

## APPENDIX B

### TECHNICAL APPENDIX

Satellite Information	
Satellite:	G-16
Orbital Location:	99° West Longitude
Uplink Beam/Band:	NAKV / Ku-Band
Downlink Beam/Band:	NAKH / Ku-Band
Nominal Transponder Bandwidth:	36.0 MHz
Customer Transponder Capacity Allocation:	9.0 MHz

#### 1.0 INTRODUCTION

This Technical Appendix contains the Performance Specifications for the Ku-Band transponders assigned to the Intelsat G-16 NAKV Uplink beam - NAKH Downlink beam. As described further herein the specifications are applicable to a fractional transponder allocation on a 36 MHz transponder and associated spares as noted, if available.

#### 2.0 SATELLITE PERFORMANCE CHARACTERISTICS

Orbital Tolerances:	Longitude Tolerance:	± 0.05 degrees
	Inclination Tolerance:	± 0.05 degrees

2.1 Communication Antenna Pointing. The Satellite will maintain the orientation of its communications antenna relative to the earth such that the EIRP, G/T and SFD described in Section 3.1 are maintained.

#### 3.0 COMMUNICATION SYSTEM PERFORMANCE CHARACTERISTICS

3.1 EIRP, G/T and SFD within Beam Coverage Area. Figure B-1 provides EIRP contours for the Satellite Downlink Beam, while Figure B-2 provides G/T contours for the Satellite Uplink Beam. These contours permit the user to estimate EIRP and G/T for any location within the Beam Coverage Areas. Minimum beam reference EIRP for the Transponder is 42.0 dBW ±1.0 dB, minimum beam reference G/T for the transponder is -2.0 dB/K ±1.5 dB. The SFD (at 0 dB/K G/T and 0 dB attenuation) is -98 dBW/m<sup>2</sup>.

Note: Beam Reference Contour values are based on the representative beam patterns attached. The contours are provided for estimation purposes only. It is recommended that a 1 dB margin be included when utilizing the contours.

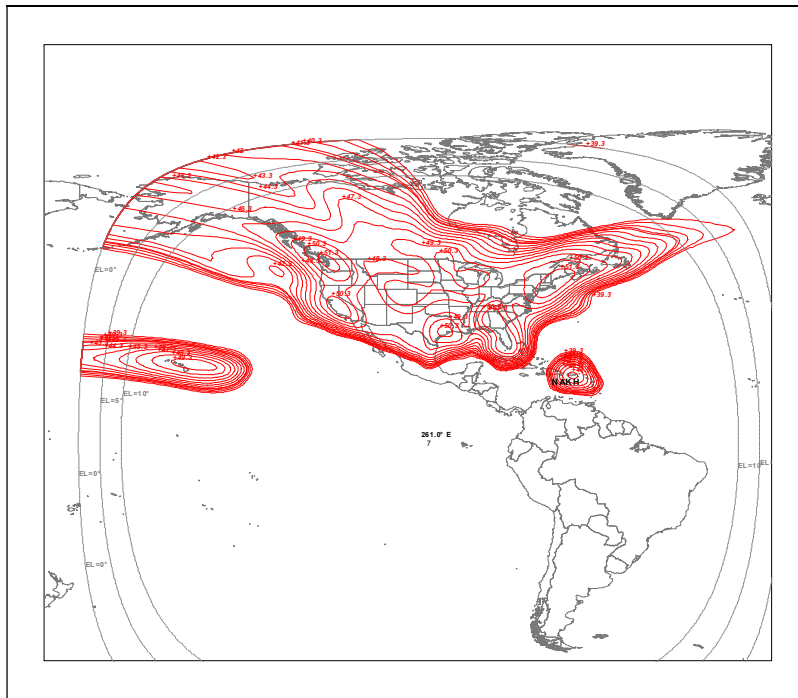
3.1.1 Input Attenuators. The gain of each transponder is adjustable by ground command over a range of 0 to 31 steps in 1 dB increments.

3.1.2 Saturation. For the purposes of this Specification, saturation is defined as the point on the single carrier power-out versus power-in transfer curve corresponding to the operating point that provides the specified EIRP output power and simultaneously meets the required linearity.

3.1.3 SFD Gain Stability. The SFD shall not vary by more than  $\pm 1.4$  dB over any 24 hour period and  $\pm 2.4$  dB over the life of the Satellite for the specified coverage area.

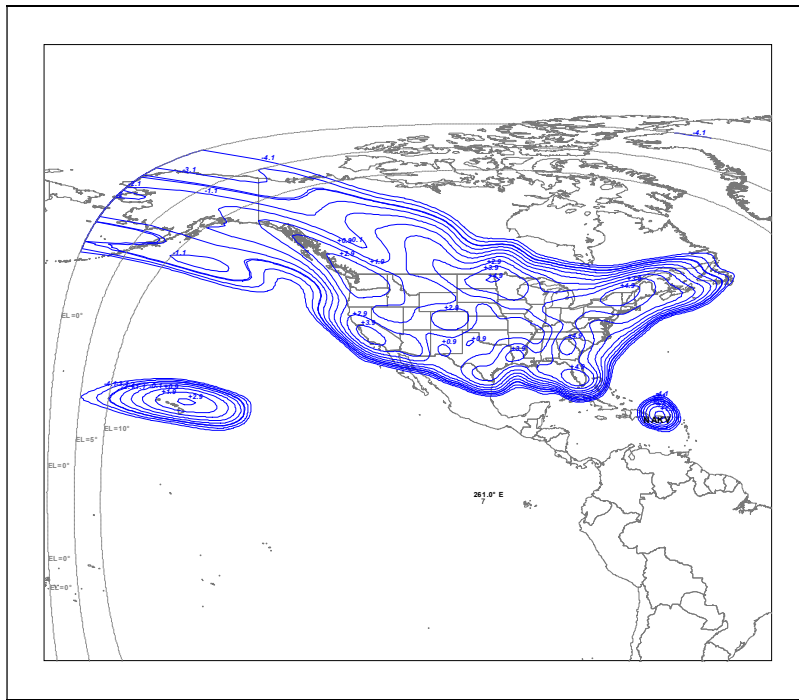
- a) Including the gain variations of the transponder.
- b) Excluding the use of ground commandable gain.
- c) Excluding effects of spacecraft attitude errors.
- d) Including antenna thermal distortion.

Figure B-1. G-16 Ku-Band NAKH Downlink Beam



(EIRP Contours: 52.3, 51.3, 50.3, 49.3, 48.3, 47.3, 46.3, 45.3, 44.3, 43.3, 42.3, 42.0, 41.3 dBW)

Figure B-2. G-16 Ku-Band NAKV Uplink Beam



(G/T Contours: +5.9, 4.9, 3.9, 2.9, 1.9, 0.9, -0.1, -1.1, -2.0, -2.1, -3.1 dB/K)

3.1.4 Two Carriers and Multi-carrier Operation. The values provided in Sections 3.1 are based on the occupancy of the transponder by a single carrier. The bandwidth and power specifications for a fractional transponder segment are contained in Table 1. While subject to final approval by Intelsat and based on specific transponder configuration, dual-carrier operation (2 carriers), or multi-carrier operation (3 or more carriers) must be conducted with a composite output and input backoff meeting the following specifications:

<u>Mode</u>	<u>Output</u>	<u>Input (see Note below)</u>
Multi Carrier:	3.5 dB/composite	6.0 dB/composite

Note: For operation of carrier modulation other than QPSK, additional power constraints may be imposed in order to reduce the generation of intermodulation and other spurious signals.

**Table 1. Fractional Transponder Allocation Specifications  
Galaxy 16 Ku-Band NAKH Downlink Beam (Ku-Band NAKV Uplink Beam)**

Transponder Bandwidth:	36.0 MHz
Allocated Bandwidth:	9.0 MHz
Transponder Composite Output Backoff:	3.5 dB
Additional Output Backoff:	6.0 dB (based on leased BW)
Total Output Backoff:	9.5 dB <sup>[1, 2]</sup>
Beam Reference Contour EIRP	42.0 dBW
Maximum Available EIRP (Beam Reference Contour)	32.5 dBW

Prior to carrier activation, Customer must provide Intelsat with a transmission plan detailing the proposed carrier frequency, modulation and coding type, as well as required yearly service availability level, along with other pertinent technical information, for approval by Intelsat. The approval will consist of the specific carrier operational parameters. Intelsat reserves the right to adjust the composite input backoff to achieve the specified output backoff.

**Notes:**

1. Specified full transponder EIRP values in Section 3.1 must be adjusted by the value shown.
2. Output backoff is the controlling value. Input backoff must be adjusted to meet output backoff requirements.
3. Prior to carrier activation, additional transponder parameters for designated space segment (i.e., frequencies, SFD) will be provided.

3.1.5 EIRP Change Due to Redundant Power Amplifier. When any transponder is switched from its primary HPA to an adjacent HPA, the transponder output power shall not decrease by more than 0.5 dB relative to the EIRP using the primary power amplifier.

3.1.6 Gain Change Due to First Redundant Receiver. When the first receiver is substituted for a redundant receiver, the gain of the affected transponders shall not decrease by more than 0.5 dB.

## 3.2 SATELLITE COMMUNICATION SYSTEM EXPECTED PERFORMANCE

3.2.1 Co-Channel Interference. The Total Co-Channel Interference ratio due to interference from co-frequency carriers on the satellite is expected to be on average better than 30 dB for most locations within the Beam Reference Contour.

3.2.2 Nominal Channel Frequencies and Polarization. Each Transponder in the Beam Coverage Area shall use the Uplink and Downlink frequency range provided in Table 2 below. Moreover, the Beam Coverage Area shall be accessible by either linear vertical or horizontal polarization. Intelsat reserves the right to assign and/or reassign Customer's space segment allocation within the Transponder or to other Transponders or Satellites within the applicable Uplink and/or Downlink Beam Coverage Area. Except in emergency circumstances, Intelsat shall notify Customer of any changes to its initial allocation as soon as reasonably practicable prior to such change and shall use reasonable efforts to minimize disruption to Customer's Transponder Capacity during any such change.

3.2.3 Frequency Translation. The communication system translates Uplink transmissions by a net frequency subtraction identified in Table 2 below. The net translation error is not expected to exceed  $\pm 11.5$  kHz over the operating lifetime of the satellite, with variations over any 24 hours period not to exceed  $\pm 2.3$  kHz.

**Table 2. Frequency Range and Corresponding Translation Frequency**

Uplink Band	Downlink Band	Translation Frequency
from 14.00 to 14.50 GHz	from 11.70 to 12.20 GHz	2300 MHz

**End of Appendix B.**