Engineering Statement

1 Introduction

Together with the accompanying Schedule S and GXT files, Intelsat License LLC ("Intelsat") herein demonstrates that it is technically qualified to hold the authority sought by in this application to operate Intelsat 11 (S2237) over a new coverage area at its current licensed location of 317° E.L./43° W.L. and for the requested extended license term. The characteristics of the satellite and its compliance with the various provisions of Part 25 of the Federal Communications Commission's ("FCC" or "Commission") rules[1] are provided herein.

In all other respects, the characteristics of Intelsat 11 remain unchanged from those provided in SAT-MOD-20070207-00027 and SAT-MOD20090108-00004 and are incorporated by reference.

2 Spacecraft Overview

Intelsat 11 is capable of operating in C- and Ku-band frequencies listed below:

Direction	Frequency
Uplink	5925-6425 MHz
	12750-13250 MHz
	13750-14000 MHz
Downlink	3700-4200 MHz
	10700-11450 MHz

The spacecraft will provide C- and Ku-band coverage of North and South America and Europe.

The C-band antenna includes a reflector position mechanism ("RPM") with the capability to reposition the reflector up to +/- 4 degrees North-South and +/- degree 4 degrees East-West and

[1] Unless otherwise stated, all references to rule sections in this document refer to sections in Title 47 of the Code of Federal Regulations.

the Ku-band antenna RPM has the capability to reposition the reflector up to +/- 4 degrees North-South and +/- degree 4 degrees East-West.

2.1 Spacecraft Characteristics

Intelsat 11 is a Northrop Grumman Space Systems Star 2.4 three-axis stabilized type satellite that has a rectangular outer body structure. Intelsat 11 utilizes two deployable solar array wings and a number of deployable and non-deployable antennas.

The Intelsat 11 satellite is composed of the following subsystems:

- thermal;
- power;
- attitude control;
- propulsion;
- telemetry, tracking, and control ("TT&C");
- uplink power control ("UPLC); and
- 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's design incorporates redundancy for all the various subsystems in order to avoid single-point failures.

The structural design of Intelsat 11 provides mechanical support for all subsystems. The structure supports the communication antennas, solar arrays, and thrusters. It also provides a stable platform for preserving the alignment of critical elements of the spacecraft.

2.2 Communication Subsystem

Intelsat provides the frequencies, polarization, channel plans, coverage contours, and performance characteristics of Intelsat 11 in the Schedule S.

The following beams have switchable polarization:[2]

- receive beams: A1HU, A1VU, AKHU, AKVU CMD1, CMD2, CMD4, CMD5; and

[2] The Schedule S software would not allow the selection of "Yes" for switchable polarization. To the extent necessary, Intelsat requests that the Commission manually correct the Schedule S to reflect the beams' switchable polarization.

- transmit beams: BKHD, BKVD, TLMA, TLMB, TLMD, and TLME.

Exhibits 1 and 2 provide the beam parameters for the C- and Ku-band uplink and downlink beams, respectively, and Exhibit 4 provides the Schedule S beam designations.

2.3 Subsystem

The TT&C 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 11 command and telemetry channel frequencies and performance are provided in Exhibit 3 and in Schedule S. 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) contours for these beams are not required to be provided and the associated GXT files have not been included in Schedule S.

2.4 ULPC

Intelsat 11 utilizes two C-band channels for 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), contours for these beams are not required to be provided and the associated GXT files have not been included in Schedule S. Intelsat 11's ULPC frequencies and subsystem performance are summarized in Exhibit 3.

2.5 Satellite Station-Keeping

The satellite will be maintained within 0.05° of its nominal longitudinal position in the east-west direction in compliance with Section 25.210(j).

The attitude of the satellite 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 11 is a general-purpose communications satellite and has been designed to support various services offered within the Intelsat satellite system. Depending upon the needs of the users, the transponders on Intelsat 11 can provide a range of communications services, including

compressed digital video, high speed digital data, and digital single channel per carrier data channels.

4 Power Flux Density

The power flux density limits for space stations operating in the C- and Ku-band are specified in Section 25.208. As provided in Schedule S, the Intelsat 11 transmissions do not exceed these limits.

5 Emission Compliance

Section 25.202(e) requires that the carrier frequency of each space station transmitter be maintained within 0.002% of the reference frequency. Intelsat 11 is designed to be compliant with the provisions of this rule.

Intelsat 11 emissions will comply with the provisions of Section 25.202(f).

6 Orbital Location

Intelsat requests that Intelsat 11 continue to be assigned the 317°E.L./43° W.L. orbital location, which satisfies Intelsat 11 requirements for optimizing coverage, elevation angles, and service availability.

7 Coordination Statement and Certifications

The downlink effective isotropic radiated power ("EIRP") density of the satellite's transmissions in the conventional C-band will not exceed 3 dBW/4kHz for digital transmissions or 8 dBW/4kHz for analog transmissions; the Ku-band the downlink EIRP density will not exceed 14 dBW/4kHz for digital transmissions or 17 dBW/4kHz for analog transmissions; and associated uplink transmissions in both bands will not exceed the applicable EIRP density envelope in Section 25.218 unless coordinated.

Operations in the 10700-10950 MHz, 11200-11450 MHz, and 12750-13250 MHz (Earth-to-space) bands will be consistent with applicable Appendix 30B International Telecommunication Union ("ITU") Radio Regulations.

In all cases, Intelsat's operation of Intelsat 11 will comply with all applicable coordination agreements.

8 Orbital Debris Mitigation Plan

Intelsat is proactive in ensuring safe operation and disposal of all satellites under its control. The four elements of debris mitigation are addressed below.

8.1 Satellite Hardware Design

Intelsat 11 is designed such that no debris will be released during normal operations. Intelsat has assessed the probability of collision with meteoroids and other debris. In order to limit the effects of such unlikely collisions critical satellite components are located inside the protective body of the satellite and are properly shielded. The satellite does not use any subsystems for end-of-life disposal that are not used for normal operations.

8.2 Minimizing Accidental Explosions

The manufacturer has assessed the probability of accidental explosions during and after completion of mission operations. The satellite 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 satellite, Intelsat will ensure that 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 Flights 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.

Intelsat is not aware of any other FCC licensed system, or any other system applied for and under consideration by the FCC, that will have an overlapping station-keeping volume with Intelsat 11. Intelsat is also not aware of any system with an overlapping station-keeping volume with Intelsat 11 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 intends to dispose of the satellite by moving it to an altitude of at least 283.3 kilometers above the geostationary arc as previously stated. Intelsat has reserved 31.45 kilograms of bi-propellent for this purpose.[3]

In calculating the disposal orbit, Intelsat has used simplifying assumptions as permitted under the Commission's 2004 Orbital Debris Report and Order.[4] The effective area to mass ratio (Cr*A/M) of the Intelsat 11 satellite is 0.045 m^2/kg, resulting in a minimum perigee disposal altitude under the Inter-Agency Space Debris Coordination Committee formula of 283.3 kilometers above the geostationary arc. Accordingly, the satellite's planned disposal orbit complies with the FCC's rules.

9 TT&C Control Earth Stations

Intelsat will conduct TT&C operations through earth stations at one or more of the following teleports: Napa, California; Hagerstown, Maryland; Fillmore, California; Riverside, California; Castle Rock, Colorado; Ellenwood, Georgia; Fuchsstadt, Germany; Fucino, Italy; and Hartebessthoek, South Africa. Additionally, Intelsat is capable of remotely controlling Intelsat 11 from its facilities in McLean, Virginia and Long Beach, California.

---

[3] The reserved propellant figure is an estimate. The figure calculation takes into account the expected mass of the satellite at the end of life and the required delta-velocity to achieve the desired orbit.

[4] *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/ Giselle Creeser November 14, 2022

Date

Giselle Creeser
Intelsat US LLC
Director, Spectrum Policy and Engineering

EXHIBIT 1

COMMUNICATION SUBSYSTEM UPLINK BEAM PARAMETERS

Beam Name	C-band Beam	C-band Beam	Ku-band Beam	Ku-band Beam
Schedule S Beam ID	ACHU	ACVU	AKHU	AKVU
Frequency Band (MHz)	5925-6425	5925-6425	12750-13250	12750-13250
Polarization	Horizontal	Vertical	Horizontal	Vertical
G/T (dB/K)	4.7	4.2	3.5	3.8
Minimum SFD-- (dBW/m^2)	-109.3	-109.5	-109.4	-109.1
Maximum SFD-- (dBW/m^2)	-73.3	-73.5	-73.4	-73.1

Beam Name	Ku-band Beam	Ku-band Beam
Schedule S Beam ID	A1HU	A1VU
Frequency Band (MHz)	13750-14000	13750-14000
Polarization	Horizontal	Vertical
G/T (dB/K)	3.5	3.8
Minimum SFD-- (dBW/m^2)	-109.4	-109.1
Maximum SFD-- (dBW/m^2)	-73.4	-73.1

EXHIBIT 2

COMMUNICATION SUBSYSTEM DOWNLINK BEAM PARAMETERS

Beam Name	C-band Beam	C-band Beam	Ku-band Beam	Ku-band Beam
Schedule S Beam ID	ACHD	ACVD	BKHD	BKVD
Frequency Band (MHz)	3700-4200	3700-4200	10700-11450	10700-11450
Polarization	Horizontal	Vertical	Horizontal	Vertical
EIRP (dBW)	43.5	43.4	56.3	56.5
Maximum Beam Peak EIRP Density (dBW/4kHz)	2.2	2.1	16.8	17.0

EXHIBIT 3

TC&C SUBSYSTEM CHARACTERISTICS

Beam Name	Command 1 Global	Command2 Global	Command 1 Omni	Command 2 Omni
Schedule S Beam ID	CMD1	CMD4	CMD2	CMD5
Frequencies (MHz)	13246.5	13995.5	13246.5	13995.5
Polarization	Horizontal	Vertical	LHCP	LHCP
Peak Flux Density at Command Threshold (dBW/m^2-Hz)	-90.0	-90.0	-90.0	-90.0

Beam Name	Telemetry 1 Global	Telemetry 1 Omni	Telemetry 2 Global	Telemetry 2 Omni	ULPC Global	ULPC Omni
Schedule S Beam ID	TLMA	TLMB	TLMD	TLME	UPC1	UPC2
Frequencies (MHz)	11448	11448	11449	11449	3701	4199.5
Polarization	Horizontal	RHCP	Horizontal	RHCP	Horizontal	Vertical
Maximum Channel EIRP (dBW)	13.5	13.5	13.5	13.5	9	9
Maximum Beam Peak EIRP Density (dBW/4kHz)	-5.9	-5.9	-5.9	-5.9	1	1

EXHIBIT 4
Beam Polarizations and GXT File Names

	Schedule S Beam 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								
C-band Beam	ACHU	ACVU	ACHD	ACVD	----	----	----	----
Telemetry Global	----	----	TLMA*	----	----	----	----	TLMB*
Telemetry Omni	----	----	TLMD*	----	----	----	----	TLME*
ULPC	----	----	UPC1*	UPC2*	----	----	----	----
Ku-band Beams								
Ku-band Beam	AKHU A1HU	AKVU A1VU	BKHD	BKVD	----	----	----	----
Command Global	CMD1*	CMD4*	----	----	----	----	----	----
Command Omni	----	----	----	----	CMD2* CMD5*	----	----	----
Telemetry Global	----	----	TLMA*	----	----	----	----	TLMB*
Telemetry Omni	----	----	TLMD*	----	----	----	----	TLME*

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