The Boeing Company
Herndon, VA

GD Vertex 3.8 Meter Earth Station

1. Background

This Exhibit is presented to demonstrate the extent to which The Boeing Company satellite earth station in Herndon, VA is in compliance with the Federal Communications Commission ("FCC") Report and Order 96-377. The potential for interference from the earth station to U.S. Navy Shipboard radiolocation operations ("Radar") and the National Aeronautics and Space Administration ("NASA") space research activities in the 13.75-14 GHz band is addressed in this exhibit. The parameters for the earth station are:

Coordinates (NAD83):	38º 57' 32.0'N, 77º 22'32.0'W
Satellite Location for Earth Station:	Telstar 12V, at the 15° W.L.
Frequency Band:	13.75-14.0 GHz
Polarizations:	Linear
Emissions:	8M00G7W
Modulation:	
Maximum Aggregate Uplink EIRP:	65.04 dBW
Transmit Antenna Characteristics:	
Antenna Size:	3.8M
Antenna Type/Model:	GD Vertex RSI
Gain:	53.0 dBi
RF Power into Antenna Flange:	12.04 dBW
Minimum Elevation Angle:	10.9 @ 264.2 12.7 @ 108.2
Side Lobe Antenna Gain	FCC Reference Pattern

Because the above uplink spectrum is shared with the Federal Government, coordination in this band requires resolution data pertaining to the potential for interference between the earth station and the U.S. Navy Department systems. Potential interference from the earth station could impact the U.S. Navy Radiolocation and Radio Navigation systems, noted in the FCC Report and Order 96-377 dated September 1996.

Summary of Coordination Issues:

a.) Potential for Impact to Government Radiolocation (Shipboard Radar)
b.) Potential for Impact to NASA Tracking and Data Relay Satellite Systems ("TDRSS")

2. Potential for Interference to Government Radiolocation (Shipboard Radar)

Radiolocation operations ("Radar") may occur anywhere in the 13.4-14.0 GHz band aboard ocean-going U.S. Navy ships. FCC order 96-377 allocates the upper 250MHz of the 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^2/4kHz.

1. Clear Sky EIRP:	65.04 dBW
2. Carrier Bandwidth:	8000KHz
3. PD at the Antenna input:`	-21dBW/4kHz
4. Transmit Antenna Gain:	53 dBi
5. Antenna Gain to Horizon:	3.1 dBi
6. Antenna Elevation Angles:	10.9 @ 264.2^o azimuth
	12.7 @ 108.2^o azimuth

The earth station will radiate toward the ocean according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in an off-axis antenna gain of 11.52 towards the nearest shoreline.

The signal density at the shoreline was calculated using the ITU-R P.452 propagation model. Using this model, Boeing calculates a propagation loss of 165.5 dB, resulting in a PFD of -187.84 dBW/m^2/4kHz, which is 20 dB below the protection criteria of -167 dbW/m^2/4kHZ (see Annex A for analysis)..

3. Potential for Impact to NASA's Tracking and Data Relay Satellite System

The geographic location of the Boeing earth station in Herndon, VA is within the 390 km radius coordination contour surrounding NASA's Blossom Point, MD ground station complex. However, the Herndon ground station has proposed to operate in the 13-90-14.0 GHz band. Therefore the TDRSS space-to-earth link will not be impacted by the Boeing earth station in Herndon, VA.

4. Coordination Result Summary and Conclusions

The results of the analysis and calculations set forth in this exhibit indicate that the earth station operations at the Herndon, VA facility and the U.S. Navy RADAR or NASA TDRSS space-earth and space-space operations should be compatible. No harmful interference to U.S. Navy RADAR or NASA TDRSS from the Herndon, VA site earth station should occur.

Annex A

ITU-R P.452 analysis

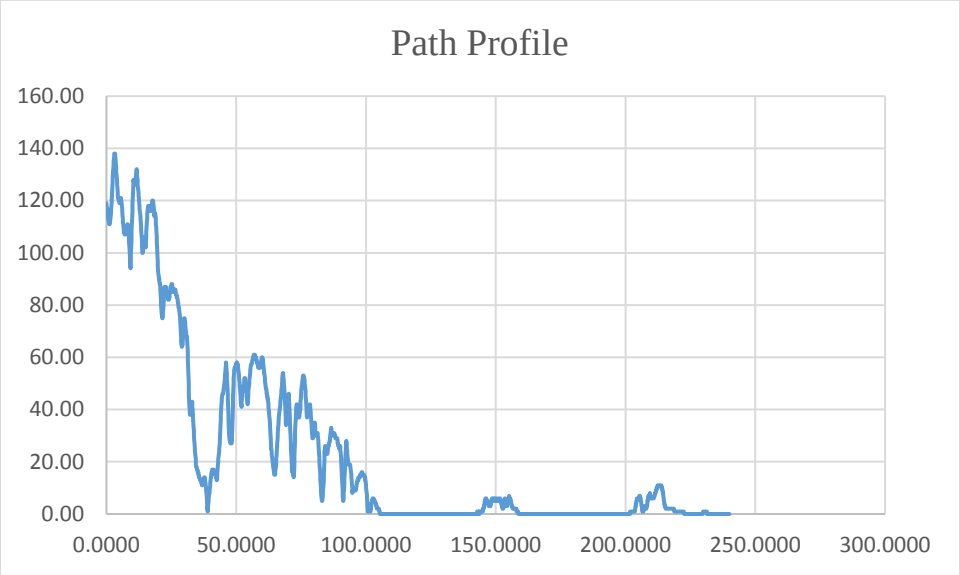
Introduction

To calculate propagation loss for this showing, the ITU-R P.452-16 propagation model was used. ITU-R P.452 is a widely used terrain model for modeling path prediction for two stations on the surface of the earth. ITU-R P.452 is a good model to use for this scenario since it specializes in calculating path loss for coastal areas

ITU-R P.452 analysis

Figure 1 provides the path profile for this section. The transmitting station is at the Herndon site and the receiving station was selected at 37.27N, 75.67W. A time percentage selection was also made of 0.01%.

Figure 1: Path Profile



X-Axis Distance (Km)
Y-Axis Elevation (m)