Engineering Statement

1 Introduction

Intelsat License LLC ("Intelsat") seeks authority in this application to launch and operate the Intelsat 15R satellite at the 85.0° E.L. orbital location. Intelsat 15R will replace Intelsat 15 (Call Sign S2789), currently operating at 85.15° E.L., and Horizon 2 (Call Sign S2423), currently operating at 84.85°E.L. The characteristics of the Intelsat 15R spacecraft, as well as its compliance with the various provisions of Part 25 of the Federal Communications Commission's ("FCC" or "Commission") rules, are provided in the remainder of this Engineering Statement.

2 Spacecraft Overview

Intelsat 15R is a Boeing model 702MP spacecraft that is capable of operating in the Ku-band and Ka-band frequencies listed in the table below.

Direction	Frequency
Uplink	13750-14000 MHz
	14000-14500 MHz
	17300-17800 MHz
	27500-30000 MHz
Downlink	10950-11200 MHz
	11450-11700 MHz
	11700-12200 MHz
	12500-12750 MHz
	17800-20200 MHz

The spacecraft provides the following coverage:

Frequency band	Beam	Coverage
Ku-Band	ME	Middle East
	Russia	Russia
	WIOR	West Indian Ocean Region
	EIOR	East Indian Ocean Region
	Steerable Spot	Visible Earth (2.5° spot)
	Global	Global
Ka-Band	Japan Spots (6)	Japan
	Korea Beam	Korea
	Steerable Spots (6)	Visible Earth
	Global	Global

2.1 Spacecraft Characteristics

Intelsat 15R is a three-axis stabilized type spacecraft that has a rectangular outer body structure. Intelsat 15R utilizes two deployable solar array wings and a number of deployable and non-deployable antennas.

The Intelsat 15R 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 Intelsat 15R 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.

2.2 Communication Subsystem

Intelsat 15R utilizes active communication channels at Ku-band and Ka-band frequencies. The Ku-band payload utilizes channels with bandwidths of 36 MHz, 54 MHz, and 72 MHz. The Ka-band payload utilizes channels having bandwidths of 450 MHz and 500 MHz. The Intelsat 15R frequency and polarization plan is provided in Schedule S.

The performance characteristics of all Intelsat 15R beams are provided in Schedule S. The coverage contours of all Intelsat 15R beams except for those with a -8.0 dB contour extending beyond the edge of the Earth are provided with Schedule S.

Intelsat 15R is equipped with five Ku-band fixed beams including a global beam plus one Ku-band steerable spot beam that will be initially centered over Thailand.

Intelsat 15R is equipped with seven fixed Ka-band spot beams and six steerable Ka-band spot beams. Because the thirteen spot beams are identical, the coverage contours and performance characteristics for a single representative spot beam are provided in Schedule S. The latitude and longitude of each Ka-band spot beam's maximum gain point on the Earth is provided in Exhibit 1 in conformance with Section 25.114(c)(4)(vii)(B) of the Commission's rules. For the steerable spot beams, the coordinates provided are the planned initial coordinates. Additionally, Intelsat has included the Schedule S beam designation for all beams in Exhibit 2.

The steerable beams may be pointed toward any location on the earth that is visible from 85.0° E.L., and the coverage contours will remain identical in gain and roll-off regardless of pointing. Intelsat will ensure that transmissions in this beam are consistent with the Commission's rules and the International Telecommunication Union ("ITU") Radio Regulations as they pertain to the Fixed Satellite Service.

Exhibits 3 and 4 provide the beam parameters for the Intelsat 15R downlink and uplink beams, respectively.

All Ku- and Ka-band communication subsystems are intra-connected and inter-connected, allowing any frequency combination for the uplink and downlink connectivity at sub-beam level. Additionally, a beam can have multiple connections to several other beams by splitting the channels into sub-channels with variable sizes.

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.

The Intelsat 15R command and telemetry channel frequencies and performance are shown in Exhibit 5. The coverage patterns of the command and telemetry 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 FCC's rules, contours for these beams are not required to be provided and the associated GXT files have not been included in Schedule S.

2.4 Uplink Power Control Subsystem

Intelsat 15R utilizes one Ku-band channel and one Ka-band channel for uplink power control ("ULPC"), antenna tracking, and ranging.

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 Intelsat 15R ULPC subsystem performance is summarized in Exhibit 5.

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

Intelsat 15R 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 Intelsat 15R can accommodate television, radio, voice, and data communications. Typical communication services include:

a) compressed digital video;

b) high speed digital data; and

c) digital single channel per carrier ("SCPC") data channels.

4 Power Flux Density

The power flux density ("PFD") limits for space stations operating in the bands 10950-11200 MHz, 11450-11700 MHz, and 18300-19700 MHz are specified in Section 25.208 of the Commission's rules. The PFD in the 18600-18800 MHz band is further limited to -118 dBW/200 MHz by 47 C.F.R. §2.106, US255.[1] Also, §25.138(a)(6) of the Commission's rules specify a PFD limit of -118 dBW/m^2/MHz for space stations operating in the 18300-18800 MHz and 19700-20200 MHz bands. The Commission's rules do not specify a PFD limit in the bands 12500-12750 MHz, 17800-18300 MHz, and 18800-19300 MHz; however there are limits specified in No. 21.16 of the ITU Radio Regulations.[2] The maximum PFD levels for the Intelsat 15R transmissions were calculated for each of those bands, and the results are provided in Schedule S showing that downlink PFD levels of the Intelsat 15R carriers do not exceed the limits specified in Sections 25.208 or Section 2.106 of the Commission's rules or the limits specified in No. 21.16 of the ITU Radio Regulations.

The calculation of maximum PFD levels for the 17800-20200 MHz band is provided in Exhibit 6. Appendix 5 of the ITU Radio Regulations specifies PFD limits to protect receiving stations of the terrestrial service in 11700-12200 MHz in Region 2. However, Intelsat 15R will only operate in Regions 1 and 3 from the 85.0° E.L. orbital location.

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. Intelsat 15R 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 Intelsat 15R emissions.

6 Orbital Location

Intelsat requests that it be assigned the 85.0° E.L. orbital location for Intelsat 15R. The 85.0° E.L. location satisfies Intelsat 15R requirements for optimizing coverage, elevation

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[1] Section 2.106, footnote US255 further limits the PFD at the surface of the earth in the 200 MHz wide band 18600-18800 MHz to -95 dBW/m^2 for all arrival angles. That level is equivalent to -118 dBW/m^2/MHz.

[2] FCC 17-122 Report and Order and Further Notice of Proposed rulemaking released on September 27, 2017 extended the PFD levels also for the frequency bands 17800-18300 MHz and 18800-19300 MHz as specified in No. 21.16 of the ITU Radio Regulations. This revision will be effective 30 days after publication of the NGSO Report and Order in the Federal Register.

angles, and service availability. Additionally, the location also ensures that the maximum operational, economic, and public interest benefits will be achieved.

7 ITU Filings

Intelsat 15R's operations in the 13750-14500 MHz band has been notified under the Administration of the United States' ITU filing USASAT-55N.

Intelsat 15R's operations in the 14000-14500 MHz, 10950-11200 MHz, and 11450-11700 MHz bands have been notified under the Administration of the United States' ITU filings INTELSAT KFOS 85E, INTELSAT6 85E, INTELSAT7 85E, INTELSAT8 85E, and USASAT-55N.

Intelsat 15R's operations in the 11700-12200 MHz band has been notified under the Administration of the United States' ITU filing USABSS-29.

Intelsat 15R's operations in the 12500-12750 MHz band has been notified under the Administration of the United States' ITU filings INTELSAT KFOS 85E, INTELSAT7 85E, INTELSAT8 85E, and USASAT-55N.

Intelsat 15R's operations in the 17800-20200 MHz, 27500-29100 MHz, and 29250-30000 MHz bands will use the ITU filing of the Administration of Papua New Guinea NEW DAWN 34.

In addition, Intelsat is also submitting ITU filings for AP30A frequencies and Ka-band frequencies together with this application.

8 Coordination Statement and Certifications

The downlink EIRP density of Intelsat 15R's transmissions in the conventional and extended Ku-band will not exceed 14 dBW/4kHz for digital transmissions or 17 dBW/4kHz for analog transmissions, and associated uplink transmissions will not exceed applicable EIRP density envelopes in Sections 25.218, 25.222(a)(1), 25.226(a)(1), or 25.227(a)(1) unless the non-routine uplink and/or downlink operation is coordinated with operators of authorized co-frequency space stations at assigned locations within six degrees of Intelsat 15R at 85.0° E.L.

In accordance with footnote US334, Intelsat will complete coordination with all affected federal FSS systems operating in the 17.8-20.2 GHz band, as required.

PFD at the Earth's surface produced by emissions from a space station in the conventional Ka-band, 18300–18800 MHz and 19700–20200 MHz for all conditions, including clear sky, and for all methods of modulation shall not exceed a level of -118 dBW/m^2/MHz, and in addition will not exceed the limits specified in § 25.208(d). The associated uplink transmissions will not exceed applicable EIRP density envelopes in Sections 25.138 unless the non-routine operation is coordinated with operators of

authorized co-frequency space stations at assigned locations within six degrees of Intelsat 15R at 85.0° E.L.

PFD at the Earth's surface produced by emissions from a space station in the 17800-18300 MHz and 18800-19700 MHz for all conditions, including clear sky, and for all methods of modulation shall not exceed a level of -118 dBW/m^2/MHz, and in addition will not exceed the limits specified in Sections 25.208(c) and 25.208(e). The associated uplink transmissions will not exceed applicable EIRP density envelopes in Sections 25.138 unless the non-routine operation is coordinated with operators of authorized co-frequency space stations at assigned locations within six degrees of Intelsat 15R at 85.0° E.L.

Intelsat 15R will also operate in several bands addressed by Section 25.140(a)(3)(v). Because there are no previously authorized co-frequency space stations at a location two degrees away, Section 9 provides an interference analysis demonstrating compatibility with a hypothetical co-frequency space station two degrees away with the same receiving and transmitting characteristics as the proposed space station.

Further, Intelsat will operate Intelsat 15R in compliance with all existing or future coordination agreements for 85.0° E.L.

9 Interference Analysis

The compatibility of the proposed Intelsat 15R emissions in the 12500-12750 MHz, 17800-18300 MHz, 18800-19700 MHz, 27500-28350 MHz, and 28600-29250 MHz bands with adjacent satellites located at 83.0° E.L. and 87°E.L. was analyzed. The interference analysis was conducted for a representative carrier in each beam type.

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's rules.
b) All transmitting and receiving earth stations have a cross-polarization isolation value of at least 30 dB within their main beam lobe.
c) Rain attenuation predictions are derived using Recommendation ITU-R P.618.
d) Increase in noise temperature of the receiving earth station due to rain is taken into account.
e) 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 Exhibit 7. Each of the link budgets demonstrate positive link margin for the representative carrier in the presence of an identical carrier operating via a satellite two degrees away.

10 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.

10.1 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.

10.2 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.

10.3 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, Intelsat 15R 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 15R will replace Intelsat 15 and Horizon 2 at 85.0° E.L. These satellites may be nominally collocated during transfer of traffic and Intelsat will ensure that sufficient spatial separation is achieved between these 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 Intelsat 15R. Intelsat is also not aware of any system with an overlapping station-keeping volume with Intelsat 15R that is the subject of an ITU filing and that is either in orbit or progressing towards launch.

10.4 Post Mission Disposal

At the end of the mission, Intelsat will dispose of the spacecraft by moving it to an altitude of at least 280 kilometers above the geostationary arc. Intelsat has reserved 2.0 kilograms of xenon for that purpose.

In calculating the disposal orbit, Intelsat has used simplifying assumptions as permitted under the Commission's Orbital Debris Report and Order.[3] The effective area to mass ratio (Cr*A/M) of the Intelsat 15R spacecraft is 0.045 m^2/kg, resulting in a minimum perigee disposal altitude under the Inter-Agency Space Debris Coordination Committee formula of 280 kilometers above the geostationary arc. Accordingly, the Intelsat 15R planned disposal orbit complies with the FCC's rules.

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.

11 TC&R Control Earth Stations

Intelsat will conduct TC&R operations through one or more of the following earth stations: Kumsan, Korea, Fucino, Italy, or Mingenew, Australia. Additionally, Intelsat is capable of remotely controlling Intelsat 15R from its facilities in McLean, VA or Long Beach, CA.

[3] *Mitigation of Orbital Debris, Second Report and Order, 19 FCC Rcd 11567 (2004).*

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/ Alexander Gerdenitsch	October 27, 2017
Alexander Gerdenitsch Intelsat Manager, Spectrum Policy, Americas	Date

EXHIBIT 1
SPOT BEAM BORESIGHT LOCATIONS

Beam Designation	Latitude (°N)	Longitude (°E)
Ka-band Beams		
*Japan Fixed Spot 1	32.07	130.19
Japan Fixed Spot 2	37.59	140.63
Japan Fixed Spot 3	27.77	130.93
Japan Fixed Spot 4	32.79	139.95
Japan Fixed Spot 5	43.04	143.5
*Korea Fixed Spot	36.71	130.08
*Steerable Spot 1	-31.18	115.33
Steerable Spot 2	-13.42	133.94
*Steerable Spot 3	-27	28.74
Steerable Spot 4	12.99	51.48
*Steerable Spot 5	24.58	54.69
Steerable Spot 6	27.24	65.07
Steerable Spot 7	77.34	131.89

* *indicates beam is expected to serve at least one gateway earth station.*

EXHIBIT 2
Beam Polarizations and GXT File Names

	Schedule S Beam GXT File Names							
	Linear Polarization				Circular Polarization			
Beam Description	**Uplink (H-Pol.)**	**Uplink (V-Pol.)**	**Downlink (H-Pol.)**	**Downlink (V-Pol.)**	**Uplink (LHCP)**	**Uplink (RHCP)**	**Downlink (LHCP)**	**Downlink (RHCP)**
Ku-Band Beams[4]								
ME	MEHU	MEVU	MEHD MEHE	MEVD MEVE	----	----	----	----
Russia	RUHU RUHV	RUVU RUVV	RUHD	RUVD	----	----	----	----
WIOR	----	WIVU	WIHD WIHE	----	----	----	----	----
EIOR	----	EIVU	EIHD	----	----	----	----	----
Steerable Spot	SKHU	SKVU	SKHD	SKVD	----	----	----	----
ULPC	----	----	----	----	----	----	----	KLRD*
Telemetry WCA	----	----	----	----	----	----	----	TLMR*
Telemetry Global	----	----	----	TLMV*	----	----	----	----
Command Omni	----	----	----	----	CMDL*	----	----	----
Command Global	CMDH*	----	----	----	----	----	----	----
Ka-Band Beams								
Japan	----	----	----	----	JSLU	JSRU	JSLD	JSRD
Korea	----	----	----	----	KSLU	KSRU	KSLD	KSRD
Steerable Spot	----	----	----	----	SSLU	SSRU	SSLD	SSRD
ULPC	----	----	----	ALVD*	----	----	----	

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

[4] Two beam designators within a cell indicates that the beam includes two disjoint frequency ranges.

EXHIBIT 3

COMMUNICATION SUBSYSTEM DOWNLINK BEAM PARAMETERS

Schedule S Beam ID	Beam Name	Frequency Band (MHz)	Polarization	Maximum EIRP (dBW)	Maximum EIRP Density (dBW/4 kHz)	Maximum EIRP Density (dBW/Hz)
MEHD	Middle East	10950-11200 MHz	Horizontal	55 0	15 9	-20 1
MEHE	Middle East	11970--12200 MHz	Horizontal	55	15 9	-20 1
MEVD	Middle East	10950-11200 MHz	Vertical	55 0	15 9	-20 1
MEVE	Middle East	12500-12750 MHz	Vertical	55 0	15 9	-20 1
RUVD	Russia	12500-12750 MHz	Vertical	52	12 9	-23 1
RUHD	Russia	11700-12200 MHz	Horizontal	52	12 9	-23 1
EIHD	East Indian Ocean Region	12500-12750 MHz	Horizontal	46 9	7 8	-28 2
WIHD	West Indian Ocean Region	11970--12200 MHz	Horizontal	50 3	11 2	-24 8
WIHE	West Indian Ocean Region	12500-12750 MHz	Horizontal	50 3	11 2	-24 8
SKVD	Steerable Spot Beam	11450-12200 MHz	Vertical	57	17 9	-18 1
SKHD	Steerable Spot Beam	10950-11200 MHz	Horizontal	57	17 9	-18 1
JSLD	Japan Fixed Spot (Six)	17804-20170 MHz	LHCP	60 5	20 0	-16 0
JSRD	Japan Fixed Spot (Six)	17804-20170 MHz	RHCP	60 5	20 0	-16 0
KSLD	Korea Fixed spot	17804-20170 MHz	LHCP	60 5	20 0	-16 0
KSRD	Korea Fixed spot	17804-20170 MHz	RHCP	60 5	20	-16
SSLD	Steerable Spot (Six)	17804-20170 MHz	LHCP	60 5	20	-16
SSRD	Steerable Spot (Six)	17804-20170 MHz	RHCP	60 5	20	-16

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

EXHIBIT 4

COMMUNICATION SUBSYSTEM UPLINK BEAM PARAMETERS

Schedule S Beam ID	Beam Name	Frequency Band (MHz)	Polarization	Beam Peak G/T (dB/K)	Maximum Beam Peak SFD (dBW/m^2)	Minimum Beam Peak SFD (dBW/m^2)
MEHU	Middle East	13750-14500 MHz	Horizontal	8 5	-87 3	-123 3
MEVU	Middle East	13750-14500 MHz	Vertical	8 5	-87 3	-123 3
RUHU	Russia	13750-14500 MHz	Horizontal	3 0	-84 1	-120 1
RUVU	Russia	13750-14500 MHz	Vertical	3 0	-84 1	-120 1
RUHV	Russia	17300-17800 MHz	Horizontal	3	-84 1	-120 1
RUVV	Russia	17300-17800 MHz	Vertical	3	-84 1	-120 1
SKHU	Steerable Spot Beam	13750-14500 MHz	Horizontal	12	-88	-124
SKVU	Steerable Spot Beam	13750-14000 MHz	Vertical	12	-88	-124
EIVU	East Indian Ocean Region	14000-14250 MHz	Vertical	2 5	-88 2	-124 2
WIVU	West Indian Ocean Region	14000-14500 MHz	Vertical	3 7	-88 4	-124 4
JSLU	Japan Fixed Spot (Six)	27504-29970 MHz	LHCP	15 8	-76 9	-101 9
JSRU	Japan Fixed Spot (Six)	27504-29970 MHz	RHCP	15 8	-76 9	-101 9
KSLU	Korea Fixed spot	27504-29970 MHz	LHCP	15 8	-76 9	-101 9
KSRU	Korea Fixed spot	27504-29970 MHz	RHCP	15 8	-76 9	-101 9
SSLU	Steerable Spot (Six)	27504-29970 MHz	LHCP	15 8	-76 9	-101 9
SSRU	Steerable Spot (Six)	27504-29970 MHz	RHCP	15 8	-76 9	-101 9

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

EXHIBIT 5
TC&R SUBSYSTEM CHARACTERISTICS

Beam Name	Command Global	Command Omni
Schedule S Beam ID	CMDH	CMDL
Center Frequencies (MHz)	14002	14004.5
Occupied Band (MHz)	14001.5-14005.0 MHz	
Command Carrier Bandwidth (MHz)	1.0	
Polarization	Horizontal	LHCP
Peak Flux Density at Command Threshold (dBW/m^2-Hz)	-103.9	-88.5

Beam Name	Telemetry WCA	Telemetry Global
Schedule S Beam ID	TLMR	TLMV
Frequencies (MHz)	11090 MHz and 11092 MHz	
Polarization	RHCP	Vertical
Maximum Channel EIRP (dBW)	12.5	20.5
Maximum Beam Peak EIRP Density (dBW/4kHz)	-6.3	1.7
Maximum Beam Peak EIRP Density (dBW/Hz)	-42.3	-34.3

Beam Name	Ku-band ULPC	Ka-band ULPC
Schedule S Beam ID	KLRD	ALVD
Frequencies (MHz)	11188 MHz	20180 MHz
Polarization	RHCP	Vertical
Maximum Channel EIRP (dBW)	11.0	12.0
Maximum Beam Peak EIRP Density (dBW/4kHz)	3.0	4.0
Maximum Beam Peak EIRP Density (dBW/Hz)	-33.0	-32.0

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

EXHIBIT 6
PFD Calculations for the 17800-20200 MHz Band

Ka band Spot Beams						
Elevation Angle (degrees)	5.0	10.0	15.0	20.0	25.0	90.0
Peak EIRP Density (dBW/Hz)	-16.0	-16.0	-16.0	-16.0	-16.0	-16.0
Spreading Loss (dB/m^2)	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/MHz)	-119.3	-119.2	-119.0	-118.9	-118.8	-118.1
Part 2.106 Footnote US255 Limit	-118.0	-118.0	-118.0	-118.0	-118.0	-118.0
Margin (dB)	1.3	1.2	1.0	0.9	0.8	0.1

Ka band Global Beam						
Elevation Angle (degrees)	5.0	10.0	15.0	20.0	25.0	90.0
Peak EIRP Density (dBW/Hz)	-32.0	-32.0	-32.0	-32.0	-32.0	-32.0
Spreading Loss (dB/m^2)	163.3	163.2	163.0	162.9	162.8	162.1
Maximum EIRP Spectral Density (dBW/m^2/MHz)	-135.3	-135.2	-135.0	-134.9	-134.8	-134.1
Part 2.106 Footnote US255 Limit	-118.0	-118.0	-118.0	-118.0	-118.0	-118.0
Margin (dB)	17.3	17.2	17.0	16.9	16.8	16.1

EXHIBIT 7

INTERFERENCE ANALYSIS:

Effect of Hypothetical Satellites 83°E.L and 87°E.L on Intelsat 15R

Band: 12500-12750 MHz; Beam: Russia

UPLINK BEAM INFORMATION				
Uplink Beam Name	RUHU	RUHU	RUHU	RUHU
Uplink Frequency (MHz)	13750-14500	13750-14500	13750-14500	13750-14500
Uplink Beam Polarization	Horizontal	Horizontal	Horizontal	Horizontal
Uplink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Uplink Contour G/T (dB/K)	3.0	3.0	3.0	3.0
Uplink SFD (dBW/m²)	-89.5	-89.5	-89.5	-89.5
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	RUVD	RUVD	RUVD	RUVD
Downlink Frequency (MHz)	12500-12750	12500-12750	12500-12750	12500-12750
Downlink Beam Polarization	Vertical	Vertical	Vertical	Vertical
Downlink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Downlink Contour EIRP (dBW)	49.0	49.0	49.0	49.0
ADJACENT SATELLITE 1				
Orbital Location	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE
Uplink Power Density (dBW/Hz)	-50.0	-50.0	-50.0	-50.0
Downlink EIRP Density (dBWHz)	-22.0	-22.0	-22.0	-22.0
CARRIER INFORMATION				
Emission Designation	36M0G7W	8M25G7W	1M73G7W	382KG7W
Information Rate (kbps)	36860.0	8448.0	1024.0	256.0
Carrier Modulation	QPSK	QPSK	BPSK	BPSK
Code Rate	0.8	0.8	0.5	0.5
Occupied Bandwidth (kHz)	26665	6111	1284	273
Allocated Bandwidth (kHz)	36000	8251	1733	382
Minimum C/N, Rain (dB)	7.30	7.30	1.80	1.20
UPLINK EARTH STATION				
Earth Station Diameter (meters)	2.4	2.4	2.4	2.4
Earth Station Gain (dBi)	49.1	49.1	49.1	49.1
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	1.11	1.11	0.89	0.86
Earth Station Gain (dBi)	41.5	41.5	39.5	39.3
Earth Station G/T (dB/K)	21.1	21.1	19.2	18.9
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	19.4	19.4	19.4	19.4
C/N Downlink (dB)	16.8	16.8	14.8	14.6
C/I Other links (Co-channel & IM)	16.0	16.0	16.0	16.0
C/I Uplink Adjacent Satellite 1 (dB)	27.7	27.7	27.7	27.7
C/I Downlink Adjacent Satellite 1 (dB)	13.4	13.4	6.1	5.5
C/I Uplink Adjacent Satellite 2 (dB)	27.7	27.7	27.7	27.7
C/I Downlink Adjacent Satellite 2 (dB)	15.6	15.6	7.5	6.7
C/(N+I) Composite (dB)	8.7	8.7	3.0	2.4
Required System Margin (dB)	1.1	1.1	1.1	1.1
Minimum Required C/N (dB)	7.3	7.3	1.8	1.2
Excess Link Margin (dB)	0.3	0.3	0.1	0.1
Number of Carriers	1	4	20	94

INTERFERENCE ANALYSIS:
Effect of Hypothetical Satellites 83°E.L and 87°E.L on Intelsat 15R
Band: 12500-12750 MHz; Beam: East Indian Ocean

UPLINK BEAM INFORMATION				
Uplink Beam Name	EIVU	EIVU	EIVU	EIVU
Uplink Frequency (MHz)	14000-14250	14000-14250	14000-14250	14000-14250
Uplink Beam Polarization	Vertical	Vertical	Vertical	Vertical
Uplink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Uplink Contour G/T (dB/K)	2.5	2.5	2.5	2.5
Uplink SFD (dBW/m²)	-88.9	-88.9	-88.9	-88.9
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	EIHD	EIHD	EIHD	EIHD
Downlink Frequency (MHz)	12500-12750	12500-12750	12500-12750	12500-12750
Downlink Beam Polarization	Horizontal	Horizontal	Horizontal	Horizontal
Downlink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Downlink Contour EIRP (dBW)	43.9	43.9	43.9	43.9
ADJACENT SATELLITE 1				
Orbital Location	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE
Uplink Power Density (dBW/Hz)	-50.0	-50.0	-50.0	-50.0
Downlink EIRP Density (dBWHz)	-22.0	-22.0	-22.0	-22.0
CARRIER INFORMATION				
Emission Designation	36M0G7W	8M25G7W	1M73G7W	382KG7W
Information Rate (kbps)	36860.0	8448.0	1024.0	256.0
Carrier Modulation	QPSK	QPSK	BPSK	BPSK
Code Rate	0.8	0.8	0.5	0.5
Occupied Bandwidth (kHz)	26665	6111	1284	273
Allocated Bandwidth (kHz)	36000	8251	1733	382
Minimum C/N, Rain (dB)	7.30	7.30	1.80	1.20
UPLINK EARTH STATION				
Earth Station Diameter (meters)	2.4	2.4	2.4	2.4
Earth Station Gain (dBi)	49.1	49.1	49.1	49.1
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	2.30	2.30	1.13	1.10
Earth Station Gain (dBi)	47.8	47.8	41.6	41.4
Earth Station G/T (dB/K)	27.5	27.5	21.3	21.1
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	16.3	16.3	16.3	16.3
C/N Downlink (dB)	18.6	18.6	12.5	12.2
C/I Other links (Co-channel & IM)	16.0	16.0	16.0	16.0
C/I Uplink Adjacent Satellite 1 (dB)	27.7	27.7	27.7	27.7
C/I Downlink Adjacent Satellite 1 (dB)	16.8	16.8	9.1	8.0
C/I Uplink Adjacent Satellite 2 (dB)	27.7	27.7	27.7	27.7
C/I Downlink Adjacent Satellite 2 (dB)	17.4	17.4	11.4	10.1
C/(N+I) Composite (dB)	9.8	9.8	5.2	4.3
Required System Margin (dB)	1.1	1.1	1.1	1.1
Minimum Required C/N (dB)	7.3	7.3	1.8	1.2
Excess Link Margin (dB)	1.4	1.4	2.3	2.0
Number of Carriers	1	4	20	94

INTERFERENCE ANALYSIS:
Effect of Hypothetical Satellites 83°E.L and 87°E.L on Intelsat 15R
Band: 12500-12750 MHz; Beam: West Indian Ocean

UPLINK BEAM INFORMATION				
Uplink Beam Name	WIVU	WIVU	WIVU	WIVU
Uplink Frequency (MHz)	14000-14250	14000-14250	14000-14250	14000-14250
Uplink Beam Polarization	Vertical	Vertical	Vertical	Vertical
Uplink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Uplink Contour G/T (dB/K)	3.7	3.7	3.7	3.7
Uplink SFD (dBW/m²)	-89.2	-89.2	-89.2	-89.2
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	WIHD	WIHD	WIHD	WIHD
Downlink Frequency (MHz)	12500-12750	12500-12750	12500-12750	12500-12750
Downlink Beam Polarization	Horizontal	Horizontal	Horizontal	Horizontal
Downlink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Downlink Contour EIRP (dBW)	47.3	47.3	47.3	47.3
ADJACENT SATELLITE 1				
Orbital Location	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE
Uplink Power Density (dBW/Hz)	-50.0	-50.0	-50.0	-50.0
Downlink EIRP Density (dBWHz)	-22.0	-22.0	-22.0	-22.0
CARRIER INFORMATION				
Emission Designation	36M0G7W	8M25G7W	1M73G7W	382KG7W
Information Rate (kbps)	36860.0	8448.0	1024.0	256.0
Carrier Modulation	QPSK	QPSK	BPSK	BPSK
Code Rate	0.8	0.8	0.5	0.5
Occupied Bandwidth (kHz)	26665	6111	1284	273
Allocated Bandwidth (kHz)	36000	8251	1733	382
Minimum C/N, Rain (dB)	7.30	7.30	1.80	1.20
UPLINK EARTH STATION				
Earth Station Diameter (meters)	2.4	2.4	2.4	2.4
Earth Station Gain (dBi)	49.1	49.1	49.1	49.1
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	1.18	1.18	0.94	0.92
Earth Station Gain (dBi)	42.0	42.0	40.1	39.8
Earth Station G/T (dB/K)	21.7	21.7	19.8	19.5
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	20.8	20.8	20.8	20.8
C/N Downlink (dB)	15.9	15.9	14.0	13.8
C/I Other links (Co-channel & IM)	16.0	16.0	16.0	16.0
C/I Uplink Adjacent Satellite 1 (dB)	27.7	27.7	27.7	27.7
C/I Downlink Adjacent Satellite 1 (dB)	14.1	14.1	6.1	5.4
C/I Uplink Adjacent Satellite 2 (dB)	27.7	27.7	27.7	27.7
C/I Downlink Adjacent Satellite 2 (dB)	14.8	14.8	7.6	6.9
C/(N+I) Composite (dB)	8.7	8.7	3.0	2.4
Required System Margin (dB)	1.1	1.1	1.1	1.1
Minimum Required C/N (dB)	7.3	7.3	1.8	1.2
Excess Link Margin (dB)	0.3	0.3	0.1	0.1
Number of Carriers	1	4	20	94

INTERFERENCE ANALYSIS

Effect of Hypothetical Satellites 83°E.L and 87°E.L on Intelsat 15R

Bands 27500-29975 GHz, 17800-18300 GHz and 18800-19700 GHz

Beam: Japan Spot

UPLINK BEAM INFORMATION				
Uplink Beam Name	JSRU	JSRU	JSRU	JSRU
Uplink Frequency (MHz)	27500-29975	27500-29975	27500-29975	27500-29975
Uplink Beam Polarization	RHCP	RHCP	RHCP	RHCP
Uplink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Uplink Contour G/T (dB/K)	15.8	15.8	15.8	15.8
Uplink SFD (dBW/m²)	-89.6	-89.6	-89.6	-89.6
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	JSLD	JSLD	JSLD	JSLD
Downlink Frequency (MHz)	17800-20200	17800-20200	17800-20200	17800-20200
Downlink Beam Polarization	LHCP	LHCP	LHCP	LHCP
Downlink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Downlink Contour EIRP (dBW)	57.5	57.5	57.5	57.5
ADJACENT SATELLITE 1				
Orbital Location	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE
Uplink Power Density (dBW/Hz)	-57.0	-57.0	-57.0	-57.0
Downlink EIRP Density (dBWHz)	-16.0	-16.0	-16.0	-16.0
CARRIER INFORMATION				
Emission Designation	36M0G7W	8M25G7W	1M73G7W	382KG7W
Information Rate (kbps)	36860.0	8448.0	1024.0	256.0
Carrier Modulation	QPSK	QPSK	BPSK	BPSK
Code Rate	0.8	0.8	0.5	0.5
Occupied Bandwidth (kHz)	26665	6111	1284	273
Allocated Bandwidth (kHz)	36000	8251	1733	382
Minimum C/N, Rain (dB)	7.30	7.30	1.80	1.20
UPLINK EARTH STATION				
Earth Station Diameter (meters)	2.4	2.4	2.4	2.4
Earth Station Gain (dBi)	55.5	55.5	55.5	55.5
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	0.97	0.97	0.60	0.58
Earth Station Gain (dBi)	44.1	44.1	40.0	39.7
Earth Station G/T (dB/K)	22.5	22.5	18.4	18.1
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	11.7	11.7	11.7	11.7
C/N Downlink (dB)	20.0	20.0	15.9	15.6
C/I Other links (Co-channel & IM)	16.0	16.0	16.0	16.0
C/I Uplink Adjacent Satellite 1 (dB)	32.9	32.9	32.9	32.9
C/I Downlink Adjacent Satellite 1 (dB)	18.4	18.4	8.2	7.3
C/I Uplink Adjacent Satellite 2 (dB)	32.9	32.9	32.9	32.9
C/I Downlink Adjacent Satellite 2 (dB)	19.0	19.0	9.7	8.8
C/(N+I) Composite (dB)	8.8	8.8	4.2	3.6
Required System Margin (dB)	1.1	1.1	1.1	1.1
Minimum Required C/N (dB)	7.3	7.3	1.8	1.2
Excess Link Margin (dB)	0.4	0.4	1.3	1.3
Number of Carriers	1	8	39	183

INTERFERENCE ANALYSIS:
Effect of Hypothetical Satellites 83°E.L and 87°E.L on Intelsat 15R
Bands 27500-29975 GHz, 17800-18300 GHz and 18800-19700 GHz
Beam: Korea Spot

UPLINK BEAM INFORMATION				
Uplink Beam Name	KSRU	KSRU	KSRU	KSRU
Uplink Frequency (MHz)	27500-29975	27500-29975	27500-29975	27500-29975
Uplink Beam Polarization	RHCP	RHCP	RHCP	RHCP
Uplink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Uplink Contour G/T (dB/K)	15.8	15.8	15.8	15.8
Uplink SFD (dBW/m²)	-89.6	-89.6	-89.6	-89.6
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	KSLD	KSLD	KSLD	KSLD
Downlink Frequency (MHz)	17800-20200	17800-20200	17800-20200	17800-20200
Downlink Beam Polarization	LHCP	LHCP	LHCP	LHCP
Downlink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Downlink Contour EIRP (dBW)	57.5	57.5	57.5	57.5
ADJACENT SATELLITE 1				
Orbital Location	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE
Uplink Power Density (dBW/Hz)	-57.0	-57.0	-57.0	-57.0
Downlink EIRP Density (dBWHz)	-16.0	-16.0	-16.0	-16.0
CARRIER INFORMATION				
Emission Designation	36M0G7W	8M25G7W	1M73G7W	382KG7W
Information Rate (kbps)	36860.0	8448.0	1024.0	256.0
Carrier Modulation	QPSK	QPSK	BPSK	BPSK
Code Rate	0.8	0.8	0.5	0.5
Occupied Bandwidth (kHz)	26665	6111	1284	273
Allocated Bandwidth (kHz)	36000	8251	1733	382
Minimum C/N, Rain (dB)	7.30	7.30	1.80	1.20
UPLINK EARTH STATION				
Earth Station Diameter (meters)	2.4	2.4	2.4	2.4
Earth Station Gain (dBi)	55.5	55.5	55.5	55.5
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	0.84	0.84	0.58	0.56
Earth Station Gain (dBi)	42.9	42.9	39.7	39.4
Earth Station G/T (dB/K)	21.6	21.6	18.4	18.1
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	12.6	12.6	12.6	12.6
C/N Downlink (dB)	20.0	20.0	16.9	16.6
C/I Other links (Co-channel & IM)	16.0	16.0	16.0	16.0
C/I Uplink Adjacent Satellite 1 (dB)	32.1	32.1	32.1	32.1
C/I Downlink Adjacent Satellite 1 (dB)	16.9	16.9	7.2	6.5
C/I Uplink Adjacent Satellite 2 (dB)	32.1	32.1	32.1	32.1
C/I Downlink Adjacent Satellite 2 (dB)	17.6	17.6	8.7	7.8
C/(N+I) Composite (dB)	8.9	8.9	3.7	3.1
Required System Margin (dB)	1.1	1.1	1.1	1.1
Minimum Required C/N (dB)	7.3	7.3	1.8	1.2
Excess Link Margin (dB)	0.5	0.5	0.8	0.8
Number of Carriers	1	8	39	183

INTERFERENCE ANALYSIS:
Effect of Hypothetical Satellites 83°E.L and 87°E.L on Intelsat 15R
Bands 27500-29975 GHz, 17800-18300 GHz and 18800-19700 GHz
Beam: Steerable Spot

UPLINK BEAM INFORMATION				
Uplink Beam Name	SSRU	SSRU	SSRU	SSRU
Uplink Frequency (MHz)	27500-29975	27500-29975	27500-29975	27500-29975
Uplink Beam Polarization	RHCP	RHCP	RHCP	RHCP
Uplink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Uplink Contour G/T (dB/K)	15.8	15.8	15.8	15.8
Uplink SFD (dBW/m²)	-89.6	-89.6	-89.6	-89.6
DOWNLINK BEAM INFORMATION				
Downlink Beam Name	SSLD	SSLD	SSLD	SSLD
Downlink Frequency (MHz)	17800-20200	17800-20200	17800-20200	17800-20200
Downlink Beam Polarization	LHCP	LHCP	LHCP	LHCP
Downlink Relative Contour Level (dB)	-3.0	-3.0	-3.0	-3.0
Downlink Contour EIRP (dBW)	57.5	57.5	57.5	57.5
ADJACENT SATELLITE 1				
Orbital Location	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE	83.0ºE, 87.0ºE
Uplink Power Density (dBW/Hz)	-57.0	-57.0	-57.0	-57.0
Downlink EIRP Density (dBWHz)	-16.0	-16.0	-16.0	-16.0
CARRIER INFORMATION				
Emission Designation	36M0G7W	8M25G7W	1M73G7W	382KG7W
Information Rate (kbps)	36860.0	8448.0	1024.0	256.0
Carrier Modulation	QPSK	QPSK	BPSK	BPSK
Code Rate	0.8	0.8	0.5	0.5
Occupied Bandwidth (kHz)	26665	6111	1284	273
Allocated Bandwidth (kHz)	36000	8251	1733	382
Minimum C/N, Rain (dB)	7.30	7.30	1.80	1.20
UPLINK EARTH STATION				
Earth Station Diameter (meters)	2.4	2.4	2.4	2.4
Earth Station Gain (dBi)	55.5	55.5	55.5	55.5
DOWNLINK EARTH STATION				
Earth Station Diameter (meters)	0.69	0.69	0.55	0.54
Earth Station Gain (dBi)	41.2	41.2	39.3	39.0
Earth Station G/T (dB/K)	20.0	20.0	18.0	17.8
COMPOSITE LINK PERFORMANCE				
C/N Uplink (dB)	21.2	21.2	21.2	21.2
C/N Downlink (dB)	18.3	18.3	16.3	16.1
C/I Other links (Co-channel & IM)	16.0	16.0	16.0	16.0
C/I Uplink Adjacent Satellite 1 (dB)	32.4	32.4	32.4	32.4
C/I Downlink Adjacent Satellite 1 (dB)	12.9	12.9	6.0	5.4
C/I Uplink Adjacent Satellite 2 (dB)	32.4	32.4	32.4	32.4
C/I Downlink Adjacent Satellite 2 (dB)	15.0	15.0	7.3	6.6
C/(N+I) Composite (dB)	8.8	8.8	3.1	2.5
Required System Margin (dB)	1.1	1.1	1.1	1.1
Minimum Required C/N (dB)	7.3	7.3	1.8	1.2
Excess Link Margin (dB)	0.4	0.4	0.2	0.2
Number of Carriers	1	8	39	183