

**Exhibit For  
Vizada. Inc.  
Southbury, Connecticut  
Vertex 9.0 Meter Earth Station  
Call Sign: WB36**

**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 Vizada, Inc. satellite earth station installed at Southbury, Connecticut is in compliance with FCC REPORT & ORDER 96-377. 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): 41° 27' 05.0" N, 73° 17' 19.0" W
- Satellite Location for Earth Station: Telstar 11N at 37.5° W.L.
- Frequency Band: 13.75-14.5 GHz for uplink
- Polarizations: Dual linear, V and H
- Emissions: 600KG7W – 45M0G7W
- Modulation: QPSK
- Maximum Aggregate Uplink EIRP: 86.6 dBW for all Carriers
- Transmit Antenna Characteristics
  - Antenna Size: 9.0 meter in Diameter
  - Antenna Type/Model: Vertex 9 KPK
  - Gain: 60.1 dBi
- RF power into Antenna Flange: 26.5 dBW or 16.5 dBW/ MHz  
or -14.0 dBW/4 kHz (Maximum)
- Minimum Elevation Angle:  
Southbury, Ct. 29.9° @ 132.6° Az (Telstar 11N)
- 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 stations 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, and (2) Data Relay Satellites.

Summary of Coordination Issues:

- 2) Potential Impact to Government Radiolocation (Shipboard Radar)
- 3) 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 Southbury earth station is approximately 88 km southeast toward the Atlantic Ocean. The calculation of the power spectral density at this distance is given by:

- |                             |                       |
|-----------------------------|-----------------------|
| 1. Clear Sky EIRP:          | 86.6 dBW              |
| 2. Carrier Bandwidth:       | 64.0 kHz to 45 MHz    |
| 3. PD at antenna input:     | -14.0 dBW/4 kHz       |
| 4. Transmit Antenna Gain:   | 60.1 dBi              |
| 5. Antenna Gain Horizon:    | FCC Reference Pattern |
| 6. Antenna Elevation Angle: | 29.9.0°               |

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  $-0.9 \text{ dBi}$  towards the Atlantic Ocean.

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

$$\begin{aligned}
 \text{PFD} &= \text{Antenna Feed Power density (dBW/4 kHz)} + \text{Antenna Off-Axis Gain (dBi)} - \text{Spread Loss (dBw-m}^2\text{)}. \\
 &= -14.0 \text{ dBw/4 kHz} + (-0.9 \text{ dBi}) - 10 \cdot \log[4\pi \cdot (88000\text{m})^2] \\
 &= -124.8 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses (~92 dB)}
 \end{aligned}$$

Our calculations show additional path loss of approximately 92 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  $-216.8$  dBW/m<sup>2</sup>/4 kHz. This is 49.8 dB 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 Southbury 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 Vizada’s Southbury, Connecticut earth station 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 Vizada earth station in Southbury, Connecticut.

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 9.0 meter earth station antenna will have an EIRP greater than 71 dBW/6 MHz, in this band. The total EIRP for all carriers is 86.6 dBW, and the equivalent EIRP per 6 MHz segment is 77.8 dBW/6 MHz. Therefore, there will be interference to the TDRSS space-to-space link.

In order to meet the 71 dBW/6 MHz interference criteria, the earth station would have to be limited to an RF power density 6.9 dB lower than the maximum of  $-14.0$  dBW/4kHz or  $-20.9$  dBW/4kHz. This power will equate to an EIRP of 79.7 dBW. If this operational condition cannot be met, then the Southbury, Connecticut 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 Southbury earth station and US Navy shipboard radiolocation operations and NASA systems space-to-earth link are probable. These analyses have been based on the assumption of 45 MHz bandwidth digital video and/or data transmissions. Should signals with significantly lower bandwidths be transmitted, the station total EIRP should also be reduced in order to continue to meet the Navy radiolocation and NASA space research interference criteria.

**Table 1**

#### **Excluded Frequency Range for Vizada, Inc. Earth Station**

<b>System</b>	<b>Frequency Restriction</b>
TDRSS	13.772-13.778 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 79.7 dBW.

No interference to US Navy RADAR operations from the Southbury, Ct. site earth station will occur.