

Exhibit D

**Intelsat License LLC
Ellenwood, Georgia
Vertex/RSI 13.1 Meter Earth Station
Call Sign: E990365**

Compliance with FCC Report & Order (FCC 96-377) for the 13.75 - 14.0 GHz Band Analysis and Calculations

1. Background

This Exhibit is presented to demonstrate the extent to which the Intelsat License LLC satellite earth station in Ellenwood, Georgia is in compliance with FCC Report & Order 96-377. The potential interference from the earth station to U.S. Navy shipboard radiolocation operations (RADAR) and the NASA space research activities in the 13.75 - 14.0 GHz Band is addressed in this exhibit. The parameters for the earth station are:

Table 1. Earth Station Characteristics

- Coordinates (NAD 83): 33° 39' 52.4" N, 84° 16' 13.7" W
- Satellite Location for Earth Station: Telstar 11N at 37.5° WL
- Frequency Band: 13.75-14.0 GHz for uplink
- Polarizations: Linear and Circular
- Emissions: 750KF2D
64K0G7W
36M0G7W
- Modulation: Digital
- Maximum Aggregate Uplink EIRP: 85.0 dBW for all Carriers
- Transmit Antenna Characteristics
 - Antenna Size: 13.1 meters in Diameter
 - Antenna Type/Model: Vertex/RSI
 - Gain: 63.8 dBi
- RF power into Antenna Flange: 750 kHz
21.2 dBW
or -1.5 dBW/4 kHz (Maximum)

64 kHz
21.2 dBW
or 9.2 dBW/4 kHz (Maximum)

36 MHz
21.2 dBW or 15.6 dBW/MHz
or -18.3 dBW/4 kHz

- Minimum Elevation Angle: 27.0° @ 117.5° Az. (Telstar-11N)
Ellenwood, Ga.
- Side Lobe Antenna Gain: $32 - 25 \cdot \log(\theta)$

Because the above uplink spectrum is shared with the Federal Government, coordination in this band requires resolution data pertaining to potential interference between the earth station and both Navy and NASA systems. Potential interference from the earth station could impact with the Navy and/or NASA systems in two areas. These areas are noted in FCC Report and Order 96-377 dated September 1996, and consist of (1) Radiolocation and radio navigation, (2) Data Relay Satellites.

Summary of Coordination Issues:

- 1) Potential Impact to Government Radiolocation (Shipboard Radar)
- 2) Potential Impact to NASA Data Relay Satellite Systems (TDRSS)

2. Potential Impact to Government Radiolocation (Shipboard Radar)

Radiolocation operations (RADAR) may occur anywhere in the 13.4 - 14 GHz frequency band aboard ocean going U.S. Navy ships. The FCC's Report & Order 96-377 allocates the top 250 MHz of this 600 MHz band to the Fixed Satellite Service (FSS) on a co-primary basis with the radiolocation operations and provides for an interference protection level of $-167 \text{ dBW/m}^2/4 \text{ kHz}$.

The closest distance to the shoreline from the Ellenwood earth station is approximately 369 km Southeast toward the Atlantic Ocean.

The calculation of the power spectral density at this distance is given by:

	<u>750 kHz</u>	<u>64 kHz</u>	<u>36 MHz</u>
1. Clear Sky EIRP:		85.00 dBW	
2. Carrier Bandwidth:	750 kHz	64 kHz	36 MHz
3. PD at antenna input: (dBW/4 kHz)	-1.5	9.2	-18.3
4. Transmit Antenna Gain:		63.8 dBi	
5. Antenna Gain Horizon:		FCC Reference Pattern	
6. Antenna Elevation Angle:	27.0°	Toward Telstar-11N (117.5° Az.)	

The existing earth station will radiate interference toward the ocean according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in off-axis antenna gains of -10.0 dBi towards the Atlantic Ocean.

The signal density at the shoreline, through free space is:

750 kHz Carriers

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBW-m²).

$$\begin{aligned}
 &= -1.5 \text{ dBW/4 kHz} + (-10.0 \text{ dBi}) - 10 \cdot \log[4\pi \cdot (369000\text{m})^2] \\
 &= -133.8 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses} (\sim 87.0 \text{ dB}) \\
 &= -220.8 \text{ dBW/m}^2/4 \text{ kHz}
 \end{aligned}$$

64 kHz Carriers

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBW-m²).

$$\begin{aligned}
 &= 9.2 \text{ dBW/4 kHz} + (-10.0 \text{ dBi}) - 10 \cdot \log[4\pi \cdot (369000\text{m})^2] \\
 &= -123.1 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses} (\sim 87.0 \text{ dB}) \\
 &= -210.1 \text{ dBW/m}^2/4 \text{ kHz}
 \end{aligned}$$

36 MHz Carriers

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBW-m²).

$$\begin{aligned}
 &= -18.3 \text{ dBW/4 kHz} + (-10.0 \text{ dBi}) - 10 \cdot \log[4\pi \cdot (369000\text{m})^2] \\
 &= -150.6 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses} (\sim 87.0 \text{ dB}) \\
 &= -237.6 \text{ dBW/m}^2/4 \text{ kHz}
 \end{aligned}$$

Our calculations show additional path loss of approximately 87.0 dB including absorption loss and earth diffraction loss for the actual path profiles from the proposed earth station to the closest shoreline.

For the 750 kHz carriers, the calculated PFD including additional path losses to the closest shoreline location is $-220.8 \text{ dBW/m}^2/4 \text{ kHz}$. This is 53.8 dB below the $-167 \text{ dBW/m}^2/4 \text{ kHz}$ interference criteria of R&O 96-377. For the 64 MHz carriers, the calculated PFD including additional path losses to the closest shoreline location is $-210.1 \text{ dBW/m}^2/4 \text{ kHz}$. This is 43.1 dB below the $-167 \text{ dBW/m}^2/4 \text{ kHz}$ interference criteria of Report & Order 96-377. For the 36 MHz carriers, the calculated PFD including additional path losses to the closest shoreline location is $-237.6 \text{ dBW/m}^2/4 \text{ kHz}$. This is 70.6 dB below the $-167 \text{ dBW/m}^2/4 \text{ kHz}$ interference criteria of Report & Order 96-377. Therefore, for all emissions, there should be no interference to the U.S. Navy RADAR from the Ellenwood earth station due to the distance and the terrain blockage between the site and the shore.

3. Potential Impact to NASA's Data Relay Satellite System (TDRSS)

The geographic location of the Intelsat License LLC earth station in Ellenwood, Georgia is outside the 390 km radius coordination contour surrounding NASA's White Sands, New Mexico ground station complex. Therefore, the TDRSS space-to-earth link will not be impacted by the Intelsat earth station in Ellenwood, Georgia.

The TDRSS space-to-space link in the 13.772 to 13.778 GHz band is assumed to be protected if an earth station produces an EIRP less than 71 dBW/6 MHz in this band. The 13.1 meter earth station dish will have an EIRP greater than 71 dBW/6 MHz in this band. The total EIRP for all carriers is 85.0 dBW, and the equivalent EIRP per 6 MHz segment remains at 85.0 dBW/6 MHz for the 750 kHz and the 64 kHz emissions. The total EIRP for the 36 MHz carriers is 85.0 dBW, and the equivalent EIRP per 6 MHz segment will be 77.2 dBW/6 MHz. Therefore, there will be interference to the TDRSS space-to-space link (Table 1).

In order to meet the 71 dBW/6 MHz interference criteria, the earth station would have to be limited to an RF power density 14 dB lower than the maximum of -1.5 dBW/4kHz or -15.5 dBW/4kHz for the 750 kHz carriers. The earth station would also have to be limited to an RF power density 14 dB lower than the maximum of 9.2 dBW/4kHz or -4.8 dBW/4kHz for the 64 MHz carriers and an EIRP of 71.0 dBW. Finally, in order to meet the 71 dBW/6 MHz interference criteria, the earth station would have to be limited to an RF power density 6.3 dB lower than the maximum of -18.3 dBW/4kHz or -24.6 dBW/4kHz for the 36 MHz carriers.

If this operational condition cannot be met, then the Ellenwood, Georgia earth station may not be tuned to operate at the frequencies in the 13.772 to 13.778 GHz Band.

4. Coordination Issue Result Summary and Conclusions

The results of the analysis and calculations performed in this exhibit indicate that compatible operations between the earth station at the Ellenwood facility and the U.S. Navy and NASA systems space-to-earth link are possible. These analyses have been based on the assumption of 750 kHz, 64 kHz and 36 MHz bandwidth carriers. Operations in NASA systems space-to-space link (13772.0 to 13778.0 MHz) will not be permitted.

Table 1

Excluded Frequency Range for Intelsat License LLC Earth Station

System	Frequency Restriction
TDRSS	13.770-13.780 GHz (see Note 1)

Note 1: In order to meet the 71 dBW/6 MHz interference criteria, the earth station would have to be limited to a maximum total EIRP of 71.0 dBW.

No interference to U.S. Navy RADAR operations from the Ellenwood, Georgia site earth station will occur.