Exhibit For
Bristol, Hartford, Connecticut Earth Station
Call Sign: E070231

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 ESPN, Inc. satellite earth station in Bristol, Hartford, Connecticut is in compliance with FCC REPORT & ORDER 96-377. This analysis considers an existing 6.1 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): 41° 38' 51.6" N, 72° 53' 51.6" W
- Satellite Location for Earth Station: From 12.0° W to 139.0° W
  Telstar 12 (15.0° W)
- Frequency Band: 13.75-14.0 GHz for uplink
- Polarizations: Linear and Circular
- Emissions: 10M0G7W
  54M0G7W
- Modulation: Digital
- Maximum Aggregate Uplink EIRP: 72.5 dBW for the 10 MHz Carriers
  76.9 dBW for the 54 MHz Carriers
- Transmit Antenna Characteristics
  - Antenna Size: 6.1 meters in Diameter
  - Antenna Type/Model: ViaSat
  - Gain: 57.3 dBi
- RF power into Antenna Flange: 10 MHz
  15.2 dBW or 5.2 dBW/MHz
  or -18.8 dBW/4 kHz (Maximum)

54 MHz
19.6 dBW or 4.1 dBW/MHz
or -19.9 dBW/4 kHz (Maximum)

- Minimum Elevation Angles:
  Bristol, CT 15.0° @ 112.6° 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 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^2/4 kHz.

The closest distance to the shoreline from the Bristol earth station is approximately 48.36 km South toward the Atlantic Ocean. The calculation of the power spectral density at this distance is given by:

	10 MHz	54 MHz
1. Clear Sky EIRP:	72.5 dBW	76.9 dBW
2. Carrier Bandwidth:	10 MHz	54 MHz
3. PD at antenna input: dBW/4 kHz	-18.8	-19.9
4. Transmit Antenna Gain:	57.3 dBi	
5. Antenna Gain Horizon:	FCC Reference Pattern	
6. Antenna Elevation Angle :	15.0°	

The earth station will radiate interference toward the Atlantic Ocean according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in off-axis antenna gains of -8.4 dBi toward the Atlantic Ocean.

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

10 MHz Carriers
PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m^2).

= -18.8 dBw/4 kHz + (-8.4) dBi – 10*log[4Π*(48360m)^2]
= -131.9 dBW/m^2/4 kHz + Additional Path Losses (~48.6 dB)
= -180.5 dBW/m^2/4 kHz

54 MHz Carriers
PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m^2).

= -19.9 dBw/4 kHz + (-8.4) dBi – 10*log[4Π*(48360m)^2]
= -133.0 dBW/m^2/4 kHz + Additional Path Losses (~48.6 dB)
= -181.6 dBW/m^2/4 kHz

Our calculations show additional path loss of approximately 48.6 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 –180.5 dBW/m^2/4 kHz for the 10 MHz carriers, and the calculated PFD including additional path losses to the closest shoreline location is -181.6 dBW/m^2/4 kHz for the 54 MHz carriers. These PFDs are 13.5 dB (10 MHz), and 14.6 dB (54 MHz) below the –167 dBW/m^2/4 kHz interference criteria of R&O 96-377. Therefore, there should be no interference to the US Navy RADAR from the Bristol 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 ESPN, Inc. earth station in Bristol, Connecticut 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 ESPN, Inc. earth station in Bristol, 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 71.0 dBW/6 MHz in this band. The 6.1 meter earth station antenna will have an EIRP less than 71.0 dBW/6 MHz for both the 10 MHz and 54 MHz carriers in this band.

The total EIRP for a 10 MHz, carrier is 72.5 dBW. The equivalent EIRP per 6 MHz segment will be 70.9 dBW/6 MHz for the 10 MHz carriers. The total EIRP for a 54 MHz carrier is 76.5 dBW. The equivalent EIRP per 6 MHz segment will also be 70.9 dBW/6 MHz for the 54 MHz carriers. Therefore, there should not be interference to the TDRSS space-to-space link for the 10 MHz to 54 MHz carriers.

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 Bristol facility and the US Navy and NASA TDRSS systems space-to-earth and space-to-space links are possible for 10 MHz through 54 MHz carriers.