

## Engineering Statement

### 1) Introduction

Intelsat License LLC (“Intelsat”) seeks modification of its authority to operate a satellite designated as Intelsat 29e at 50.0° W.L. The modification requested reflects the ability to tune the frequencies of the command receivers over a range via ground command. This Engineering Statement updates only those portions of the previously provided Engineering Statement that change as a result of this modification application, specifically Section 2.3, Exhibit 5 and Exhibit 6. The remainder of the technical information previously provided remains unchanged and is incorporated by reference.

### 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 command channels that can have center frequencies in the ranges 5850.5 - 5853.0 MHz and 6422 - 6424.5 MHz, selectable via ground command in 100 kHz steps. 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 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.

## EXHIBIT 5: TC&R SUBSYSTEM CHARACTERISTICS

	Global	Global
<b>Command Frequency (MHz) / Polarization</b> <small>(see note)</small>		
<b>Transfer Orbit / Emergency (tunable in 100 kHz steps)</b>	n/a	5850.5 – 5853.0 (LHCP) 6422.0 - 6424.5 (LHCP)
<b>On-Station (tunable in 100 kHz steps)</b>	5850.5 - 5853.0 (LHCP) 6422.0 - 6424.5 (V)	n/a
<b>Command Modulation</b>	FM	FM
<b>Bandwidth of Command Carrier (kHz)</b>		
<b>Occupied Bandwidth</b>	800	800
<b>Allocated Bandwidth</b>	3700	3700
<b>Command Threshold (dBW/m<sup>2</sup>)</b>		
<b>Beam Peak</b>	-101.0	-80.0
<b>Edge of Coverage</b>	-98.4	-77.4
<b>Command G/T (dB/K)</b>		
<b>Beam Peak</b>	-31.0	-52.9
<b>Edge of Coverage</b>	-33.6	-55.5
<b>Telemetry Frequency (MHz) / Polarization</b> <small>(see note)</small>		
<b>Transfer Orbit / Emergency</b>	n/a	3701.25 (LHCP) 3701.75 (LHCP) 3702.25 (LHCP) 3702.75 (LHCP)
<b>On-Station</b>	3701.25 (V) 3701.75 (V) 3702.25 (V) 3702.75 (V)	n/a
<b>Telemetry Modulation</b>	PM	PM
<b>Bandwidth of Telemetry Carrier (kHz)</b>		
<b>Occupied</b>	300	300
<b>Allocated</b>	500	500
<b>Telemetry EIRP</b>		
<b>Beam Peak</b>	13.4	16.1
<b>Edge of Coverage</b>	10.8	13.5
<b>On-Station Ranging Accuracy (meters)</b>	≤ 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**

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

