ATTACHMENT

TECHNICAL DESCRIPTION OF THE INMARSAT-3 AOR-W SATELLITE TESTS

A. PURPOSE

Hughes Network Systems, Inc ("HNS") has been contracted by Inmarsat Ventures Limited ("Inmarsat") to develop and manufacture upgraded user terminals and base station software so that Inmarsat may seamlessly migrate existing Regional Broadband Global Area Network (R-BGAN) services to the future Inmarsat 4 ("I4") satellite. The new Inmarsat satellite, Inmarsat 4 ("I4") will be launched in late 2004 and is expected to commence commercial service in 2005.

This new type of Inmarsat user terminal is not currently used in the U.S. To perform this series of tests on its manufactured terminals, HNS requests experimental authority to test a limited number of these terminals in the United States prior to the launch of I4. These tests will use the existing Inmarsat 3 Atlantic Ocean Region-W ("I3 AOR-W") satellite located at 54° W.L. to simulate future I4 operations. The proposed testing is designed to ensure that the system technical performance and features of these terminals are met under all conditions. Specifically, the tests to be conducted will demonstrate the correct performance of the upgraded terminals, ensure their correct operation at very low look angles, and assess enhanced terminal position location features.

B. TEST FACILITY DESCRIPTION

The test facility consists of the space segment, the user terminal segment, and the base station segment.

B.1 Space Segment

The space segment consists of the I3 AOR-W satellite located at 54W. The frequencies to be used for this test have already been assigned to, and are being used by Inmarsat pursuant to the existing five-party coordination agreement. The satellite characteristics are as follows:

- (terminal to satellite) The L-band spectrum bandwidth has a Return/Uplink range of 1626.5 MHz to 1660.5 MHz, and a Forward/Downlink frequency range of 1525 MHz to 1559 MHz. Terminals access the system through frequencies on a global beam and data is exchanged over frequencies that are assigned by the network.

  The actual L-band frequencies to be used during the I3 AOR-W tests have the following characteristics:
  a) Global Beam Allocation:
  From 1537.0 MHz to 1541.5 MHz for Forward/downlink allocations
  From 1638.5 MHz to1643.0 MHz for Return/uplink allocations
  The Carrier Bandwidth for the Global beam carrier is 31.25 kHz.

b) Spot Beam Allocation:
From 1525.15 MHz to 1525.65 MHz for Forward/downlink allocations
From 1626.65 MHz to 1627.15 MHz for Return/uplink allocations
From 1529.2 MHz to 1529.535 MHz for Forward/downlink allocations
From 1630.7 MHz to 1631.035 MHz for Return/uplink allocations
From 1548.32 MHz to 1548.55 MHz for Forward/downlink allocations
From 1649.82 MHz to 1650.05 MHz for Return/uplink allocations
In a spot beam there are 2 types of carriers, one control carrier with Carrier Bandwidth of 31.25 kHz and other traffic carrier with Carrier Bandwidth of 156.25 kHz.

- (satellite to base station) C-band starts from 6424 MHz to 6459 MHz in the Uplink direction and 3599 MHz to 3629 MHz in the Down Link direction.

- C/L Transponder:
  G/T: -10 dB/K
  EIRP: 48 dBW on spot beams + 39 dBW on Global beam
  NPR: 14 dB
  Gain: Nominal – 167 dB
  Min – 153 dB
  Max – 177 dB

- L/C Transponder:
  G/T : -3 dB/K on Spot beams & -10 dB/K on Global beam
  EIRP : 2 x 27 dBW on Global beam
  NPR : 22 dB
  Gain : Nominal – 159 dB
  Min – 142 dB
  Max – 175 dB for Spot beam and 165 dB for Global beam

- Gain stability:
  Short Term: 2 dB p-p in 24 hours
  Long Term: 3 dB p-p in 1 year

- Gain Flatness
  0.75 dB p-p /100 kHz and 1.5 dB p-p over channel

B.2 User Terminal

A maximum of seven total terminals will be required for this test program. The characteristics of these identical user terminals are as follows:

- Type of the transmitter - Hughes Model 9101 Regional BGAN Satellite IP Modem

- Transmitter power:
  - For Bluetooth interface - Power Class 2, Maximum Power 2.5 mW (4 dBm), Minimum Power 0.25 mW (-6 dBm), Nominal Power 1 mW (0 dBm)

- For Satellite terminal - Maximum power into the antenna will be 0.63 W (-2 dBW). Internal Antenna Gain will be 14dbi maximum and External Antenna Gain will be 21.3dBi maximum.

- Internal Antenna beam width at 3dB (Rx and Tx**)**
  a. Rx (36 degrees +/- 10%)
  b. Tx (36 degrees +/- 10%)

- Total equivalent noise temperature of the receiver, K degrees –System Noise temperature: 16.2dB/K Min; Operating Range: -10 deg to +55 deg C.

- Maximum density of the power with internal Antenna, (dBW/4kHz) - 6.2dBW/4kHz

- External Antenna beam width at 3 dB (Rx and Tx)
  a. Rx (16 degrees +/- 10%)
  b. Tx (16 degrees +/- 10%)

  Complies with following Mask:
  +/- 16 degrees Gain 21dBi
  16 – 21 degrees Gain 8dBi
  21 – 51 degrees Gain (41 – 25log(theta) dBi
  > 51 degrees Gain –3dBi

  - Maximum density of EIRP with external Antenna will be 13.5dBW/4kHz

HNS proposes to operate the terminals at two locations using an external antenna:

- Hughes Network Systems San Diego Facility – located at 10450 Pacific Center Ct. in San Diego, CA 92121. At most, two terminals will be operating at this location.

- Hughes Network Systems Lake Forest Facility - located at 100 Lake Forest Blvd. Gaithersburg MD, 20879. The terminals that will be associated with this facility will be either operated at this location, or moved around to different locations in a radius up to 60 kilometers around this address during testing. At most, five terminals will be operating within the above mentioned radius.

At the application level, all tests would involve the transmission and receipt of Internet Protocol ("IP") data packets. The user terminal will be connected to a computer (PC) and the user terminal will be perceived as a modem by the computer.

B.3 Base Station

The Base Station to be used during the tests is located in Fucino, Italy. It communicates with the satellite over the C-Band.

The Base Station provides all the RF equipment, channel unit equipment and network switching equipment. Besides the transceiver equipment, the Base Station is responsible for radio

synchronization, resource and channel management and providing the interface for the IP packets received or transmitted by the terminal to be relayed to the public internet.

HNS is applying for an STA simultaneously with this application so that it may start executing these tests as soon as possible.

C. INTERFERENCE TO OTHER SERVICES

The test environment proposed with these upgraded terminals is not likely to cause interference to any other licensed service or systems. The particular L-band frequencies HNS requests are already assigned to and are being used by Inmarsat pursuant to the existing five-party coordination agreement. Furthermore, Inmarsat has conducted certain tests and simulations associated with current versions of these terminals and the service migration system using the Inmarsat 3 Indian Ocean Region satellite located at 25 E and no interference events were experienced. The current user terminal has been in commercial service in Europe and the Middle East for 13 months, it is CE certified and has the ITU GMPCS-MoU mark. Additionally, the external antenna has also been commercially deployed (albeit on different terminals). For these reasons, HNS does not expect any interference with licensed operations during the testing of these upgraded terminals.

D. RF RADIATION COMPLIANCE

The operation of these user terminals will be in full compliance with the Commission's radio frequency (RF) exposure guidelines, pursuant to Table 1 of Section 1.1307(b)(1) which states routine environment evaluation is not required for Experimental Radio Services if the power is less than 100 Watts ERP. The maximum power from these terminals will be 51.8 Watts ERP. Also, these user terminals will be secured from access by the general public and will be operated by experienced test personnel.