

NSL Ground Station EMC Analysis

Introduction and Summary

The purpose of the NSL Ground Station is to send basic telecommands to small educational satellites. The ground station is located near Upland, Indiana, about 2 miles south of Taylor University, in a rural area with a mix of forests and fields. It is a 1.5 meter diameter dish antenna, beam width 5.3 degrees, 30 dBi gain, and will operate on 2467 MHz. The elevation will be constrained to 60 degrees or above at all times, to hold Doppler shift within acceptable limits. This elevation constraint also reduces signal strength to the surroundings below a level of concern.

Test measurements indicate that at nearby locations on the azimuth of the beam, on the transmission frequency, and a distance of less than a half mile from the antenna, no emissions are detected using a -114 dB detection floor. The local operator of commercial wifi has indicated that no interference to his operation will result from operation of this transmitter. There are less than 10 residences within the radius of detection.

Based on this, our analysis shows that no harmful interference can be expected to occur from operation of this transmitter.

Test Measurements

Observations of signal strength were made August 25, 2018. Figure 1 shows location, distance from antenna and signal strength values for the observations. The transmitter was set to transmit at the operating nominal level of 158 Watts EIRP, center beam.

Testing was done with a 3dB omni 5' above ground



Figure 1 Signal Strength Measurements for NSL Ground Station Antenna

The signal strength data was obtained with test equipment having a noise floor of -114 dB.

Table 1 summarizes some of the data taken.

Data Point	Distance from Antenna, m	Degrees Azimuth from Center Beam	Signal Strength dBW	Comments
1	129	0	-50	
2	258	0	-86	
3	580	0	-107	
4	846	0	-114	Noise Floor of Test Instrument
5	210	-45	-92	
6	299	+30	-94	
7	127	+90	-89	