
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	20.6	22.1	21.2
C/N Downlink (dB)	11.9	11.2	10.3
C/I Intermodulation (dB)	N/A	20.2	19.3
C/I Uplink Co-Channel (dB)*	27.0	28.7	28.4
C/I Downlink Co-Channel (dB)*	27.0	28.7	28.4
C/I Uplink Adjacent Satellite 1 (dB)	10.8	12.3	11.5
C/I Downlink Adjacent Satellite 1 (dB)	11.4	10.7	9.8
C/I Uplink Adjacent Satellite 2 (dB)	10.8	12.3	11.5
C/I Downlink Adjacent Satellite 2 (dB)	16.2	15.4	14.5
C/(N+I) Composite (dB)	4.7	4.9	4.0
Required System Margin (dB)	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	3.7	3.9	3.0
Minimum Required C/N (dB)	-3.4	-3.9	-3.0
Excess Link Margin (dB)	.3	0.0	0.0
Number of Carriers	1.0	7.3	807.5
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-56.7	-51.8	-52.6
Downlink EIRP Density At Beam Peak (dBW/Hz)	-36.8	-37.6	-38.5

EXHIBIT 12: ADJACENT SATELLITE (52º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION					
Uplink Beam Name	SPOT	SPOT	SPOT	SPOT	SPOT
Uplink Frequency (GHz)	14.125	14.125	14.125	14.125	14.125
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	11.3	11.3	11.3	11.3	11.3
Uplink SFD (dBW/m2)	-83.3	-84.3	-84.3	-84.3	-84.3
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION					
Downlink Beam Name	SPOT	SPOT	SPOT	SPOT	SPOT
Downlink Frequency (GHz)	11.575	11.575	11.575	11.575	11.575
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	53.6	53.6	53.6	53.6	53.6
Rain Rate (mm/hr)	95.0	95.0	95.0	95.0	95.0
ADJACENT SATELLITE 1					
Satellite 1 Orbital Location	50.0W	50.0W	50.0W	50.0W	50.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
ADJACENT SATELLITE 2					
Satellite 2 Orbital Location	54.0W	54.0W	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0	0.0	0.0
CARRIER INFORMATION					
Carrier ID	62M5G7W	10M3G7W	100KG7W	1M45G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK	BPSK	BPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A	N/A	N/A
Information Rate(kbps)	42665	6000	64	512	128
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256	R1/2	R1/2
Occupied Bandwidth(kHz)	52314	6771.1	75.4	1229.0	307.0
Allocated Bandwidth(kHz)	62500	10300	100	1450.0	400.0
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99	3.4	3.4
Minimum C/N, Rain (dB)	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	2.4
Earth Station Gain (dBi)	56.8	56.8	56.8	56.8	48.9
Earth Station Elevation Angle	20	20	20	20	20
DOWNLINK EARTH STATION					
Earth Station Diameter (meters)	3.7	2.4	2.4	2.4	6.1
Earth Station Gain (dBi)	50.8	47.2	47.2	47.2	55.2
Earth Station G/T (dB/K)	28.3	24.7	24.7	24.7	32.8
Earth Station Elevation Angle	20	20	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE					
Uplink Earth Station EIRP (dBW)	67.3	60.2	39.9	52.0	43.9
Uplink Path Loss, Clear Sky (dB)	-207.4	-207.4	-207.4	-207.4	-207.4
Uplink Rain Attenuation	0.0	0.0	0.0	0.0	0.0
Satellite G/T(dB/K)	11.3	11.3	11.3	11.3	11.3
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-77.2	-68.3	-48.8	-60.9	-54.9
Uplink C/N(dB)	22.6	24.4	23.7	23.6	21.5
DOWNLINK PERFORMANCE					
Downlink EIRP per Carrier (dBW)	47.2	38.3	18.1	30.1	22.0
Antenna Pointing Error (dB)	-.5	-.5	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-205.7	-205.7	-205.7	-205.7	-205.7
Downlink Rain Attenuation	0.0	0.0	0.0	0.0	0.0
Earth Station G/T (dB/K)	28.3	24.7	24.7	24.7	32.8
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-77.2	-68.3	-48.8	-60.9	-54.9
Downlink C / N(dB)	20.7	17.2	16.4	16.3	22.4
COMPOSITE LINK PERFORMANCE					
C/N Uplink (dB)	22.6	24.4	23.7	23.6	21.5
C/N Downlink (dB)	20.7	17.2	16.4	16.3	22.4
C/I Intermodulation (dB)	N/A	22.6	21.9	21.7	19.7
C/I Uplink Co-Channel (dB)*	27.0	24.7	24.5	24.9	22.4
C/I Downlink Co-Channel (dB)*	27.0	24.7	24.5	24.9	22.4
C/I Uplink Adjacent Satellite 1 (dB)	13.1	14.9	14.2	14.1	12.0
C/I Downlink Adjacent Satellite 1 (dB)	19.2	15.4	14.6	14.5	21.0
C/I Uplink Adjacent Satellite 2 (dB)	13.1	14.9	14.2	14.1	12.0
C/I Downlink Adjacent Satellite 2 (dB)	20.2	16.9	16.2	16.1	21.6
C/(N+I) Composite (dB)	8.6	8.3	7.5	7.5	7.6
Required System Margin (dB)	-1.0	-1.0	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	7.6	7.3	6.5	6.5	6.6
Minimum Required C/N (dB)	-3.4	-3.9	-3.0	-3.4	-3.4
Excess Link Margin (dB)	4.3	3.4	3.6	3.1	3.2
Number of Carriers	1.0	6.1	625.0	43.1	156.3
CARRIER DENSITY LEVELS					
Uplink Power Density (dBW/Hz)	-66.7	-64.9	-65.6	-65.8	-59.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.0	-26.0	-26.7	-26.8	-28.9

EXHIBIT 12: ADJACENT SATELLITE (52º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION			
Uplink Beam Name	C_BAND	C_BAND	C_BAND
Uplink Frequency (GHz)	6.2875	6.2875	6.2875
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-10.0	-10.0	-10.0
Uplink Contour G/T (dB/K)	-3.9	-3.9	-3.9
Uplink SFD (dBW/m2)	-72.1	-75.1	-75.1
Rain Rate (mm/hr)	95.0	95.0	95.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	SPOT	SPOT	SPOT
Downlink Frequency (GHz)	11.950	11.950	11.950
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	53.6	53.6	53.6
Rain Rate (mm/hr)	95.0	95.0	95.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	50.0W	50.0W	50.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 2 Orbital Location	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-38.7	-38.7	-38.7
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-20.4	-20.4	-20.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	125MG7W	10M3G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	85329	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	104628	6771.1	75.4
Allocated Bandwidth(kHz)	125000	10300	100
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99
Minimum C/N, Rain (dB)	3.36	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	15.2	6.1	6.1
Earth Station Gain (dBi)	58.6	49.6	49.6
Earth Station Elevation Angle	20	20	20
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	1.8	1.8	1.8
Earth Station Gain (dBi)	44.8	44.8	44.8
Earth Station G/T (dB/K)	22.3	22.3	22.3
Earth Station Elevation Angle	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	81.6	69.4	49.1
Uplink Path Loss, Clear Sky (dB)	-200.4	-200.4	-200.4
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	-3.9	-3.9	-3.9
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-80.2	-68.3	-48.8
Uplink C/N(dB)	25.7	25.5	24.7
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	50.2	38.3	18.0
Antenna Pointing Error (dB)	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-205.9	-205.9	-205.9
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	22.3	22.3	22.3
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-80.2	-68.3	-48.8
Downlink C / N(dB)	14.5	14.5	13.7
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	25.7	25.5	24.7
C/N Downlink (dB)	14.5	14.5	13.7
C/I Intermodulation (dB)	N/A	25.6	24.8
C/I Uplink Co-Channel (dB)*	27.0	27.7	27.5
C/I Downlink Co-Channel (dB)*	27.0	27.7	27.5
C/I Uplink Adjacent Satellite 1 (dB)	12.1	11.8	11.0
C/I Downlink Adjacent Satellite 1 (dB)	12.6	12.6	11.9
C/I Uplink Adjacent Satellite 2 (dB)	12.1	11.8	11.0
C/I Downlink Adjacent Satellite 2 (dB)	14.7	14.7	14.0
C/(N+I) Composite (dB)	6.0	5.8	5.0
Required System Margin (dB)	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	5.0	4.8	4.0
Minimum Required C/N (dB)	-3.4	-3.9	-3.0
Excess Link Margin (dB)	1.6	.9	1.0
Number of Carriers	1.0	10.4	1117.9
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-57.2	-48.4	-49.2
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.0	-26.0	-26.7

EXHIBIT 12: ADJACENT SATELLITE (52º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION			
Uplink Beam Name	SPOT	SPOT	SPOT
Uplink Frequency (GHz)	13.875	13.875	13.875
Uplink Beam Polarization	LINEAR	LINEAR	LINEAR
Uplink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Uplink Contour G/T (dB/K)	11.3	11.3	11.3
Uplink SFD (dBW/m2)	-83.3	-88.3	-88.3
Rain Rate (mm/hr)	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	TRANS	TRANS	TRANS
Downlink Frequency (GHz)	12.010	12.010	12.010
Downlink Beam Polarization	LINEAR	LINEAR	LINEAR
Downlink Relative Contour Level (dB)	-4.0	-4.0	-4.0
Downlink Contour EIRP (dBW)	45.1	45.1	45.1
Rain Rate (mm/hr)	42.0	42.0	42.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	50.0W	50.0W	50.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-16.4	-16.4	-16.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 2 Orbital Location	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-45.0	-45.0	-45.0
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-16.4	-16.4	-16.4
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	36M0G7W	10M3G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	24575	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	30133	6771.1	75.4
Allocated Bandwidth(kHz)	36000	10300	100
Minimum C/N, Clear Sky (dB)	3.36	3.87	2.99
Minimum C/N, Rain (dB)	3.36	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	6.1	6.1	6.1
Earth Station Gain (dBi)	56.7	56.7	56.7
Earth Station Elevation Angle	20	20	20
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	1.8	2.4	2.4
Earth Station Gain (dBi)	44.8	47.5	47.5
Earth Station G/T (dB/K)	22.3	25.0	25.0
Earth Station Elevation Angle	20	20	20
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	75.6	62.7	42.5
Uplink Path Loss, Clear Sky (dB)	-207.2	-207.2	-207.2
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	11.3	11.3	11.3
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-74.8	-68.3	-48.8
Uplink C/N(dB)	33.5	27.0	26.4
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	44.8	36.3	16.1
Antenna Pointing Error (dB)	-.5	-.5	-.5
Downlink Path Loss, Clear Sky (dB)	-206.0	-206.0	-206.0
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	22.3	25.0	25.0
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-74.8	-68.3	-48.8
Downlink C / N(dB)	14.5	15.1	14.5
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	33.5	27.0	26.4
C/N Downlink (dB)	14.5	15.1	14.5
C/I Intermodulation (dB)	N/A	26.6	26.0
C/I Uplink Co-Channel (dB)*	27.0	28.7	28.7
C/I Downlink Co-Channel (dB)*	27.0	28.7	28.7
C/I Uplink Adjacent Satellite 1 (dB)	23.8	17.4	16.8
C/I Downlink Adjacent Satellite 1 (dB)	8.7	9.6	9.0
C/I Uplink Adjacent Satellite 2 (dB)	23.8	17.4	16.8
C/I Downlink Adjacent Satellite 2 (dB)	10.8	11.2	10.6
C/(N+I) Composite (dB)	5.7	5.8	5.2
Required System Margin (dB)	-1.0	-1.0	-1.0
Net C/(N+I) Composite (dB)	4.7	4.8	4.2
Minimum Required C/N (dB)	-3.4	-3.9	-3.0
Excess Link Margin (dB)	1.4	1.0	1.3
Number of Carriers	1.0	2.4	244.2
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-55.9	-62.3	-62.9
Downlink EIRP Density At Beam Peak (dBW/Hz)	-26.0	-28.0	-28.6

EXHIBIT 12: ADJACENT SATELLITE (52º W.L) LINK BUDGETS (continued)

UPLINK BEAM INFORMATION			
Uplink Beam Name	KA	KA	KA
Uplink Frequency (GHz)	29.8	29.8	29.8
Uplink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR
Uplink Relative Contour Level (dB)	-5.0	-5.0	-5.0
Uplink Contour G/T (dB/K)	-10.3	-10.3	-10.3
Uplink SFD (dBW/m2)	-81.8	-81.8	-81.8
Rain Rate (mm/hr)	42.0	42.0	42.0
DOWNLINK BEAM INFORMATION			
Downlink Beam Name	KA	KA	KA
Downlink Frequency (GHz)	20.0	20.0	20.0
Downlink Beam Polarization	CIRCULAR	CIRCULAR	CIRCULAR
Downlink Relative Contour Level (dB)	-3.0	-3.0	-3.0
Downlink Contour EIRP (dBW)	36.9	36.9	36.9
Rain Rate (mm/hr)	42.0	42.0	42.0
ADJACENT SATELLITE 1			
Satellite 1 Orbital Location	50.0W	50.0W	50.0W
Uplink Power Density (dBW/Hz)	-56.5	-56.5	-56.5
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-18.9	-18.9	-18.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
ADJACENT SATELLITE 2			
Satellite 1 Orbital Location	54.0W	54.0W	54.0W
Uplink Power Density (dBW/Hz)	-56.5	-56.5	-56.5
Uplink Polarization Advantage (dB)	0.0	0.0	0.0
Downlink EIRP Density (dBW/Hz)	-18.9	-18.9	-18.9
Downlink Polarization Advantage (dB)	0.0	0.0	0.0
CARRIER INFORMATION			
Carrier ID	67M7G7W	10M3G7W	100KG7W
Carrier Modulation	QPSK	QPSK	QPSK
Peak to Peak Bandwidth of EDS (MHz)	N/A	N/A	N/A
Information Rate(kbps)	60052.2	6000	64
Code Rate	1/2x188/204	1/2x188/204	1/2x239/256
Occupied Bandwidth(kHz)	65163.0	6771.1	75.4
Allocated Bandwidth(kHz)	67711.0	10300	100
Minimum C/N, Clear Sky (dB)	3.4	3.87	2.99
Minimum C/N, Rain (dB)	3.4	3.57	2.79
UPLINK EARTH STATION			
Earth Station Diameter (meters)	9.0	9.0	9.0
Earth Station Gain (dBi)	67.1	67.1	67.1
Earth Station Elevation Angle	54.8	54.8	54.8
DOWNLINK EARTH STATION			
Earth Station Diameter (meters)	7.2	7.2	7.2
Earth Station Gain (dBi)	61.7	61.7	61.7
Earth Station G/T (dB/K)	39.3	39.3	39.3
Earth Station Elevation Angle	54.8	54.8	54.8
LINK FADE TYPE	Clear Sky	Clear Sky	Clear Sky
UPLINK PERFORMANCE			
Uplink Earth Station EIRP (dBW)	80.5	70.4	56.2
Uplink Path Loss, Clear Sky (dB)	213.2	213.2	213.2
Uplink Rain Attenuation	0.0	0.0	0.0
Satellite G/T(dB/K)	-10.3	-10.3	-10.3
Boltzman Constant(dBW/K-Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-78.1	-68.3	-48.8
Uplink C/N(dB)	16.0	6.8	12.2
DOWNLINK PERFORMANCE			
Downlink EIRP per Carrier (dBW)	36.9	28.8	4.6
Antenna Pointing Error (dB)	-0.5	-0.5	-0.5
Downlink Path Loss, Clear Sky (dB)	209.8	209.8	209.8
Downlink Rain Attenuation	0.0	0.0	0.0
Earth Station G/T (dB/K)	39.3	39.3	39.3
Boltzman Constant(dBW / K - Hz)	228.6	228.6	228.6
Carrier Noise Bandwidth (dB-Hz)	-78.1	-68.3	-48.8
Downlink C / N(dB)	16.0	17.7	13.1
COMPOSITE LINK PERFORMANCE			
C/N Uplink (dB)	7.1	6.8	12.2
C/N Downlink (dB)	16.0	17.7	13.1
C/I Intermodulation (dB)	N/A	16.7	16.7
C/I Uplink Co-Channel (dB)*	27.0	27.0	27.0
C/I Downlink Co-Channel (dB)*	27.0	27.0	27.0
C/I Uplink Adjacent Satellite 1 (dB)	37.7	37.4	42.8
C/I Downlink Adjacent Satellite 1 (dB)	18.2	19.9	15.3
C/I Uplink Adjacent Satellite 2 (dB)	38.3	38.0	43.4
C/I Downlink Adjacent Satellite 2 (dB)	18.7	20.4	15.8
C/(N+I) Composite (dB)	5.9	5.7	7.2
Required System Margin (dB)	-1.0	1.0	1.0
Net C/(N+I) Composite (dB)	4.9	4.7	6.2
Minimum Required C/N (dB)	3.4	3.9	3.0
Excess Link Margin (dB)	1.5	0.8	3.2
Number of Carriers	1.0	6.0	1688.0
CARRIER DENSITY LEVELS			
Uplink Power Density (dBW/Hz)	-64.7	-65.0	-59.6
Downlink EIRP Density At Beam Peak (dBW/Hz)	-38.2	-36.5	-41.1