

ATTACHMENT

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

A. PURPOSE

Telenor Satellite Services ("TSS") has been asked by Inmarsat Ventures Ltd. ("Inmarsat") to participate in a test program for the use of Inmarsat's Regional Broadband Global Area Network ("R-BGAN") services with the Inmarsat 3 ("I3") satellites. Hughes Network Systems, Inc ("HNS") has been contracted by Inmarsat to develop and manufacture upgraded user terminals and base station software so that Inmarsat may seamlessly migrate existing R-BGAN services to the future Inmarsat 4 ("I4") satellite. The new I4 satellites will be launched in late 2004 and are expected to commence commercial service in 2005.

This new type of Inmarsat user terminal is not currently used in the U.S. To participate in this R-BGAN test program, TSS 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 1537.000 MHz to 1541.500 MHz for Forward/downlink allocations.

From 1638.500 MHz to 1643.000 MHz for Return/uplink allocations.

The Carrier Bandwidth for the Global beam carrier is 31.25 kHz.

b) Spot Beam Allocation:

From 1525.150 MHz to 1525.650 MHz for Forward/downlink allocations

From 1626.650 MHz to 1627.150 MHz for Return/uplink allocations

From 1548.150 MHz to 1548.650 MHz for Forward/downlink allocations

From 1649.650 MHz to 1650.150 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 six 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 two types of equipment are filed. The ranges are; -4 to -2 dbw; -10 to -4 dbw Peak power into the antenna. Internal Antenna gaining 14dbi maximum. And External Antenna Gain of 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 $(41 - 25\log(\theta))$ dBi

> 51 degrees Gain -3dBi

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

TSS proposes to operate the terminals at its headquarters located at 1101 Wootton Parkway, Rockville, Maryland 20852, and at customer sites throughout the United States.

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.

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 TSS 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, TSS 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.