

## Exhibit A

### Compliance of Operations in the 13.75 - 14.0 GHz Band with FCC Report & Order (FCC96-377)

#### 1. Background

This exhibit is presented to demonstrate the extent to which the Intelsat North America LLC earth station KA258 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 operations 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): 39° 13' 06.6" N, 77° 16' 15.3" W
- Satellite Location for Earth Station: Intelsat 16 from 48.0° W to 58° W
- Frequency Band: 13.9975 GHz for uplink
- Polarizations: Circular and Linear
- Emissions: 850KG7D
- Modulation: Digital
- Maximum Aggregate Uplink EIRP: 85.0 dBW for all Carriers
- Transmit Antenna Characteristics
  - Antenna Size: 14.2 meter in Diameter
  - Antenna Type/Model: TIW
  - Gain: 64.7 dBi
- RF power into Antenna Flange: 20.3 dBW or 21.0 dBW/ MHz  
or -3.0 dBW/4 kHz (Maximum)
- Minimum Elevation Angle:  
Clarksburg, MD
  - 35.4° @ 138.4° Az. at 48.0° W
  - 40.4° @ 151.1° Az. at 58.0° W
- Side Lobe Antenna Gain:  $32 - 25 \cdot \log(\theta)$

Because the above uplink spectrum is shared with the federal government, analysis of potential interference between the earth station and both Navy Department and NASA systems is required. Potential interference from the earth station could impact the Navy and/or NASA systems in two areas. These areas are noted in FCC Order 96-377 and consist of (1) Radiolocation and radio navigation and (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 on U.S. Navy ships. The 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 shoreline from the Clarksburg, MD earth station is approximately 88 km Southeast towards the Atlantic Ocean. The calculation of the power spectral density at this distance is given below:

- |                             |                       |
|-----------------------------|-----------------------|
| 1. Clear Sky EIRP:          | 85.00 dBW             |
| 2. Carrier Bandwidth:       | 850 kHz               |
| 3. PD at antenna input:     | -3.0 dBW/4 kHz        |
| 4. Transmit Antenna Gain:   | 64.7 dBi              |
| 5. Antenna Gain Horizon:    | FCC Reference Pattern |
| 6. Antenna Elevation Angle: | 35.4° and 40.4°       |

The proposed earth station will radiate interference towards 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 -6.6 dBi towards the Atlantic Ocean.

The calculated signal density at the shoreline, assuming free space loss only:

$$\begin{aligned} \text{PFD}_{\text{free space only}} &= \text{Antenna Feed Power density (dBW/4 kHz)} + \text{Antenna Off-Axis Gain (dBi)} - \\ &\text{Spread Loss (dBw-m}^2\text{)} \\ &= -3.0 \text{ dBw/4 kHz} + (-6.6 \text{ dBi}) - 10 \cdot \log[4\pi \cdot (88000\text{m})^2] \\ &= -119.5 \text{ dBW/m}^2/4 \text{ kHz} \end{aligned}$$

However there is an additional path loss of approximately 68.0 dB, which includes absorption loss and earth diffraction loss for the actual path profiles from the proposed earth station to the nearest shoreline.

$$\begin{aligned} \text{PFD}_{\text{actual}} &= \text{PFD}_{\text{free space loss only}} + \text{Additional Path Losses (~ 68.0 dB)} \\ &= -187.5 \text{ dBW/m}^2/4 \text{ kHz} \end{aligned}$$

The resulting PFD, including additional path losses to the closest shoreline location, is  $-187.5$  dBW/m<sup>2</sup>/4 kHz. This is 20.5 dB below the  $-167$  dBW/m<sup>2</sup>/4 kHz interference criteria of FCC Order 96-377. Therefore, the interference to the U.S. Navy RADAR from the earth station will be well within the permissible levels per the FCC's rules, given 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 Clarksburg, MD earth station is outside the 390 km radius coordination contour surrounding NASA's White Sands, NM ground station complex. Therefore, the TDRSS space-to-earth link will not be impacted by Intelsat's KA258 earth station.

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 14.2 meter earth station that is the subject of this application will not radiate in this band, as the proposed transmissions will be limited to the 13997.5 GHz frequency.

Therefore, there will be interference to the TDRSS space-to-space link. .

### **4. Summary and Conclusions**

The results of the analysis and calculations performed in this exhibit indicate compatible operation between the Clarksburg, MD earth station and the U.S. Navy radiolocation systems.

Similarly, there will be no interference above permissible FCC levels into NASA's TDRSS systems, as the intended operations are outside of the 13772.0 to 13778.0 MHz frequency range.