ATTACHMENT 1

TECHNICAL DESCRIPTION OF THE Ka-BAND TEST RANGE

A. GENERAL

Hughes Network Systems, Inc. ("HNS") has over the past five years been developing broadband communication equipment for use in the Ka-band. To ensure the successful performance of this new hardware, HNS sought and was granted an experimental authorization to perform a variety of ground based tests and simulations to evaluate the technical and operational system performance specifications and features of the Ka-band equipment (Call Sign WD2XFP)[1].

On February 7, 2005, the Commission granted an application seeking consent to assign the underlying experimental facility at issue here, WD2XFP, from HNS, Inc. to HNS License Sub, LLC. That granted application, File Number 0034-EX-AU-2004, also sought authority to assign to HNS License Sub, LLC all applications for related experimental special temporary authorizations ("STAs") and all applications for related modified or extended experimental authorizations that may be granted prior to the consummation of the assignment of WD2XFP, such as the authority sought here. This application for a license modification with respect to WD2XFP is being filed prior to the consummation of the assignment of WD2XFP to HNS License Sub LLC. HNS License Sub LLC is filing this application in its own name, because the licensee of WD2XFP has already been changed in the OET electronic filing system.

To date, this testing has been done via terrestrial repeaters and satellite simulators since few in-orbit Ka-band spacecraft have been available to use for this testing. However, since the start of HNS's test program, a few satellite operators have launched and several are planning to launch commercial satellites having Ka-band capacity.

HNS wishes through this modification to augment the current test facility to include testing of terminals through available in-orbit Ka-band capacity.

B. TEST OBJECTIVES

Through testing of the Ka-band earth station equipment using an in-orbit satellite, HNS expects to accomplish the following objectives:

a. verify the impact to modulation characteristics of transmission over satellite (eg. timing, group delay, spectrum spreading);

[1] Experimental license modification to call sign WD2XFP, file number 0051-EX-ML-2004 was approved 11/17/2004.

b. verify that deployment of a moderate number of small earth stations meets the expected pointing error requirements;

c. monitor actual Ka-band rain fade statistics in certain key regions;

d. verify the performance characteristics of the ground equipment.

C. TEST FACILITY DESCRIPTION

Current Test Facility
The current test facility is located at the Headquarters of Hughes Network Systems at 11717 Exploration Lane, Germantown, Maryland and will remain unchanged.

Additional Test Facility:
The proposed addition to the test facility would include the addition of two 350 cm hub antennas[2] to be located at Exploration Lane and another similar 350 cm antenna to be located at One Aeroway Lane in North Las Vegas. The hub antennas will be used to communicate with each other or with any of the remote terminals listed in the Table 1. All 350 cm antenna will be installed in a controlled environment.

TABLE 1 – Remote Antennas

Antenna Model Number	Antenna Manufacturer	Antenna Dimensions	Transmit Gain	Receive Gain	Quantity
		(cm)	(dBi)	(dBi)	
HNS1031929	Prodelin	74 effective (98x56 cm)	45.6	42.2	50
3980-131	Prodelin	98 cm	48.0	44.6	25
3120-131	Prodelin	120 cm	49.8	46.4	10
3180-131	Prodelin	180 cm	53.3	49.9	10

Both the hub and remote terminals will transmit signals in the frequency band from 29.5 GHz to 30.0 GHz and receive signals in the band 19.7 to 20.2 GHz. Emissions of the hub will vary in bandwidth from 250 kHz to 39 MHz (QPSK). The emission codes that will be most used are: 250KG7W, 320KG7W, and 39M0G7W. Should any other emission codes be used during testing, the transmitted power will be adjusted such that the nominal EIRP density is not exceeded.

Each of the remote antennas listed in Table 1 are fully compliant with FCC Part 25.209 and are compliant with the FCC's blanket licensing rules as provided in Part 25.138. As well, the terminals listed above have been previously approved for terrestrial testing as part of the current license for WD2XFP. While the majority of the small antennas listed in Table 1 will be located in the vicinity of the Germantown or North Las Vegas hubs,

[2] Andrew 350 cm antenna, model number ES35SRT-1, transmit gain of 58.9 dBi, receive gain of 55.5 dBi.

HNS requests permission to also test the remote terminals in Table 1 anywhere in the continental United States in order to allow objectives (b) and (c) as listed above to be conducted.

Since HNS intends to conduct tests for short periods of time over the next two years, it is unclear which satellite operator will have available capacity at the time of the tests. For this reason, HNS requests permission to conduct tests over any visible satellite having Ka band capacity.
The EIRP that will be transmitted towards this satellite is summarized in Table 2. The Nominal EIRP levels listed in Table 2 ensure compliance with Part 25.138(a)(1), 25.138(a)(2), 25.138 (a)(4) and 25.138(a)(6). The peak EIRP is only used by an uplink power control system during fading events and its use fully complies with the Part 25.138 (a)(5). HNS undertakes to comply with the limitations placed on the space segment by the provider as a result of satellite coordination.

TABLE 2 – EIRP

Antenna Serial Number	Antenna Size	EIRP (Nominal)	EIRP Density (Nominal)	EIRP (Peak)	EIRP Density (Peak)
	(cm)	(dBW)	(dBW/40 kHz)	(dBW)	(dBW/40 kHz)
HNS1031929	74 cm	42.8	33.7	48.6	39.6
3980-131	98 cm	45.2	36.1	51.0	42.0
3120-131	120 cm	47.0	37.9	52.8	43.8
3180-131	180 cm	50.7	41.6	56.5	47.5
ES35SRT-1	350 cm	76.9	47.0	77.9	48.0

D. INTERFERENCE TO OTHER SERVICES

The modification to the test facility proposed by this application abides by the blanket licensing requirements as listed in Part 25.138 and should thus not cause interference to other licensed FSS satellites operating in Ka-band. HNS undertakes to comply with the limitations placed on the space segment by the provider as a result of satellite coordination.

E. RF RADIATION COMPLIANCE

Remote Antennas (74 cm, 98 cm, 120 cm, 180 cm)
The operation of these transmit/receive terminals 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. The attachments to this application provide the radiation calculations for the all the various types of terminals using the nominal (clear sky) power of the transmitter to be tested. These analyses show that the power density levels will not exceed the Maximum Permissible Exposure (MPE)

limit of 1 milliwatt per centimeter squared for the general public as specified in the Office of Engineering and Technology (OET) Bulletin No. 65 except in the region between the feed and the reflector. Safety of the general public is assured by an installation procedure which prevents the public from gaining access to the region between the feed and the antenna reflector.

Hub Antenna (350 cm)

The operation of the hub 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. An attachment to this application provides the radiation calculation for the 350 cm hub antennas. This analysis makes use of the nominal (clear sky) power and takes into account the fact that all such antenna are located in a controlled environment. This analysis shows that the power density levels will not exceed the Maximum Permissible Exposure (MPE) limit of 5 milliwatt per centimeter squared for 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.