

**Exhibit For
Hauppauge, Suffolk, NY Earth Station
Call Sign: E020003**

**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 Systems Inc. satellite earth station planned for Hauppauge, Suffolk, New York is in compliance with FCC REPORT & ORDER 96-377. This analysis considers the installation of a new 3.8 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' 55.3" N, 73° 14' 17.3" W
- Satellite Location for Earth Station: Hispasat 1C at 30.0° W.L and Hispasat 1E at 30.0° W.L.
- Frequency Band: 13.75-14.5 GHz for uplink
- Polarizations: Linear and Circular
- Emissions: 36M0G7W
- Modulation: QPSK
- Maximum Aggregate Uplink EIRP: 72.4 dBW for all Carriers
- Transmit Antenna Characteristics
 - Antenna Size: 3.8 meter in Diameter
 - Antenna Type/Model: Prodelin Corp. / 1388
 - Gain: 52.4 dBi
- RF power into Antenna Flange: 20.0 dBW or 4.4 dBW/ MHz or -19.5 dBW/4 kHz (Maximum)
- Minimum Elevation Angle: Hauppauge, Suffolk, NY 25.6° @ 124.8° Azimuth (Hispasat-1C)
- Side Lobe Antenna Gain: 32 - 25*log(θ)

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 Department 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 United States Navy ships. The Federal Communication Commission (FCC) 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 Hauppauge, New York earth station is approximately 12.3 km south towards the Atlantic Ocean. The calculation of the power spectral density at this distance is given by:

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|-----------------------------|-----------------------|
| 1. Clear Sky EIRP: | 72.4 dBW |
| 2. Carrier Bandwidth: | 36 MHz |
| 3. PD at antenna input: | -19.5 dBW/4 kHz |
| 4. Transmit Antenna Gain: | 52.4 dBi |
| 5. Antenna Gain Horizon: | FCC Reference Pattern |
| 6. Antenna Elevation Angle: | 25.6° |

The proposed 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 dBi towards the Atlantic Ocean.

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

$$\begin{aligned}
 \text{PFD} &= \text{Antenna Feed Power density (dBW/4 kHz)} + \text{Antenna Off-Axis Gain (dBi)} - \text{Spread Loss (dBw-m}^2\text{)}. \\
 &= -19.5 \text{ dBw/4 kHz} - 10 \text{ dBi} - 10 * \log[4\pi * (12300\text{m})^2] \\
 &= -122.3 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses (} \sim 51 \text{ dB)}
 \end{aligned}$$

Our calculations show additional path loss of approximately 51 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 -173.3 dBW/m²/4 kHz. This is 6.3 dB below the -167 dBW/m²/4 kHz interference criteria of R&O 96-377. Therefore, there should be no interference to the US Navy RADAR from the Hauppauge, New York earth station due to the distance and the terrain blocking between the site and the shore.

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

The geographic location of the Globecom Systems Inc. earth station in Hauppauge, Suffolk, NY 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 Systems Inc. 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 3.8 meter earth station dish will not have an EIRP greater than 71 dBW in this band. The total EIRP for the 36 MHz carriers is 72.4 dBW, and the equivalent EIRP per 6 MHz segment is 64.62 dBW/6 MHz. Therefore, there will not be interference to the TDRSS space-to-space link.

4. Coordination Issue Result Summary and Conclusions

The results of the analysis and calculations performed in this exhibit indicate that compatible operations between the proposed earth station at the Hauppauge facility and the US Navy and NASA systems space-to-earth and space-to-space links are possible. These analyses have been based on the assumption of 36 MHz bandwidth carriers.

No interference to US Navy RADAR nor TDRSS operations from the Hauppauge, New York site earth station will occur.