

**Exhibit For
IPX International Systems, Inc.
Aberdeen, MD
Prodelin/Satcom Tech 4.8 Meter Earth Station**

**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 IPX International Systems, Inc.'s satellite earth station planned for Aberdeen, MD 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): 39° 28' 36.6" N, 76° 08' 31.9" W
- Satellite Location for Earth Station: TELESTAR 12 at 15.0° W
- Frequency Band: 13.817-14.0 GHz for uplink
- Polarizations: Linear and Circular
- Emissions: 2M00G7W
- Modulation: QPSK
- Maximum Aggregate Uplink EIRP: 68.2 dBW for all Carriers
- Transmit Antenna Characteristics
 - Antenna Size: 4.8 meter in Diameter
 - Antenna Type/Model: Prodelin/Satcom Tech
 - Gain: 55.2 dBi
- RF power into Antenna Flange: 2M00G7W
10 dBW
or -14.0 dBW/4 kHz (Maximum)

- Minimum Elevation Angle:
Aberdeen, MD 13.4° @ 109.3° Az (Telstar-12) at 15.0° W
- 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 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, (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 South Jordan earth station is approximately 116 km east toward the Atlantic Ocean. The calculation of the power spectral density at this distance is given by:

- | | |
|-----------------------------|-----------------------|
| 1. Clear Sky EIRP: | 68.2 dBW |
| 2. Carrier Bandwidth: | 2M00G7W |
| 3. PD at antenna input: | -14.0 dBW/4 kHz |
| 4. Transmit Antenna Gain: | 55.2 dBi |
| 5. Antenna Gain Horizon: | FCC Reference Pattern |
| 6. Antenna Elevation Angle: | 13.4° |

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 3.5 dBi towards the coastline.

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

2 MHz Carriers

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

$$\begin{aligned} &= -14.0 \text{ dBW/4 kHz} + 3.5 \text{ dBi} - 10*\log[4\pi*(116000\text{m})^2] \text{ (-112.3)} \\ &= -122.8 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses (~44.3 dB)} \\ &= -167.1 \text{ dBW/m}^2/4 \text{ kHz} \end{aligned}$$

Our calculations show additional path loss of approximately 44.3 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 –167.1 dBW/m²/4 kHz. This is 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 Aberdeen 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 IPX International Systems, Inc.’s. earth station in Aberdeen, MD 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 this facility.

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 4.8 meter earth station dish will have an EIRP less than 71 dBW/6 MHz for the 2 MHz kHz carriers in this band. The total EIRP for the 2 MHz carriers is 68.2 dBW. The equivalent EIRP per 6 MHz segment is 62.2 dBW/6 MHz. Therefore, there will 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 operation between the earth station at the Aberdeen earth station and the US Navy and NASA systems is probable. These analyses have been based on the assumption of 2 MHz bandwidth digital video and/or data transmissions.