

HNS License Sub, LLC  
Attachment A to STA Application  
File Number: 0207-EX-ST-2005  
Dated: April 26, 2005

## **Attachment A**

### **DirecWay on the Move**

#### **Background**

The deployment of American troops overseas has brought forward requirements from the Department of Defense for small, high throughput terminals that can be used by local commanders for command, control communications, computers and intelligence surveillance and reconnaissance (C<sup>4</sup>ISR). General Dynamics, in an effort to meet this need, has constructed prototype satellite terminals that are mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV). To test these vehicle-mounted satellite terminals, a special temporary authority (STA) was granted by OET<sup>1</sup> allowing the functionality of the prototype vehicle to be developed and demonstrated to military operational, technical and procurement staff. As a result, the U.S. Marine Corps has deployed two such prototype units in Iraq, and General Dynamics has received orders from the U.S. Army and Marine Corps for additional units.

Hughes Network Systems, LLC, the parent company of HNS License Sub, LLC (“HNS”), has been granted permission by General Dynamics to borrow its vehicle-mounted satellite terminals and to integrate baseband equipment from the DirecWay 7000 product line that would extend to the mobile terminals the same functionality available to HNS’ fixed VSAT terminals. In this application, HNS seeks authorization to operate up to two of these mobile terminals in the DirecWay system to communicate by satellite with its HNS’ Germantown hub station.

Most of the salient technical characteristics of these terminals have already been approved. *See* General Dynamics experimental license application, OET File No. 0640-EX-ST-2004 (granted 11/24/2004). For the sake of completeness, these characteristics are repeated below, along with other relevant parameters.

#### **Equipment**

The RF equipment consists of a 60 cm transmit/receive antenna having a transmit gain of 36.8 dBi that is mounted on a gyro-stabilized platform. The mount and antenna

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<sup>1</sup> General Dynamics experimental license application, OET file number 0640-EX-ST-2004, granted 11/24/2004, call sign WC9XAP.

are enclosed in a radome which is connected to the frame of the prototype HMMWV. The transmitter, which is attached to the boom arm of the antenna, is rated at 15 Watts RF. As a result, the peak e.i.r.p. is of 48.6 dBW (72 kW) which corresponds to an e.r.p. of 46.4 dBW (44 kW). The RF equipment is identical to that approved by OET for use by General Dynamics under its experimental authorization, WC9XAP.

The baseband equipment located on the HMMWV consists of an HNS manufactured, DirecWay 7000 series terminal identical to those currently manufactured for consumer applications. When used in a consumer application, the baseband terminal is used with a fixed or temporary fixed antenna to provide a TCP/IP link with an HNS VSAT hub station. For this particular case, the terminal will operate using QPSK modulation varying from 128 to 1024 ksymbols/sec using a bandwidth from 200 kHz to 1.6 MHz. In all cases, the e.i.r.p. density transmitted by the terminal will remain constant at 22.8 dBW/4kHz.

### **Frequency**

The terminal located on the HMMWV transmits in the frequency band 14.0 to 14.5 GHz and receives in the frequency band 11.7 to 12.2 GHz. For the purpose of this testing and demonstration, a dedicated 1.6 MHz channel will be assigned on either of Galaxy 10-R or SATMEX-5. At the time of the submission of this STA, a final frequency had yet to be selected. Therefore, HNS requests authority from OET to use any 1.6 MHz channel that will be assigned by the satellite operator in the FSS allocation ranging from 14.0 to 14.5 GHz.

### **Operation**

HNS requests permission to operate the mobile terminal in conjunction with the HNS VSAT hub located in Germantown, MD. This hub has been licensed for VSAT operation by the International Bureau of the FCC and is identified under call sign E000166. While the E000166 hub is licensed to provide VSAT service in the U.S. on multiple spacecraft, the test of these mobile terminals will be limited to either Galaxy 10-R satellite located at 123.0 West Longitude or SATMEX-5 located at 116.8 degrees West Longitude.

### **Radiation Hazard Analysis**

Enclosed in Attachment B to this STA is a radiation hazard analysis based on the methodology described in OET Bulletin 65. The operating conditions and RF equipment are identical to those authorized in the General Dynamics STA<sup>2</sup>, and as a result, the results in Attachment B are identical.

As described in General Dynamics' experimental license application, OET File No. 0640-EX-ST-2004, the terminal antennas have a very small signal beam area.

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<sup>2</sup> General Dynamics experimental license application, OET file number 0640-EX-ST-2004, granted 11/24/2004, Call sign WC9XAP.

Moreover, the terminals are mounted on the roof of vehicles and pointed upward, away from areas where personnel could enter the beam. Further, the mobile terminals are designed to cease transmission when the signal from the hub is lost due to signal fading or blockage, or due to a misoriented antenna. This antenna design mechanism ensures that the terminal does not accidentally illuminate persons that might be in the boresight of the terminal, while the vehicle on which the antenna is mounted is either stopped or in motion.

### **Adjacent Satellite Interference**

The terminal is designed to maintain a power density at the flange that complies with the -14 dBW/4kHz limit specified in Part 25.134(a)(1) of the FCC's rules.

Due to the small size of the antenna used with this prototype, it does not comply with the antenna off-axis gain mask as established in Part 25.209. The antenna gain performance is included in Attachment C to this STA.

To compensate for this non-compliance, HNS proposes to coordinate with the satellite operators involved, so as to ensure that the testing does not adversely interfere with operations on adjacent satellites. Since the testing being proposed will be limited to a few hours of intermittent use over the term of the STA requested here, HNS undertakes to advise the operation center of the adjacent satellite operators of the exact time periods during which the testing of these mobile terminals will be conducted. HNS will also provide the adjacent satellite operators with the contact information of the engineer responsible for the prototype test so that the transmission can be immediately stopped in the event of any interference.

### **Geographic Area**

HNS expects to conduct testing of the prototype in a few, controlled test ranges, where its performance can be adequately assessed. However, the demonstration of the functional product, when successfully integrated, may take place at any of a number of military bases and headquarters. For this reason, HNS requests permission to operate the mobile terminal at any location in the continental United States. Such general authorization would allow HNS to test the mobile terminals as described above without filing modifications to this STA to add deployment locations.

However, should a CONUS authorization not be possible, HNS alternatively requests that the following areas be authorized for deployment of the mobile terminal:

- a. Within a 55 kilometer radius around HNS headquarters, located at N39 10' 49" 77 14' 47";
- b. Within a 55 kilometer radius around Ft. Huachuca, Arizona, located at N31 33' 09", W110 20' 50";

- c. Within an 80 kilometer radius around Ft. Monmouth, New Jersey, located at N40 18' 25" W74 02' 24";
- d. Within a 5 kilometer radius around the Vertex RSI Richardson, Texas facility, located at N32 58' 27", W096 42' 15";
- e. Within a 5 kilometer radius around the General Dynamics facility in Tauton, Massachusetts, located at N41 57' 05", W071 07' 48";
- f. Within a 5 kilometer radius around Fort Gordon, Georgia, located at N33 24' 36", W082 08' 24";
- g. Within a 5 kilometer radius around VertexRSI facility in Duluth, Georgia, located at N33 55' 10", W084 16' 12"; and
- h. Within a 5 kilometer radius around Coherent Systems, Fredricksburg, Virginia facility, located at N38 19' 50", W077 28' 56".