

The Boeing Company
Developmental Center
Tukwila, WA

Wide Band Satellite Simulation Operations Demonstration

Submitted 6/02/06

By

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CONFIDENTIALITY STATEMENT

See the Confidentiality Statement and Confidentiality Items Document.

PURPOSE

See the Confidentiality Items Document.

SCHEDULE

June 15, 2006 to September 15, 2006

CONTRACT NUMBER AND DESCRIPTION

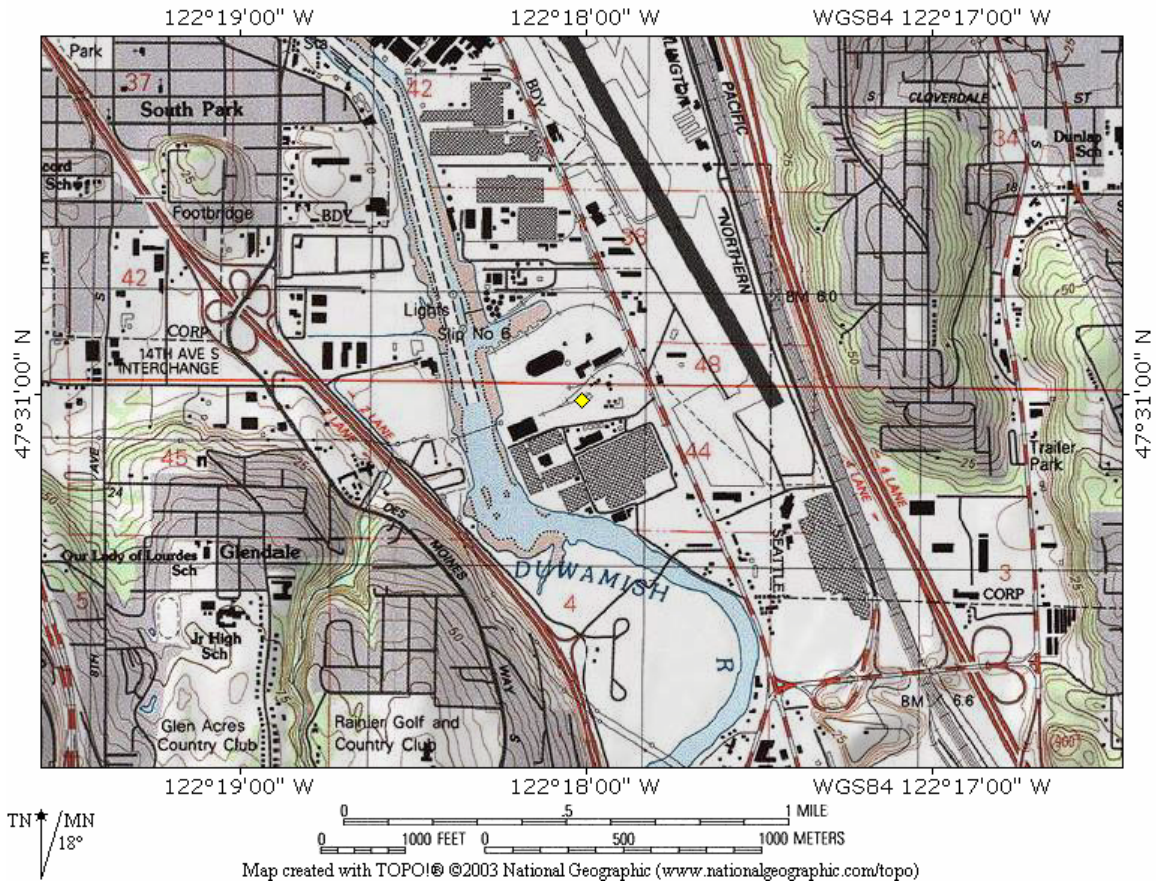
None. Independent Research and Development

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LOCATION

Boeing Developmental Center
Parking lot outside 9-53 building on Boeing property
9725 E Marginal Way S
Tukwila (KING COUNTY), WA 98108-4040
47-30-59 N
122-18-01 W
NAD83
AMSL 10 Feet

TOPO! map printed on 05/31/06 from "Untitled.tpo"



Frequencies, Emissions and RF Power

Transmit (Uplink from Ground Equipment to Satellite Simulator):

Earth Station Trailer (Integrated by Lyman Brothers, <http://www.lymanbros.com>)



29.877 - 29.997 GHz

29.752 – 29.872 GHz

29.627 - 29.747 GHz

TX Power: 250 mW (Reduced power for demonstration)

Manufacturer: Xicom, <http://www.xicomtech.com/products/kaband.htm>

Model: XTRD-150Ka

Units: 2

TX Antenna: 3.7 Meter Transportable Earth Station Antenna

Beam Width: 0.2 degrees

TX Antenna Gain: 10 dB

Polarization: Left or Right Hand Circular

Manufacturer: Andrew

Model: ESA37AP-1, <http://www.andrew.com/products/antennas/esa/6233.aspx>

TX EIRP (max): -7 dBW, 250 mW

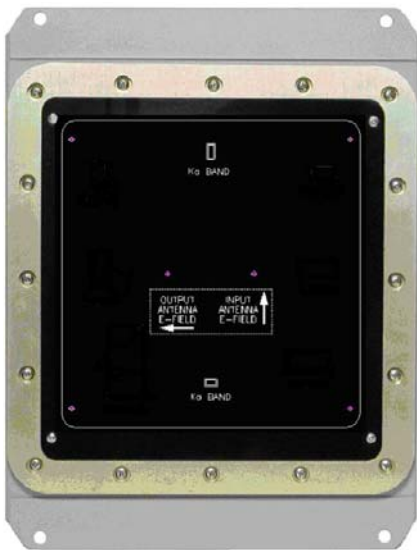
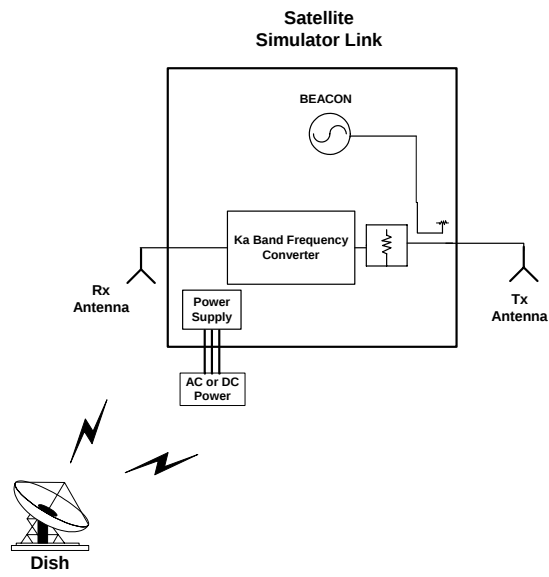
Data Rate: 200 Kbps (BPSK), 10.71Mbps (OQPSK), and 45Mbps (OQPSK)

Emissions: 200K0WXX, 10M7WXX, 45M0WXX

Transmit (Downlink from Satellite Simulator to Ground Equipment):

The Model MSS-9800-BEA Satellite Simulator provides the frequency and level shifting required to perform self-test on ground equipment without the use of the satellite. This simulator provides a single band of frequency conversion, with the added functionality of a beacon.

Simulation of the satellite link is accomplished in the Satellite Simulator by receiving signals sent from the remote antenna and then translating their frequency and power to the respective receive band. Once translated, these signals are retransmitted to the remote antenna at appropriate levels. The Multi-turn Attenuators located on the inside panel allow for adjustment of the output level and beacon level. Rotating the attenuators to higher numbers raises the level of the output, i.e. decreases attenuation. (Reference test data for correlation of dial settings to actual attenuation). Frequency Translation is accomplished in the Satellite Simulator by mixing the transmitted signal received at the input antenna with the local phase locked oscillator at 9800 MHz. The signal is then retransmitted via the respective output antenna. The uplink receive and the downlink transmit antennas are internal to the simulator.



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20.077 - 20.197 GHz
19.952 - 20.072 GHz
19.827 - 19.947 GHz

TX Power 2.5 mW

Manufacturer: Tampa Microwave, <http://www.tampamicrowave.com/>

Model: MSS-9800-BEA

Units: 1

TX Antenna Gain: 10 dB

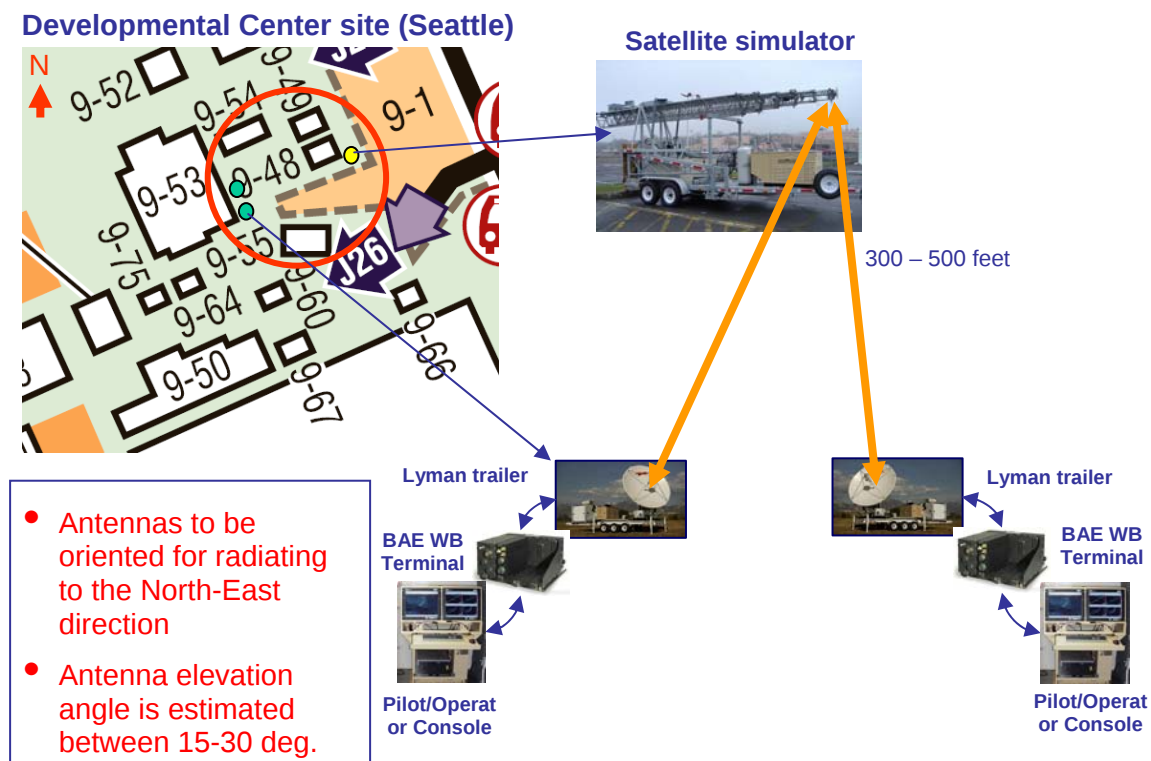
Internal antennas

TX EIRP (max): -17 dBW, 25 mW (Reduced power for demonstration)

Data Rate: 200Kbps (BPSK), 10.71Mbps (OQPSK), and 45Mbps (OQPSK)

Emissions: 200K0WXX, 10M7WXX, 45M0WXX

System Diagram



Using two 3.7 meter ground station dish antennas to transmit and receive signals to the satellite simulator located 300-500 feet away and 100 feet high. The 3.7 meter dish provide narrow beam width and low side lobe to comply with FCC regulation, Part 25. Satellite simulator is a “bent pipe” that simulates the behavior/operation of a commercial satellite at low power.

The system configuration consists of:

1. Two 3.7 meter dishes and associated electronic equipment on the trailers located in the parking lot.
2. One satellite simulator mounted atop the 100 foot tower at about 300 to 500 feet away.
3. The uplink path transmission direction is to the northeast with an up tilt of 15 to 30 degrees.
4. The downlink path transmission direction is to the southwest with a down tilt of 60 to 75 degrees.

Stop Buzzer Contact

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