

## Calculation to Show Power Density and Signal Strength for Coordination with FCC Monitoring Station

### Parameters for the Calculation:

Coordinates for Earth Station Site: 39° 05' 27.7"N; 76°44' 37.6"W

Coordinates for FCC Monitor Station: 39° 09' 54.4"N; 76°49' 15.9"W

Distance Based on Coordinates: 6.6 miles or 10,619.4 meters

Relative Azimuth of Earth Station Antenna: 140.87°

Earth Station EIRP: 67.9 dBW or 6,165,950 Watts

Earth Station Antenna Gain: 53.5 dB or 223,872

Earth Station Antenna Diameter: 3.7 meters

Earth Station Transmit Power: 14.4 dBW or 27.5Watts

Criteria Level for coordination with FCC Monitoring Station

-65.8 dBW/meter<sup>2</sup> or 10milliVolts/meter

### Formula for the Calculation:

$$P_d = P * G / 4 * \Pi * R^2$$

Where,

$P_d$  = Power density at the FCC Monitoring Station Antenna, dBW/meter<sup>2</sup>

$P$  = Earth Station Transmit Power, dBW

$G$  = Gain of the Earth Station Antenna Toward the Monitoring Station Antenna,  
= 32 -25\*Log( $\theta$ ), or -10 dB which ever is larger, where  $\theta$  = 140.87°

$G$  = -10 dB or 0.1

$\Pi$  = 3.14

$R$  = Separation distance of the two antennas, 10,619.4 meters

From these values  $P_d$  = -87.3 dBW/meter<sup>2</sup> 1.86X10<sup>-9</sup> Watts/meter<sup>2</sup>

To convert the power density found to field strength the following formula is used.

$$F = (P_d * 377)^{0.5}$$

Where,

$F$  = Field Strength at the FCC Monitoring Station Antenna, Volts/meter

377 = Impedance of Free Space, Ohms

From these values  $F$  = 0.84 milliVolts/meter

The power density and field strength values calculated at the FCC monitoring antenna are well below the criteria set for coordination. Therefore, the proposed earth station should be acceptable to the FCC as proposed.