

**Exhibit For  
NBC Telemundo License, LLC  
Washington, DC  
Andrew Corporation 5.6 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 NBC Telemundo License, LLC satellite earth station, which is being coordinated in Washington, DC, 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): 38° 56' 27.2" N, 77° 04' 54.7" W
- Satellite Location for Earth Station: From 15.0° W to 139.0° W  
Telstar-12 (15.0° W)
- Frequency Band: 13.75-14.0 GHz for uplink
- Polarizations: Linear
- Emissions: 1M50G7D  
36M0G7D
- Modulation: Digital
- Maximum Aggregate Uplink EIRP: 68.74 dBW for the 1.5 MHz Carriers  
82.5 dBW for the 36 MHz Carriers
- Transmit Antenna Characteristics
  - Antenna Size: 5.6 meters in Diameter
  - Antenna Type/Model: Andrew Corporation
  - Gain: 57.0 dBi
- RF power into Antenna Flange: 1.5 MHz  
11.74 dBW  
or -14.0 dBW/4 kHz (Maximum)

36 MHz  
 25.5 dBW  
 or -14.05 dBW/4 kHz (Maximum)

- Minimum Elevation Angles:  
 Washington, DC 12.9° @ 108.4° Az. (Telstar-12) at 15.0° W
- Side Lobe Antenna Gain: 32 - 25\*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 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 dBW/m<sup>2</sup>/4 kHz.

The closest distance to the shoreline from the Washington earth station is approximately 55.4 km East toward the Chesapeake Bay. The calculation of the power spectral density at this distance is given by:

	<u>1.5 MHz</u>	<u>36 MHz</u>
1. Clear Sky EIRP:	68.74 dBW	82.5 dBW
2. Carrier Bandwidth:	1.5 MHz	36 MHz
3. PD at antenna input: dBW/4 kHz	-14.0	-14.05
4. Transmit Antenna Gain:	57.0 dBi	
5. Antenna Gain Horizon:	FCC Reference Pattern	
6. Antenna Elevation Angle :	12.9°	

The proposed earth station will radiate interference toward the Chesapeake Bay according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in off-axis antenna gains of -2.9 dBi towards the Chesapeake Bay.

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

1.5 MHz Carriers

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

$$\begin{aligned} &= -14.0 \text{ dBW/4 kHz} + (-2.9) \text{ dBi} - 10*\log[4\pi*(149000\text{m})^2] \\ &= -122.8 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 59.3 \text{ dB}) \\ &= -182.1 \text{ dBW/m}^2/4 \text{ kHz} \end{aligned}$$

36 MHz Carriers

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

$$\begin{aligned} &= -14.05 \text{ dBW/4 kHz} + (-2.9) \text{ dBi} - 10*\log[4\pi*(149000\text{m})^2] \\ &= -122.85 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 59.3 \text{ dB}) \\ &= -182.15 \text{ dBW/m}^2/4 \text{ kHz} \end{aligned}$$

Our calculations show additional path loss of approximately 59.3 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 -182.1 dBW/m<sup>2</sup>/4 kHz for the 1.5 MHz carriers and -182.15 dBW/m<sup>2</sup>/4 kHz for the 36 MHz carriers. This is 15.1 dB (1.5 MHz carriers) and 15.15 dB (36 MHz carriers) below the -167 dBW/m<sup>2</sup>/4 kHz interference criteria of R&O 96-377 for both sets of carriers. Therefore, there should be no interference to the US Navy RADAR from the Washington 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 NBC Telemundo License, LLC earth station in Washington, DC 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 NBC Telemundo License, LLC earth station in Washington, DC.

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 5.6 meter earth station antenna will have an EIRP less than 71 dBW/6 MHz for the 1.5 MHz carriers in this band. The total EIRP for the 1.5 MHz carriers is 68.74 dBW. The equivalent EIRP per 6 MHz segment will be 68.49 dBW/6 MHz. Therefore, there should not be interference to the TDRSS space-to-space link for the 1.5 MHz carriers.

For the 36 MHz carriers, the total EIRP of 82.5 dBW, will equate to an EIRP per 6 MHz of 76.5 dBW/6 MHz. Since this level will be above the 71.0 dBW/6 MHz threshold, there will be interference to the TDRSS space-to-space link from the 36 MHz carriers. Therefore, at the 82.5 dBW power level, the earth station will only operate between frequencies 13787 and 14000 MHz.

#### **4. Coordination Issue Result Summary and Conclusions**

The results of the analysis and calculations performed in this exhibit indicate that compatible operations between the earth station at the Washington facility and the US Navy and NASA systems space-to-earth link and NASA systems space-to-space link (13772.0 to 13778.0 MHz) will be permitted for the 1.5 MHz carriers.

For the 36 MHz carriers, the results of the analysis and calculations performed in this exhibit indicate that compatible operation between the earth station at the Washington facility and the US Navy and NASA systems space-to-earth link are possible. However, operations in NASA systems space-to-space link (13772.0 to 13778.0 MHz) will not be permitted. Frequencies from 13750 to 13787 MHz will be avoided for the 36 MHz carriers.