

Terrestrial line-of-sight Communications Link Test
Boeing Proprietary

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Submitted by

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This experimental license is required to continue testing necessary to evaluate the effects of weather and other atmospheric phenomena on high frequency data link communications. This test will allow full understanding of the impact that rain and other weather conditions have on these point-to-point links, which operate in the 92-95 GHz band. In order to produce accurate results from this study, one cannot rely on conventional regional weather reports. It is absolutely necessary to record highly accurate localized weather statistics, in conjunction with monitored link performance data. To date the effects of seasonal weather has been analyzed over a 6 month period, previously licensed under STA WC9XPG, but additional analysis is required to fully evaluate data link performance in all conditions.

The test will use a completely automated monitoring system capable of recording weather data that accurately depicts the test environment as well as corresponding RF signal strength. This data will serve as the foundation of the study and ultimately validate the results.

As depicted in Figure 1-1, the system will consist of a wireless weather station (temperature, humidity, atmospheric pressure, and wind speed/direction), a highly accurate optical rain/snow/precipitation sensor, two power meters, and a

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PC for data logging and analysis. A single weather station and optical rain/snow gauge is sufficient for a test link of up to 2.5km since the average rain cell is approximately 2.5km in diameter. In this test, the two sites will be 1 km apart. The weather station console/receiver and data logging PC will be placed in the Boeing Herndon office located at 460 Herndon Pkwy, Herndon, VA, within range of the wireless outdoor weather station. The PC will record data sent from the weather station to the console/receiver and run its data management and analysis software suite. The PC will also be connected directly to the optical precipitation sensor and will run a QuickCollect software package. Two power meters will be connected to the Rx antenna and will be polled automatically by the PC using custom software. One power meter will measure the received power for co-polarization and the other will do the same for cross-polarization. Throughout the duration of the study the collected data will be periodically incorporated into a complete link analysis.

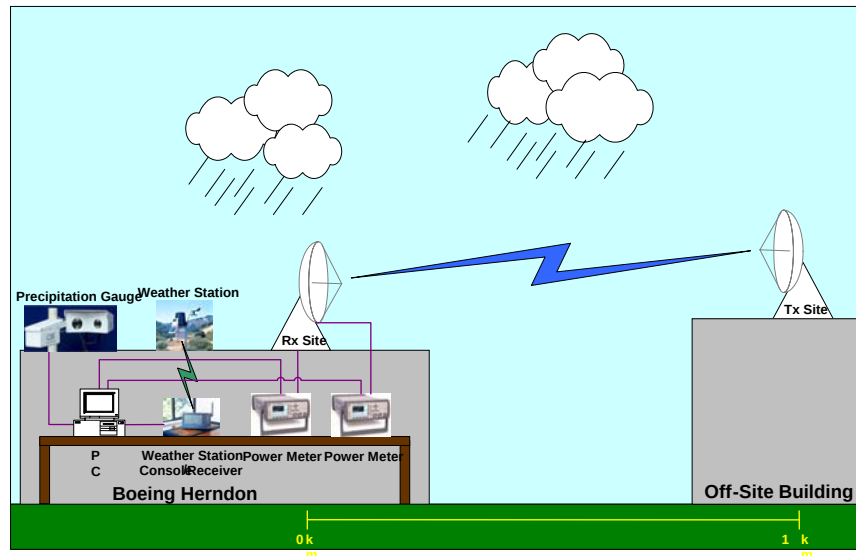


Figure 1-1: System Overview

The test will be conducted in The Boeing Company Herndon facility, which is located at 460 Herndon Pkwy, Herndon VA. This site will contain the link receive equipment as well as the weather monitoring and data collection and recording devices. The link transmitter will be located approximately 1 kilometer from the Herndon facility, on the rooftop of the building at 12120 Sunset Hills Rd, Reston, VA. The link will transmit at one of three frequencies, 93.4125GHz, 93.5 GHz, or 93.6 GHz, and will use two different modulation types. Initially the test procedure will use un-modulated continuous wave (CW), and later modulated QPSK.

The transmit equipment was built by Boeing and is depicted in Figure 1-2. The device will be roof top mounted on a tripod. The tripod will be attached to a floor plate to allow for weighting against wind loads. The weight of the transmitter and

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tripod are about 10 pounds and the wind loading is expected to be 50 lbs in a 9sq ft area (TBR). The transmitter requires 110V AC power.

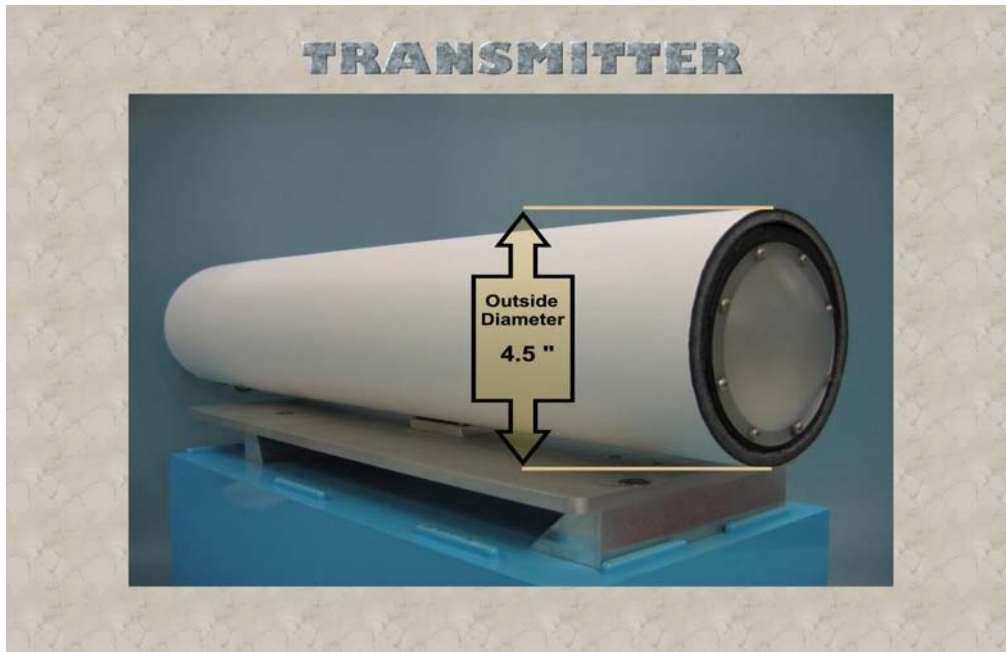


Figure 1-2

The specific equipment specifications and location data are contained in Figure 1-3.

As shown in Figure 1-1, the test set up uses a relatively low power, highly directional point-to-point link. The link is short distance and Boeing believes that the test will not cause any RF interference.

The occupied bandwidth of the emission shall not extend beyond the band limits.

The tests will be conducted periodically from December 2, 2006 through December 2, 2008.

The “Stop Buzzer” point of contact is Susan Bach, telephone: 703-467-7179.

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Equipment List and Transmitter Locations	
RF Source:	
The Boeing Company transmitter	
Source RF Output:	
24 dBm	
Frequency:	
93.4125 GHz	
93.5 GHz	
93.6 GHz	
Modulation Types:	
0K00N0N	
1G00G1D	
Transmit Antenna Specifications:	
3 inch Gaussian Lens	
Gain 35 dBi	
Beam Width 2.9 deg	
Polarization Circular	
Transmitter Information Location	
12120 Sunset Hills Rd, Reston, VA, located on roof top	
Lat/Lon: 38-57-18 N 77-21-51 W, Ground Elevation 113 meters	
Building Height: 30 meters	
Antenna Height: 32 meters	
Receive Equipment Location Information	
460 Herndon, Pkwy, Herndon VA, located on roof top	
Lat/Lon: 38-57-32 N 77-22-33 W	
Building Height: 9.4 Meters	
Antenna Height: 11 meters	

Figure 1-3