

## **ATTACHMENT 1**

### **TECHNICAL DESCRIPTION OF THE Ka-BAND SATELLITE SIMULATION TEST RANGE**

#### **A. PURPOSE**

The first SPACEWAY satellite will be launched during the first quarter of 2005 to provide commercial service to North America during the middle of 2005. SPACEWAY is a next generation satellite system which will operate in Ka-band spectrum globally allocated for the Fixed-Satellite Services. The SPACEWAY system will employ new technologies for on-board digital processing, packet switching and spot-beams that do not yet exist on any satellite that is currently available.

Hughes Network Systems, Inc. ("HNS") is developing a Ka-band Satellite Simulation test environment comprised of a radiated far-field test environment for testing SPACEWAY satellite user terminals ("STs") using a transmitter/receiver that will simulate a SPACEWAY satellite on the ground ("Satellite Simulator Terminal"). Because HNS's Ka band satellites have not yet been launched, this test environment is necessary to allow HNS to test the user terminals designed for this unique satellite system. Such testing is designed to ensure that the technical and operational system performance specifications and features of the STs are met. The following sections of this Attachment describe this test facility and the modifications now sought.

HNS seeks authorization for the proposed Test Range 1 modifications and new Test Range 2 characteristics on or before August 15, 2004 so that the performance of these various SPACEWAY user terminal types can be thoroughly analyzed.

#### **B. TEST FACILITY DESCRIPTION**

On May 10, 2004, HNS was granted an Experimental License, Call Sign WD2XFP, File Number 044-EX-ST-2004, to conduct field range antenna tests simulating SPACEWAY operations.

In the instant application, HNS seeks authorization to modify some of the characteristics of this first test range, and to add a second test range to this license.

##### Existing Range ("Test Range 1"):

Test Range 1 is 656 feet long and supports the testing of antennas that are elliptical 66cm and 74cm in equivalent diameters respectively and 98cm circular diameter (see Figure 1). Test Range 1 is located at HNS Headquarters at 11717 Exploration Lane, Germantown, Maryland. These transmit/receive terminals are located at 39°10'45.9" North Latitude and 77°14'49.1" West Longitude on the ground near the D Building of HNS Headquarters.

The test STs transmit signals in the frequency band from 29.5 GHz to 30.0 GHz utilizing two types of transmitters (2.1 Watts and 3.5 Watts) and three different antennas: 98 cm circular, 74 cm elliptical, and 66 cm elliptical. The maximum output power of these transmitters is limited to 0.5 Watts. The emission designators of these signals are 650KG7W, 2M61G7W and 20M9G7W using QPSK modulation. The current authorization is for use of forty 2.1 Watt transmitters and forty 3.5 Watt transmitters, however, only one ST transmits using a single carrier at any given time.

The SPACEWAY Satellite Simulator Terminal employs a 74 cm antenna connected to a satellite payload emulator. This terminal is located at 39°10'43.4" North Latitude and 77°14'41.4" West Longitude on the roof of the D building. This Satellite Simulator Terminal transmits a broadband QPSK modulated carrier with an emission designator of 500MG7W centered at 19.95 GHz. The transmit input power to the 74cm Satellite Simulator Terminal antenna will be limited to a maximum of 10 nanowatts.

On Test Range 1, HNS requests authority to use two new antenna sizes having circular diameters of 1.2 meter and 1.8 meter respectively, and three new types of transmitters having a maximum output power of 2.2 Watts, 4.0 Watts and 10.0 watts respectively. There will be a quantity of 40 for each kind of transmitter. All these transmitters will be tested with all the antennas except the 10 Watt transmitter will be tested only with the 1.8 meter antenna. At a given instant, only one ST will be transmitting, and only transmitting up to the maximum power. Also under this modification, HNS requests to replace the 74cm with a 98cm antenna for the Satellite Simulator Terminal.

#### New Test Range ("Test Range 2"):

Test Range 2 is 14,804 feet long and will support the testing of an ST located at 39°10'45.40" North Latitude and 77°14'52.29" West Longitude on the roof of the AC3 building of HNS Headquarters. Figure 2 shows Test Range 2 along with Test Range 1 (as modified per the above request).

The Test ST will transmit signals in the frequency band from 29.5 GHz to 30.0 GHz utilizing two types of transmitters (10 Watts and 125 Watts) and a fixed 3.5m circular diameter antenna. The emission designators of the test carriers will be 650KG7W, 2M61G7W and 20M9G7W using QPSK modulation. This application requests authority to use ten 10 Watt transmitters and ten 125 Watt transmitters. However, only one ST will transmit at any given time using a combination of no more than 12 of the above test carriers,.

The power at the antenna flange, for all the transmitters above, will be limited to 1 Watt for 650KG7W, 4 Watts for 2M61G7W and 35 Watts for 20M9G7W in order to be in compliance with FCC Rule 25.138.

The SPACEWAY Satellite Simulator Terminal for Test Range 2 employs a 1.8 m antenna connected to a satellite payload emulator. This terminal will be co-located at 39°10'45.40" North Latitude and 77°14'52.29" West Longitude on the roof of the AC3 building at HNS's Headquarters. This Satellite Simulator Terminal will transmit a broadband QPSK modulated carrier with an emission designator of 500MG7W centered

at 19.95 GHz. The transmit input power to the 1.8m Satellite Simulator Terminal antenna will be limited to a maximum of 50 milliwatts.

The test ST for Test Range 2 will transmit to a passive repeater located on the roof of the one of HNS's leased buildings at 100 Lakeforest Blvd, Gaithersburg, MD 20876. This passive repeater will be comprised of a pair of 74 cm antennas. This repeater will be specifically located at 39°9'8.13" North Latitude and 77°12'32.9" West Longitude.

#### C. INTERFERENCE TO OTHER SERVICES

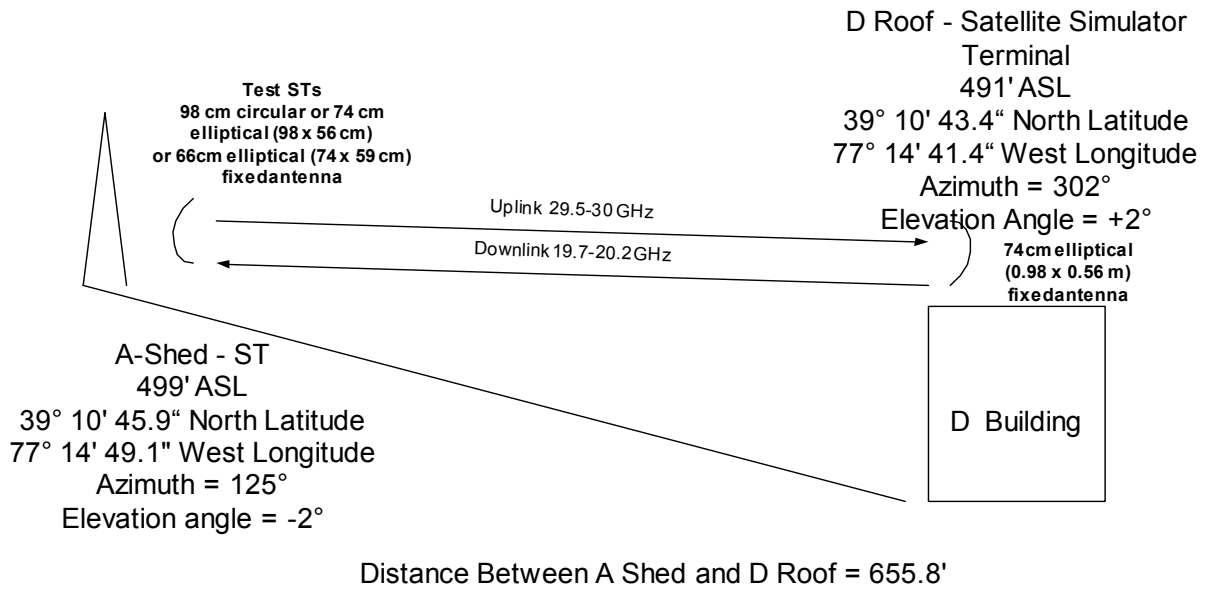
The modifications to Test Range 1 and the new Test Range 2 proposed by this application are not likely to cause interference to any other licensed services or systems. The particular Ka-band frequencies HNS requests are not allocated to terrestrial systems, so the earth station transmissions will not cause interference to any licensed terrestrial systems. The only commercial or government satellite system currently operating over the US in this portion of the Ka-band, of which HNS is aware is ACTS (may have been de-orbited) and ANIK F2; however, all transmissions in this proposed test range will operate at very low elevation angles (*i.e.* close to two degrees. See Figure 1). Operation at this low elevation will ensure that interference is not received by any satellite systems that may be operating in this portion of the Ka-band.

#### D. RF RADIATION COMPLIANCE

The operation of these transmit/receive terminals at the HNS satellite simulation test facility will be in full compliance with the Commission's radio frequency (RF) exposure guidelines, pursuant to Section 1.1307(b)(1) through (b)(3) of the Commission's rules. Attachment 2 provides the radiation calculations for the all these various types of terminals using the maximum power of the transmitter to be tested in this facility. These analyses show that the power density levels will not exceed the Maximum Permissible Exposure (MPE) limit of 5 milliwatt per centimeter squared for the persons in Occupational/Controlled environment as specified in the Office of Engineering and Technology (OET) Bulletin No. 65 except in the region between the feed and the reflector. To ensure compliance with the FCC MPE limit, the terminal transmitter will be turned off whenever test personnel are required to work within this potentially hazardous area, and the terminals will be operated in a manner to prevent exposure to the general public and the radiation hazard caution signs will be posted.

#### E. TIMING

HNS seeks authorization for the proposed Test Range 1 modifications and new Test Range 2 characteristics on or before August 15, 2004 so that the performance of these various SPACEWAY user terminal types can be thoroughly analyzed.



## Satellite Simulation Farfield Range

Figure 1 – Test Range 1

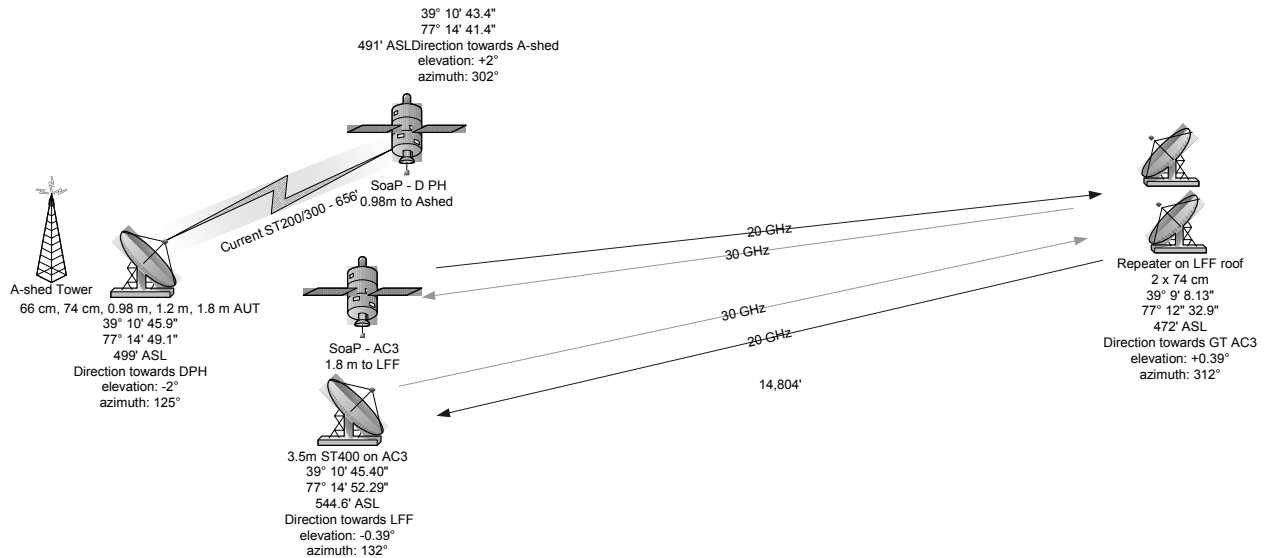


Figure 2 – Test Ranges 1 and 2 Combined