

**Exhibit For  
Hauppauge, Suffolk, New York Earth Station  
Call Sign: E990402**

**Compliance with FCC Report & Order (FCC96-377) for the 13.75 - 14.0 GHz Band  
Analysis and Calculations**

**1. Background**

This Exhibit is presented to demonstrate the extent to which the Globecom License Sub LLC satellite earth station in Hauppauge, Suffolk, New York is in compliance with FCC REPORT & ORDER 96-377. This analysis considers an existing 9.3 meter antenna. The potential interference from the earth station to US 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 (NAD83): 40° 48' 54.1" N, 73° 14' 17.8" W
- Satellite Location for Earth Station: From 2.0° W to 130.0° W  
Atlantic Bird 2 (8.0° W)
- Frequency Band: 13.75-14.0 GHz for uplink
- Polarizations: Linear and Circular
- Emissions: 600KG7W  
30M0G7W  
36M0G7W
- Modulation: Digital
- Maximum Aggregate Uplink EIRP: 68.5 dBW for the 600 kHz Carriers  
75.9 dBW for the 30 MHz Carriers  
84.8 dBW for the 36 MHz Carriers
- Transmit Antenna Characteristics
  - Antenna Size: 9.3 meters in Diameter
  - Antenna Type/Model: Vertex Corporation
  - Gain: 60.8 dBi
- RF power into Antenna Flange: 600 kHz  
7.7 dBW  
or -14.1 dBW/4 kHz (Maximum)



- |                              |                       |
|------------------------------|-----------------------|
| 5. Antenna Gain Horizon:     | FCC Reference Pattern |
| 6. Antenna Elevation Angle : | 9.9°                  |

The earth station will radiate interference toward the Atlantic Ocean according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in off-axis antenna gains of 10.9 dBi toward the Atlantic Ocean.

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

600 kHz Carriers

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m<sup>2</sup>).

$$\begin{aligned}
 &= -14.1 \text{ dBw/4 kHz} + 10.9 \text{ dBi} - 10 \cdot \log[4\pi \cdot (27040\text{m})^2] \\
 &= -102.8 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 82.9 \text{ dB}) \\
 &= -185.7 \text{ dBW/m}^2/4 \text{ kHz}
 \end{aligned}$$

30 MHz Carriers

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m<sup>2</sup>).

$$\begin{aligned}
 &= -23.7 \text{ dBw/4 kHz} + 10.9 \text{ dBi} - 10 \cdot \log[4\pi \cdot (27040\text{m})^2] \\
 &= -112.4 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 82.9 \text{ dB}) \\
 &= -195.3 \text{ dBW/m}^2/4 \text{ kHz}
 \end{aligned}$$

36 MHz Carriers

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m<sup>2</sup>).

$$\begin{aligned}
 &= -15.5 \text{ dBw/4 kHz} + 10.9 \text{ dBi} - 10 \cdot \log[4\pi \cdot (27040\text{m})^2] \\
 &= -104.2 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 82.9 \text{ dB}) \\
 &= -187.1 \text{ dBW/m}^2/4 \text{ kHz}
 \end{aligned}$$

Our calculations show additional path loss of approximately 82.9 dB including absorption loss and earth diffraction loss for the actual path profiles from the proposed earth station to the nearest shoreline.

The calculated PFD including additional path losses to the closest shoreline location is –185.7 dBW/m<sup>2</sup>/4 kHz for the 600 kHz carriers. The calculated PFD including additional path losses to the closest shoreline location is -195.3 and -187.1 dBW/m<sup>2</sup>/4 kHz for the 30 and 36 MHz carriers respectively. These PFDs are 18.7 dB (600 kHz), 28.3 dB (30 MHz), and 20.1 dB (36 MHz) below the –167 dBW/m<sup>2</sup>/4 kHz interference criteria of R&O 96-377. Therefore, there should be no interference to the US Navy RADAR from the Hauppauge 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 Globecom License Sub LLC earth station in Hauppauge, New York 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 Globecom License Sub LLC earth station in Hauppauge, New York.

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 9.3 meter earth station antenna will have an EIRP less than 71 dBW/6 MHz for the 600 kHz and 30 MHz carriers in this band. The total EIRP for the 600 kHz, carrier is 68.5 dBW, while the total EIRP for the 30 MHz, carrier is 75.9 dBW. The equivalent EIRP per 6 MHz segment will remain at 68.5 dBW/6 MHz for the 600 kHz carriers and 70.9 dBW/6 MHz for the 30 MHz carriers. Therefore, there should not be interference to the TDRSS space-to-space link for the 600 kHz to 30 MHz carriers.

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 9.3 meter earth station antenna will have an EIRP greater than 71 dBW/6 MHz for the 36 MHz carriers in this band. The total EIRP for all carriers is 84.8 dBW, and the equivalent EIRP per 6 MHz segment will be 78.8 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's 36 MHz carrier would have to be limited to an RF power density 7.9 dB lower than the maximum of -15.5 dBW/4kHz or -23.4 dBW/4kHz for an EIRP of 76.9 dBW. If this operational condition cannot be met, then the Hauppauge, New York 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 operation between the earth station at the Hauppauge facility and the US Navy and NASA systems space-to-earth and space-to-space links are possible for the 600 kHz through 30 MHz carriers.

The results of the analysis and calculations performed in this exhibit also indicate that compatible operations between the earth station at the Hauppauge facility and the US Navy and NASA systems space-to-earth link will be possible for the 36 MHz carriers. However, the analysis based on the assumption of a 36 MHz bandwidth carrier indicates that operations in NASA systems space-to-space link (13772.0 to 13778.0 MHz) will not be permitted. Therefore, the 36 MHz carriers will only transmit on frequencies 13,780.0 to 14,000.0 MHz.

**Table 1**

**Excluded Frequency Range for Intelsat License LLC Earth Station**

<b>System</b>	<b>Frequency Restriction</b>
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's 36 MHz carriers would have to be limited to a maximum total EIRP of 76.9 dBW.

No interference to US Navy RADAR or NASA TDRSS space-to-earth operations from the Hauppauge, New York earth station will occur.