April 11, 2016

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: Supplement to Application to Launch and Operate Horizons 3e at 169.0° E.L.
Call Sign S2947; File No. SAT-LOA-20151202-00080

Dear Ms. Dortch:

Horizons-3 License LLC, an indirect wholly owned subsidiary of Intelsat S.A. (together "Intelsat"), hereby supplements the above referenced application. Specifically, Intelsat has revised Exhibits 4, 5, and 6 of the Engineering Statement to include the Maximum Saturation Flux Density and the Maximum Beam Peak EIRP Density per beam. In addition, Intelsat herein requests waiver of the requirement in Section 25.140 to provide an interference analysis for the Appendix 30B frequencies – 10850-10950 MHz and 11200-11450 MHz.[1]

Under Section 1.3 of the Commission's rules, the Commission has authority to waive its rules "for good cause shown."[2] Good cause exists if "special circumstances warrant a deviation from the general rule and such deviation will serve the public interest" better than adherence to the general rule.[3] In determining whether waiver is appropriate, the Commission should "take into account considerations of hardship, equity, or more effective implementation of overall policy."[4]

Waiver is warranted here because there is no risk of interference into any other co-frequency U.S. Appendix 30B operations or allotments. At 169.0° E.L., Horizons 3e will be at least 32 degrees from any U.S. Appendix 30B filing covering the 10850-10950 MHz frequencies. This will provide sufficient orbital separation to ensure that Horizons 3e does not significantly degrade the interference environment for any other U.S. Appendix 30B location. Accordingly, an interference analysis is unnecessary.

Intelsat additionally has revised Section 7 of the Horizons 3e Engineering Statement to note that, for the above stated reasons, it has not included an interference analysis for the Appendix 30B frequencies. For the Commission's convenience, Intelsat attaches herewith a revised Engineering Statement that replaces the prior filed versions.

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[1] 47 C.F.R. § 25.140.

[2] 47 C.F.R. § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969).

[3] *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

[4] *WAIT Radio*, 418 F.2d at 1159.

Please direct any questions to the undersigned at (703) 559-7848.

Sincerely,

/s/ Susan H. Crandall

Susan H. Crandall
Associate General Counsel
Intelsat Corporation

cc: Kathyrn Medley
Stephen Duall
Jay Whaley
Cindy Spiers

Engineering Statement

1 Introduction

Horizons-3 License LLC ("Intelsat") seeks authority in this application to launch and operate a C/Ku-band satellite to be known as Horizons 3e at the 169.0° E.L. orbital location. Horizons 3e will replace Intelsat 805, which currently operates at 169.0° E.L.,[1] and Intelsat 8, which is expected to begin drifting from its current location of 169.0° E.L. to 168.9° E.L. in early April 2016.[2]

The characteristics of the Horizons 3e spacecraft, as well as its compliance with the various provisions of Part 25 of the Federal Communication Commission's ("FCC or "Commission") rules, are provided in the remainder of this Engineering Statement.

2 Spacecraft Overview

Horizons 3e is a Boeing model 702MP spacecraft that is capable of operating in C-band and Ku-band frequencies listed in the table below.

C-band:	Uplink:	5925 – 6425 MHz
	Downlink:	3700 – 4200 MHz
Ku-band:	Uplink:	12920 – 13250 MHz
		13750 – 14500 MHz
	Downlink:	10850 – 11700 MHz
		12200 – 12750 MHz

The spacecraft provides the following coverage:

C-band:	Global Beam - Global Coverage
Ku-band:	Spot Beams - Global Coverage

2.1 Spacecraft Characteristics

[1] *See Policy Branch Information; Actions Taken*, Report No. SAT-01139, File No. SAT-MOD-20151020-00072 (Feb. 26, 2016) (Public Notice).

[2] *See Policy Branch Information; Actions Taken*, Report No. SAT-001139, File No. SAT-MOD-20151021-00073 (Feb. 26, 2016) (Public Notice).

Horizons 3e is a three-axis stabilized type spacecraft that has a rectangular outer body structure. Horizons 3e utilizes two deployable solar array wings and a number of deployable and non-deployable antennas.

The Horizons 3e spacecraft is composed 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) Communications

These subsystems maintain the correct position and attitude of the spacecraft, ensure that all internal units are maintained within the required temperature range, and ensure 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 Horizons 3e provides mechanical support for all subsystems. The structure 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.

2.2 Communication Subsystem

Horizons 3e provides active communication channels at C-band and Ku-band frequencies. The C-band payload employs channels having bandwidths of 36 MHz and 108 MHz. The Ku-band payload employs channels having bandwidths of 72 MHz, 81 MHz, 108 MHz, and 224 MHz. The Horizons 3e frequency and polarization plan is provided in Schedule S. Due to the extensive number of channel combinations, the uplink channels and downlink channels have been listed separately in the Schedule S S10 "Space Station Transponders" table.

Horizons 3e utilizes a multiple spot-beam architecture in Ku-band. In this architecture each spot beam has an identical design. Therefore, the coverage contours and performance characteristics for only a single representative spot beam are provided in the Schedule S. The latitude and longitude of each spot beam's maximum gain point on the Earth is provided in Exhibit 2 in conformance with Section 25.114(c)(4)(vii)(B) of the Commission's rules. Additionally, Intelsat has included the Schedule S beam designation for all beams in Exhibit 3.

Exhibits 4 and 5 provide the beam parameters for the Horizons 3e uplink and downlink beams, respectively.

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.

Horizons 3e can be commanded through the use of command channels centered at the frequencies 5925.5 MHz and 6424.5 MHz. The spacecraft telemetry is received through two of four telemetry channels centered at the frequencies 4197.75 MHz, 4198.25 MHz, 4198.75 MHz and 4199.75 MHz.

The coverage patterns of the on-station command and telemetry beams are provided in the Schedule S in the format prescribed in Section 25.114(c)(4)(vi)(A) of the Commission's rules. The beams used for orbital maneuvers and on-station emergencies as well as the on-station beams have gain contours that vary by less than 8 dB across the surface of the Earth, and accordingly the gain at 8 dB below the peak falls beyond the edge of the Earth. Therefore, pursuant to Section 25.114(c)(4)(vi)(A) of the Commission's rules, contours for these beams are not required to be provided and the associated GXT files have not been included in Schedule S. The Horizons 3e command and telemetry subsystem performance is summarized in Exhibit 6.

2.4 Uplink Power Control Subsystem

Horizons 3e utilizes three ULPC channels. The ULPC channel center frequencies are 4199.75 MHz, 11451.0 MHz, and 12200.25 MHz.

The coverage patterns of the ULPC beams have gain contours that vary by less than 8 dB across the surface of the Earth, and accordingly the gain at 8 dB below the peak falls beyond the edge of the Earth. Therefore, pursuant to Section 25.114(c)(4)(vi)(A) of the Commission's rules, contours for these beams are not required to be provided and the associated GXT files have not been included in Schedule S. The Horizons 3e ULPC subsystem performance is summarized in Exhibit 6.

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 will comply 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.).

3 Services and Emission Designators

Horizons 3e will be a general purpose communications satellite and has been designed to support various services offered within Intelsat's satellite system. Depending upon the needs of the users, the transponders on Horizons 3e can accommodate television, radio, voice, and data communications. Typical communication services include:

a) Compressed digital video

b) High speed digital data

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

Emission designators and allocated bandwidths for representative communication carriers are provided in Schedule S.

4 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 are contained in Section 25.208 of the Commission's rules. With respect to the frequency bands 10850 – 10950 MHz, 11200 – 11450 MHz and 12200 - 12750 MHz, there are PFD limits specified in No. 21.16 of the ITU Radio Regulations.

The maximum PFD levels for the Horizons 3e transmissions were calculated for the 3700 – 4200 MHz, 10850 – 11700 MHz, and 12200 – 12750 MHz. The PFD levels were also calculated for the Horizons 3e telemetry and ULPC carriers. The results are provided in Schedule S and show that the downlink power flux density levels of the Horizons 3e carriers do not exceed the limits specified in Sections 25.208 of the Commission's rules or the limits specified in No. 21.16 of the ITU Radio Regulations.

5 Emission Compliance

Section 25.202(e) of the Commission's rules requires that the carrier frequency of each space station transmitter be maintained within 0.002% of the reference frequency. Horizons 3e is designed to be compliant with the provisions of this rule.

Intelsat will comply with the provisions of Section 25.202(f) of the Commission's rules with regard to Horizons 3e emissions.

6 Orbital Location

Intelsat requests that it be assigned the 169.0° E.L. orbital location for Horizons 3e. The 169.0° E.L. location satisfies Horizons 3e requirements for optimizing coverage, elevation angles, and service availability. Additionally, the location also ensures that the maximum operational, economic, and public interest benefits will be derived.

7 Interference Analysis

The impact of the proposed Horizons 3e emissions on adjacent satellites located at 167.0° E.L. and 171.0º E.L. was analyzed. The interference analysis was conducted for a number of representative carriers at C-band and Ku-band frequencies. It was assumed that there were hypothetical satellites having the same operating characteristics as Horizons 3e at the 167.0° E.L. [3] and 171.0° E.L. orbital locations.

For the satellite located at 167.0º E.L., it was assumed that the adjacent satellites were Horizons 3e, located at 169.0º E.L., and a hypothetical satellite having the same operating characteristics as Horizons 3e located at 165.0º E.L.[4] For the satellite located at 171.0º E.L., it was assumed that the adjacent satellites were Horizons 3e, located at 169.0º E.L., and a hypothetical satellite having the same operating characteristics as Horizons 3e located at 173.0º E.L.[5]

Other assumptions made for the interference 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) 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-band frequencies rain attenuation predictions are derived using Recommendation ITU-R P.618.
e) At Ku-band frequencies, increase in noise temperature of the receiving earth station due to rain is taken into account.

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[3] At the time of submission of this application, Luch-5A is located at 167° E.L. Its frequency plan overlaps Intelsat 805 in the 12500 – 12750 MHz band. Luch-5A was not included in the interference analysis because it is not licensed by the United States nor does it have U.S. market access. Intelsat is coordinating the use of the overlapping frequencies pursuant to ITU rules.

[4] At the time of submission of this application, Intelsat 19 is located at 166°E.L. Intelsat 19 is not included in the interference analysis because it is less than 2° away from 167° E.L., and so its use in the interference analysis would be inconsistent with a two-degree orbital separation environment and policy.

[5] Other satellites in the vicinity of 167° E.L. and 171° E.L. were not included in the interference analysis because they are not licensed by the United States nor do they have U.S. market access. Intelsat is coordinating the use of the overlapping frequencies pursuant to ITU rules.

f) For the cases where the transponder operates in a multi-carrier mode, the effects due to intermodulation interference are taken into account.

All assumptions and the results of the analysis are documented in Exhibits 7, 8, and 9. The minimum orbital separation between the Horizons 3e planned orbital location and any other United States Appendix 30B allotments, assignments, or operations in the 10850 – 10950 MHz and 11200 – 11450 MHz bands is 32 degrees. The orbital separation will provide sufficient isolation to ensure that Horizons 3e will not cause significant degradation to the interference environment of any other United States Appendix 30B plan locations, and therefore a separate interference analysis for the Appendix 30B allotments, assignments, and operations is not provided.

The Horizons 3e 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 potentially affected adjacent satellite operators. In any case, pursuant to the results in Exhibits 7, 8, and 9, the uplink power density of the Horizons 3e digital carriers will not exceed the levels specified below:

a) 5925 – 6425 MHz: -42.0 dBW/Hz
b) 12920 – 14500 MHz: -42.0 dBW/Hz

The downlink EIRP density of Horizons 3e digital carriers will not exceed the levels specified below:

a) 3700 – 4200 MHz: -32.0 dBW/Hz
b) 10850 – 11700 MHz -20.0 dBW/Hz
c) 12200 – 12750 MHz -20.0 dBW/Hz

8 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.

8.1 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.

8.2 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.

8.3 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 potential exception of co-location during a traffic transition period, Horizons 3e 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.

Horizons 3e will replace Intelsat 8 and Intelsat 805 at 169.0° E.L. These satellites may be nominally collocated during transfer of traffic and Intelsat will ensure that sufficient spatial separation is achieved between these two satellites through the use of orbit eccentricity and inclination offsets and thus minimize the risk of collision. 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 Horizons 3e. Intelsat is also not aware of any system with an overlapping station-keeping volume with Horizons 3e that is the subject of an ITU filing and that is either in orbit or progressing towards launch.

8.4 Post Mission Disposal

At the end of the mission, Intelsat will dispose of the spacecraft by moving it to a minimum altitude 300 kilometers above the geostationary arc. Intelsat has reserved 2.0 kilograms of xenon for this purpose. The reserved fuel figure was determined by the spacecraft manufacturer and provided for in the propellant budget. This figure was calculated 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.[6] For reference, the effective

[6] *Mitigation of Orbital Debris*, Second Report and Order, IB Docket No. 02-54, FCC 04-130 (rel. June 21, 2004).

area to mass ratio (Cr*A/M) of the Horizons 3e spacecraft is 0.045 m^2/kg, resulting in a minimum perigee disposal altitude under the Inter-Agency Space Debris Coordination Committee formula of at most 280 kilometers above the geostationary arc. Accordingly, the Horizons 3e planned disposal orbit complies with the FCC's rules.

9 ITU Filings

Horizons 3e's operations in the 3700 – 4200 MHz, 5925 – 6425 MHz, 12250 – 12750 MHz, and 14000 – 14500 MHz bands have been coordinated under the Administration of the United States' International Telecommunication Union ("ITU") filing USASAT-60J.

Horizons 3e's operations in the 11450 – 11700 MHz band have been coordinated under the Administration of the United States' International Telecommunication Union ("ITU") filing USASAT-55L.

Horizons 3e's operations in the 13750 – 14000 MHz band have been coordinated under the Administration of the United States' International Telecommunication Union ("ITU") filing USASAT-55V.

Intelsat currently has no United States filing with the ITU for a satellite network that specifies operation in the frequency bands 12750 – 13250 MHz, 10700 – 10950 MHz, 10950 – 11200 MHz, and 11200 – 11450 MHz at the nominal orbital location of 169° E.L. Intelsat will submit to the Commission Appendix 4 information for a new satellite network that utilizes these frequency bands at the nominal orbital longitude of 169° E.L., to be forwarded to the ITU. Intelsat will also include Appendix 4 information for the 11450 – 11700 MHz frequency band.

10 TC&R Control Earth Stations

Intelsat will conduct TC&R operations through one or more of the following earth stations: Fillmore, CA; Paumalu, Hawaii; or Mingenew, Australia. Additionally, Intelsat is capable of remotely controlling Horizons 3e from its facilities in McLean, VA or Long Beach, CA.

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/ Candice DeVane	April 8, 2016
Candice DeVane Intelsat Manager, Spectrum Policy	Date

EXHIBIT 1

SUMMARY OF SPACECRAFT CHARACTERISTICS

General Spacecraft Characteristics	
Spacecraft Name	Horizons 3e
Orbital Location	60.0° E.L.
Spacecraft Manufacturer	Boeing
Spacecraft Model	702 MP
Spacecraft Type	3-axis stabilized
Spacecraft Expected Lifetime	15 years
Eclipse Capability	100%
Station-keeping	
North-South	±0.05°
East-West	±0.05°
Propulsion Type	Xenon Ion Propulsion Subsystem

EXHIBIT 2
SPOT BEAM LOCATIONS

Beam Designation	Longitude (°E)	Latitude (°N)
Ku-Band Beams		
Ku Spot P1	183.9	-24.0
Ku Spot P2	146.4	-19.5
Ku Spot P3	206.6	4.5
Ku Spot P4	169.0	8.5
Ku Spot P5	130.1	13.3
Ku Spot P6	199.3	41.5
Ku Spot P7	147.5	48.0

EXHIBIT 3
Beam Polarizations and GXT File Names

	Schedule S Beam GXT File Names							
	Linear Polarization				Circular Polarization			
Beam Designation	**Uplink (H-Pol.)**	**Uplink (V-Pol.)**	**Downlink (H-Pol.)**	**Downlink (V-Pol.)**	**Uplink (LHCP)**	**Uplink (RHCP)**	**Downlink (LHCP)**	**Downlink (RHCP)**
C-Band Beams								
Global Beam	----	----	----	----	GLR*	GRR*	GLT*	GRT*
ULPC1	----	----	CLHD*	----	----	----	----	----
Telemetry Global	----	----	TGHD*		----	----	----	----
Command Global	----	CGVU*	----	----	----	----	----	----
Telemetry Pipe	----	----	----	----	----	----	TPLD*	----
Telemetry Hemi	----	----	----	----	----	----	THLD*	----
Command Pipe	----	----	----	----	CPLU*	----	----	----
Command Hemi	----	----	----	----	CHLU*	----	----	----
Ku-Band Beams								
Spot P	PHR	PVR	PHT	PVT	----	----	----	----
ULPC2	----	----	----	----	----	----	----	KLRD*
ULPC3	----	----	----	----	----	----	KLLD*	----

** GXT files are not provided for the indicated beams because their -8 dB gain contours extend beyond the edge of the Earth.*

EXHIBIT 4
COMMUNICATION SUBSYSTEM UPLINK BEAM PARAMETERS

Beam Name	Ku-Band Horizontal	Ku-Band Vertical
Schedule S Beam ID	PHR	PVR
Frequency Band (MHz)	12920 – 13250 & 13750 - 14500	12920 – 13250 & 13750 - 14500
Polarization	Horizontal	Vertical
Beam Peak Gain (dBi)	29.6	29.6
G/T (dB/K)	4.0	4.0
Minimum SFD-- (dBW/m^2)	-106.0	-106.0
Maximum SFD-- (dBW/m^2)	-86.0	-86.0
Beam Name	C-Band Global LHCP	C-Band Global RHCP
Schedule S Beam ID	GLR*	GRR*
Frequency Band (MHz)	5925 - 6425	5925 - 6425
Polarization	LHCP	RHCP
Beam Peak Gain (dBi)	21.1	21.1
G/T (dB/K)	-6.0	-6.0
Minimum SFD-- (dBW/m^2)	-102.0	-102.0
Maximum SFD-- (dBW/m^2)	-82.0	-82.0

** GXT files are not provided for the indicated beams because their -8 dB gain contours extend beyond the edge of the Earth.*

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

EXHIBIT 5

COMMUNICATION SUBSYSTEM DOWNLINK BEAM PARAMETERS

Beam Name	Ku-Band Horizontal	Ku-Band Vertical
Schedule S Beam ID	PHT	PVT
Frequency Band (MHz)	10850 – 11700 & 12200 - 12750	10850 – 11700 & 12200 - 12750
Polarization	Horizontal	Vertical
Peak Antenna Gain (dBi)	27.8	27.8
EIRP (dBW)	49.5	49.5
Maximum Beam Peak EIRP Density (dBW/4kHz)	16.0	16.0
Beam Name	C-Band Global LHCP	C-Band Global RHCP
Schedule S Beam ID	GLT*	GRT*
Frequency Band (MHz)	3700 - 4200	3700 - 4200
Polarization	LHCP	RHCP
Peak Antenna Gain (dBi)	21.0	21.0
EIRP (dBW)	36.0	36.0
Maximum Beam Peak EIRP Density (dBW/4kHz)	4.0	4.0

** GXT files are not provided for the indicated beams because their -8 dB gain contours extend beyond the edge of the Earth.*

Note: *RHCP - Right Hand Circular Polarization, LHCP - Left Hand Circular Polarization*

EXHIBIT 6
TC&R SUBSYSTEM CHARACTERISTICS

Beam Name	Command – Global Hemi	Command – Aft Pipe	Command – Global Horn
Description	Transfer Orbit & On-station Contingency	Transfer Orbit & On-station Contingency	On-Station
Schedule S Beam ID	CHLU*	CPLU*	CGVU*
Frequencies (MHz)	5925.5	6425.5	6425.5
Polarization	LHCP	LHCP	Vertical
Beam Peak Gain (dBi)	4.8	1.2	20.8
Beam Name	Telemetry – Global Hemi	Telemetry – Aft Pipe	Telemetry – Global Horn
Schedule S Beam ID	THLD*	TPLD*	TGHD*
Frequencies (MHz)	4197.75, 4198.25, 4198.75, 4199.25	4197.75, 4198.25, 4198.75, 4199.25	4197.75, 4198.25, 4198.75, 4199.25
Polarization	LHCP	LHCP	Horizontal
Peak Antenna Gain (dBi)	3.3	7.6	20.1
Maximum EIRP (dBW)	11.9	15.4	13.7
Maximum Beam Peak EIRP Density (dBW/4kHz)	-6.1	-2.6	-4.3
Beam Name	ULPC 1	ULPC 2	ULPC 3
Schedule S Beam ID	CLHD*	KLRD*	KLLD*
Frequencies (MHz)	4199.75	11451.0	12200.25
Polarization	Horizontal	RHCP	RHCP
Peak Antenna Gain (dBi)	11.5	18.1	19.4
Maximum EIRP (dBW)	9.4	16.0	16.8
Maximum Beam Peak EIRP Density (dBW/4kHz)	4.4	12.0	13.8

** GXT files are not provided for the indicated beams because their -8 dB gain contours extend beyond the edge of the Earth.*

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

EXHIBIT 7
HYPOTHETICAL 167°E SATELLITE INTERFERENCE ANALYSIS

UPLINK BEAM INFORMATION				
Uplink Beam Name	**PVR/PHR**	**PVR/PHR**	**PVR/PHR**	**PVR/PHR**
Uplink Frequency (MHz)	**14271**	**14271**	**14271**	**14271**
Uplink Beam Polarization	**Vertical/Horizontal**	**Vertical/Horizontal**	**Vertical/Horizontal**	**Vertical/Horizontal**
Uplink Beam Peak G/T (dB/K)	**4.0**	**4.0**	**4.0**	**4.0**
Uplink Beam Peak SFD (dBW/m2)	**-89.2**	**-89.2**	**-89.2**	**-89.2**
Uplink Relative Contour Level (dB)	**-8.5**	**-8.5**	**-8.5**	**-8.5**
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	**PHT/PVT**	**PHT/PVT**	**PHT/PVT**	**PHT/PVT**
Downlink Frequency (MHz)	**11371**	**11371**	**11371**	**11371**
Downlink Beam Polarization	**Horizontal/Vertical**	**Horizontal/Vertical**	**Horizontal/Vertical**	**Horizontal/Vertical**
Downlink Beam Peak EIRP (dBW)	**49.5**	**49.5**	**49.5**	**49.5**
Downlink Relative Contour Level (dB)	**-8.5**	**-8.5**	**-8.5**	**-8.5**
ADJACENT SATELLITE 1				
Satellite Name	**Horizons 3e**	**Horizons 3e**	**Horizons 3e**	**Horizons 3e**
Orbital Location	**169E**	**169E**	**169E**	**169E**
Uplink Power Density (dBW/Hz)	**-42.0**	**-42.0**	**-42.0**	**-42.0**
Beam Peak Downlink EIRP Density (dBW/Hz)	**-20.0**	**-20.0**	**-20.0**	**-20.0**
ADJACENT SATELLITE 2				
Satellite Name	**Hypothetical 165E**	**Hypothetical 165E**	**Hypothetical 165E**	**Hypothetical 165E**
Orbital Location	**165E**	**165E**	**165E**	**165E**
Uplink Power Density (dBW/Hz)	**-50**	**-50**	**-50.0**	**-50.0**
Beam Peak Downlink EIRP Density (dBW/Hz)	**-26.0**	**-26.0**	**-26.0**	**-26.0**
CARRIER INFORMATION				
Carrier ID	**36M0G7W**	**8M25G7W**	**1M73G7W**	**382KG7W**
Carrier Modulation	**QPSK**	**QPSK**	**QPSK**	**QPSK**
Information Rate(kbps)	**36860**	**8448**	**1024**	**256**
Code Rate	**3/4x188/204**	**3/4**	**1/2**	**1/2**
Occupied Bandwidth(kHz)	**26664.7**	**6111.3**	**1284**	**273**
Allocated Bandwidth(kHz)	**36000**	**8250.5**	**1733**	**382**
Minimum C/N, Rain (dB)	**7.3**	**7.3**	**1.8**	**1.2**
UPLINK EARTH STATION				
Earth Station Diameter (meters)	**6.5**	**4.0**	**2.4**	**2.4**
Earth Station Gain (dBi)	**57.4**	**53.1**	**48.7**	**48.7**
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	**6.5**	**6.5**	**4.0**	**2.4**
Earth Station Gain (dBi)	**55.6**	**55.6**	**51.4**	**47.0**
Earth Station G/T (dB/K)	**34.0**	**34.0**	**29.0**	**25.0**
COMPOSITE LINK PERFORMANCE				
C/N Thermal Uplink (dB)	**18.2**	**16.6**	**14.5**	**14.1**
Uplink Interference C/I (dB)	**29.1**	**30.8**	**25.0**	**30.7**
Uplink Adjacent Satellite C/I (dB)	**14.3**	**12.7**	**10.6**	**10.2**
Intermodulation C/IM (dB)	**----**	**35.2**	**32.0**	**33.4**
Downlink Thermal C/N (dB)	**18.9**	**16.9**	**9.7**	**5.3**
Downlink Interference C/I (dB)	**28.4**	**26.3**	**20.1**	**24.0**
Downlink Adjacent Satellite C/I (dB)	**24.0**	**22.3**	**15.9**	**11.1**
Subtotal C/N (dB)	**11.4**	**9.8**	**5.7**	**2.9**
Antenna Mispointing and Other Losses (dB)	**0.3**	**0.3**	**0.3**	**0.3**
Total C/N (dB)	**11.1**	**9.5**	**5.4**	**2.6**
Minimum Required C/N (dB)	**7.3**	**7.3**	**1.8**	**1.2**
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	**-55.6**	**-52.8**	**-50.6**	**-51.0**
Downlink EIRP Density At Beam Peak (dBW/Hz)	**-30.3**	**-31.9**	**-34.1**	**-34.5**

UPLINK BEAM INFORMATION				
Uplink Beam Name	**GLR/GRR**	**GLR/GRR**	**GLR/GRR**	**GLR/GRR**
Uplink Frequency (MHz)	**6145**	**6145**	**6145**	**6145**
Uplink Beam Polarization	**LHCP/RHCP**	**LHCP/RHCP**	**LHCP/RHCP**	**LHCP/RHCP**
Uplink Beam Peak G/T (dB/K)	**-6.0**	**-6.0**	**-6.0**	**-6.0**
Uplink Beam Peak SFD (dBW/m2)	**-82.2**	**-82.2**	**-82.2**	**-82.2**
Uplink Relative Contour Level (dB)	**-1.0**	**-1.0**	**-1.0**	**-1.0**
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	**GRT / GLT**	**GRT / GLT**	**GRT / GLT**	**GRT / GLT**
Downlink Frequency (MHz)	**3920**	**3920**	**3920**	**3920**
Downlink Beam Polarization	**RHCP/LHCP**	**RHCP/LHCP**	**RHCP/LHCP**	**RHCP/LHCP**
Downlink Beam Peak EIRP (dBW)	**36.0**	**36.0**	**36.0**	**36.0**
Downlink Relative Contour Level (dB)	**-3.5**	**-3.5**	**-3.5**	**-3.5**
ADJACENT SATELLITE 1				
Satellite Name	**Horizons 3e**	**Horizons 3e**	**Horizons 3e**	**Horizons 3e**
Orbital Location	**169E**	**169E**	**169E**	**169E**
Uplink Power Density (dBW/Hz)	**-38.7**	**-38.7**	**-38.7**	**-38.7**
Beam Peak Downlink EIRP Density (dBW/Hz)	**-32.0**	**-32.0**	**-32.0**	**-32.0**
ADJACENT SATELLITE 2				
Satellite Name	**Hypothetical 165E**	**Hypothetical 165E**	**Hypothetical 165E**	**Hypothetical 165E**
Orbital Location	**165E**	**165E**	**165E**	**165E**
Uplink Power Density (dBW/Hz)	**-38.7**	**-38.7**	**-38.7**	**-38.7**
Beam Peak Downlink EIRP Density (dBW/Hz)	**-32.0**	**-32.0**	**-32.0**	**-32.0**
CARRIER INFORMATION				
Carrier ID	**36M0G7W**	**8M25G7W**	**1M73G7W**	**382KG7W**
Carrier Modulation	**QPSK**	**QPSK**	**QPSK**	**QPSK**
Information Rate(kbps)	**36860**	**8448**	**1024**	**256**
Code Rate	**3/4x188/204**	**3/4**	**1/2**	**1/2**
Occupied Bandwidth(kHz)	**24500**	**6111.3**	**1284**	**273**
Allocated Bandwidth(kHz)	**36000**	**8250.5**	**1733**	**382**
Minimum C/N, Rain (dB)	**7.3**	**7.3**	**1.8**	**4.6**
UPLINK EARTH STATION				
Earth Station Diameter (meters)	**7.5**	**5.5**	**5.5**	**2.4**
Earth Station Gain (dBi)	**51.2**	**48.6**	**48.6**	**41.4**
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	**5.5**	**7.5**	**5.0**	**5.5**
Earth Station Gain (dBi)	**45.4**	**48.1**	**44.6**	**45.4**
Earth Station G/T (dB/K)	**27.0**	**29.0**	**22.7**	**27.0**
COMPOSITE LINK PERFORMANCE				
C/N Thermal Uplink (dB)	**24.3**	**23.7**	**23.1**	**24.1**
Uplink Interference C/I (dB)	**30.2**	**30.1**	**30.4**	**53.1**
Uplink Adjacent Satellite C/I (dB)	**17.2**	**17.2**	**16.6**	**17.6**
Intermodulation C/IM (dB)	**----**	**20.1**	**19.9**	**22.1**
Downlink Thermal C/N (dB)	**17.2**	**16.2**	**9.1**	**14.3**
Downlink Interference C/I (dB)	**26.8**	**25.3**	**21.7**	**26.1**
Downlink Adjacent Satellite C/I (dB)	**13.8**	**13.5**	**9.1**	**10.9**
Subtotal C/N (dB)	**10.6**	**9.8**	**5.4**	**8.3**
Antenna Mispointing and Other Losses (dB)	**0.3**	**0.3**	**0.3**	**0.3**
Total C/N (dB)	**10.3**	**9.5**	**5.1**	**7.6**
Minimum Required C/N (dB)	**7.3**	**7.3**	**1.8**	**4.6**
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	**-47.8**	**-43.8**	**-44.4**	**-39.9**
Downlink EIRP Density At Beam Peak (dBW/Hz)	**-39.9**	**-41.3**	**-42.1**	**-41.4**

HYPOTHETICAL 171°E SATELLITE INTERFERENCE ANALYSIS

UPLINK BEAM INFORMATION				
Uplink Beam Name	**PVR/PHR**	**PVR/PHR**	**PVR/PHR**	**PVR/PHR**
Uplink Frequency (MHz)	**14271**	**14271**	**14271**	**14271**
Uplink Beam Polarization	**Vertical/Horizontal**	**Vertical/Horizontal**	**Vertical/Horizontal**	**Vertical/Horizontal**
Uplink Beam Peak G/T (dB/K)	**4.0**	**4.0**	**4.0**	**4.0**
Uplink Beam Peak SFD (dBW/m2)	**-89.2**	**-89.2**	**-89.2**	**-89.2**
Uplink Relative Contour Level (dB)	**-8.5**	**-8.5**	**-8.5**	**-8.5**
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	**PHT/PVT**	**PHT/PVT**	**PHT/PVT**	**PHT/PVT**
Downlink Frequency (MHz)	**11371**	**11371**	**11371**	**11371**
Downlink Beam Polarization	**Horizontal/Vertical**	**Horizontal/Vertical**	**Horizontal/Vertical**	**Horizontal/Vertical**
Downlink Beam Peak EIRP (dBW)	**49.5**	**49.5**	**49.5**	**49.5**
Downlink Relative Contour Level (dB)	**-8.5**	**-8.5**	**-8.5**	**-8.5**
ADJACENT SATELLITE 1				
Satellite Name	**Horizons 3e**	**Horizons 3e**	**Horizons 3e**	**Horizons 3e**
Orbital Location	**169E**	**169E**	**169E**	**169E**
Uplink Power Density (dBW/Hz)	**-42.0**	**-42.0**	**-42.0**	**-42.0**
Beam Peak Downlink EIRP Density (dBW/Hz)	**-20.0**	**-20.0**	**-20.0**	**-20.0**
ADJACENT SATELLITE 2				
Satellite Name	**Hypothetical 173E**	**Hypothetical 173E**	**Hypothetical 173E**	**Hypothetical 173E**
Orbital Location	**173E**	**173E**	**173E**	**173E**
Uplink Power Density (dBW/Hz)	**-50**	**-50**	**-50.0**	**-50.0**
Beam Peak Downlink EIRP Density (dBW/Hz)	**-26.0**	**-26.0**	**-26.0**	**-26.0**
CARRIER INFORMATION				
Carrier ID	**36M0G7W**	**8M25G7W**	**1M73G7W**	**382KG7W**
Carrier Modulation	**QPSK**	**QPSK**	**QPSK**	**QPSK**
Information Rate(kbps)	**36860**	**8448**	**1024**	**256**
Code Rate	**3/4x188/204**	**3/4**	**1/2**	**1/2**
Occupied Bandwidth(kHz)	**26664.7**	**6111.3**	**1284**	**273**
Allocated Bandwidth(kHz)	**36000**	**8250.5**	**1733**	**382**
Minimum C/N, Rain (dB)	**7.3**	**7.3**	**1.8**	**1.2**
UPLINK EARTH STATION				
Earth Station Diameter (meters)	**6.5**	**4.0**	**2.4**	**2.4**
Earth Station Gain (dBi)	**57.4**	**53.1**	**48.7**	**48.7**
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	**6.5**	**6.5**	**4.0**	**2.4**
Earth Station Gain (dBi)	**55.6**	**55.6**	**51.4**	**47.0**
Earth Station G/T (dB/K)	**34.0**	**34.0**	**29.0**	**25.0**
COMPOSITE LINK PERFORMANCE				
C/N Thermal Uplink (dB)	**18.2**	**16.6**	**14.5**	**14.1**
Uplink Interference C/I (dB)	**29.1**	**30.8**	**25.0**	**30.7**
Uplink Adjacent Satellite C/I (dB)	**14.3**	**12.7**	**10.6**	**10.2**
Intermodulation C/IM (dB)	**----**	**35.2**	**32.0**	**33.4**
Downlink Thermal C/N (dB)	**18.9**	**16.9**	**9.7**	**5.3**
Downlink Interference C/I (dB)	**28.4**	**26.3**	**20.1**	**24.0**
Downlink Adjacent Satellite C/I (dB)	**24.0**	**22.3**	**15.9**	**11.1**
Subtotal C/N (dB)	**11.4**	**9.8**	**5.7**	**2.9**
Antenna Mispointing and Other Losses (dB)	**0.3**	**0.3**	**0.3**	**0.3**
Total C/N (dB)	**11.1**	**9.5**	**5.4**	**2.6**
Minimum Required C/N (dB)	**7.3**	**7.3**	**1.8**	**1.2**
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	**-55.6**	**-52.8**	**-50.6**	**-51.0**
Downlink EIRP Density At Beam Peak (dBW/Hz)	**-30.3**	**-31.9**	**-34.1**	**-34.5**

UPLINK BEAM INFORMATION				
Uplink Beam Name	**GLR/GRR**	**GLR/GRR**	**GLR/GRR**	**GLR/GRR**
Uplink Frequency (MHz)	**6145**	**6145**	**6145**	**6145**
Uplink Beam Polarization	**LHCP/RHCP**	**LHCP/RHCP**	**LHCP/RHCP**	**LHCP/RHCP**
Uplink Beam Peak G/T (dB/K)	**-6.0**	**-6.0**	**-6.0**	**-6.0**
Uplink Beam Peak SFD (dBW/m2)	**-82.2**	**-82.2**	**-82.2**	**-82.2**
Uplink Relative Contour Level (dB)	**-1.0**	**-1.0**	**-1.0**	**-1.0**
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	**GRT / GLT**	**GRT / GLT**	**GRT / GLT**	**GRT / GLT**
Downlink Frequency (MHz)	**3920**	**3920**	**3920**	**3920**
Downlink Beam Polarization	**RHCP/LHCP**	**RHCP/LHCP**	**RHCP/LHCP**	**RHCP/LHCP**
Downlink Beam Peak EIRP (dBW)	**36.0**	**36.0**	**36.0**	**36.0**
Downlink Relative Contour Level (dB)	**-3.5**	**-3.5**	**-3.5**	**-3.5**
ADJACENT SATELLITE 1				
Satellite Name	**Horizons 3e**	**Horizons 3e**	**Horizons 3e**	**Horizons 3e**
Orbital Location	**169E**	**169E**	**169E**	**169E**
Uplink Power Density (dBW/Hz)	**-38.7**	**-38.7**	**-38.7**	**-38.7**
Beam Peak Downlink EIRP Density (dBW/Hz)	**-32.0**	**-32.0**	**-32.0**	**-32.0**
ADJACENT SATELLITE 2				
Satellite Name	**Hypothetical 173E**	**Hypothetical 173E**	**Hypothetical 173E**	**Hypothetical 173E**
Orbital Location	**173E**	**173E**	**173E**	**173E**
Uplink Power Density (dBW/Hz)	**-38.7**	**-38.7**	**-38.7**	**-38.7**
Beam Peak Downlink EIRP Density (dBW/Hz)	**-32.0**	**-32.0**	**-32.0**	**-32.0**
CARRIER INFORMATION				
Carrier ID	**36M0G7W**	**8M25G7W**	**1M73G7W**	**382KG7W**
Carrier Modulation	**QPSK**	**QPSK**	**QPSK**	**QPSK**
Information Rate(kbps)	**36860**	**8448**	**1024**	**256**
Code Rate	**3/4x188/204**	**3/4**	**1/2**	**1/2**
Occupied Bandwidth(kHz)	**24500**	**6111.3**	**1284**	**273**
Allocated Bandwidth(kHz)	**36000**	**8250.5**	**1733**	**382**
Minimum C/N, Rain (dB)	**7.3**	**7.3**	**1.8**	**4.6**
UPLINK EARTH STATION				
Earth Station Diameter (meters)	**7.5**	**5.5**	**5.5**	**2.4**
Earth Station Gain (dBi)	**51.2**	**48.6**	**48.6**	**41.4**
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	**5.5**	**7.5**	**5.0**	**5.5**
Earth Station Gain (dBi)	**45.4**	**48.1**	**44.6**	**45.4**
Earth Station G/T (dB/K)	**27.0**	**29.0**	**22.7**	**27.0**
COMPOSITE LINK PERFORMANCE				
C/N Thermal Uplink (dB)	**24.3**	**23.7**	**23.1**	**24.1**
Uplink Interference C/I (dB)	**30.2**	**30.1**	**30.4**	**53.1**
Uplink Adjacent Satellite C/I (dB)	**17.2**	**17.2**	**16.6**	**17.6**
Intermodulation C/IM (dB)	**----**	**20.1**	**19.9**	**22.1**
Downlink Thermal C/N (dB)	**17.2**	**16.2**	**9.1**	**14.3**
Downlink Interference C/I (dB)	**26.8**	**25.3**	**21.7**	**26.1**
Downlink Adjacent Satellite C/I (dB)	**13.8**	**13.5**	**9.1**	**10.9**
Subtotal C/N (dB)	**10.6**	**9.8**	**5.4**	**8.3**
Antenna Mispointing and Other Losses (dB)	**0.3**	**0.3**	**0.3**	**0.3**
Total C/N (dB)	**10.3**	**9.5**	**5.1**	**7.6**
Minimum Required C/N (dB)	**7.3**	**7.3**	**1.8**	**4.6**
CARRIER DENSITY LEVELS				
Uplink Power Density (dBW/Hz)	**-47.8**	**-43.8**	**-44.4**	**-39.9**
Downlink EIRP Density At Beam Peak (dBW/Hz)	**-39.9**	**-41.3**	**-42.1**	**-41.4**