Request for Experimental Authority

Thales Defense & Security, Inc. ("Thales") herein requests experimental authority to demonstrate and test earth station facilities in connection with Iridium's non-geostationary satellite orbit space station constellation (Call Sign S2110) in the manner described below.

Thales seeks authority for a period of twenty-four (24) months.

The twenty (20) VF700BM earth station terminals are proto-type terminals that will be fixed to the building, at each location. The ten (10) MF700BV earth station terminals are proto-type terminals that will be fixed to the building, at each location. The proposed experimental earth station terminals will use electronic beam forming technology. The project will enable Thales to validate this electronic beam forming technology and Waveform(s) and Extended waveform(s) on the space station constellation.

Necessary Bandwidth Description

The necessary bandwidth is determined by the frequency channelization that Iridium uses and is filed with other Iridium licenses. The frequency of a center of an Iridium channel can be calculated by this equation. There are 270 channels numbered 1 to 270 for transmit and 7 more that are receive only.

$$chan_{frequency} = 1616 \times 10^6 + \Big((41.6666 \times 10^3) \times \big((chan_{number} - 1) + 0.5\big)\Big) MHz$$

Directional Antenna Information

The antenna consists of multiple electronically steered beams so the azimuth can be in any direction. The typical beamwidth is 60 degrees. The maximum gain is based on elevation angle as per the table below. The gain is the total gain from the Transceiver Modem (BCX) component (input to antenna) which is max of 6dBm to reach the EIRP (dBW) the specified antenna Gain is used.

Antenna Gain	Angle over horizon	EIRP
41.2	90 (overhead)	16.8
41.0	80	15.8
40.4	70	13.8
41.1	60	16.3
41.1	50	16.3
40.4	40	14
40.9	30	15.6
40.9	20	15.6
40.4	10 and below	13.8

Ground station locations:

(1) Clarksburg, MD
39 13 45 N latitude 77 16 45 W longitude
22605 Gateway Center Drive
Clarksburg, MD 20871

Table 1: Particulars of Operation

Lower Freq. (MHz)	Upper Freq. (MHz)	Input Power (milliWatts)[1]	ERP (Watts)[2]	Mean/ Peak	Freq. Tolerance (%)	Station Class
1618.725	1626	0.120	4.8	Mean	0.0021	Fixed
1618.725	1626	0.120	4.8	Mean	0.0021	Fixed
1618.725	1626	0.120	4.8	Mean	0.0021	Fixed
1618.725	1626	0.501	20.2	Mean	0.0021	Fixed
1618.725	1626	1.0	40.4	Mean	0.0021	Fixed
1618.725	1626	0.838	9.0	Mean	0.0021	Fixed
1618.725	1626	0.838	9.0	Mean	0.0021	Fixed

[1] **NOTE:** defined as the nominal mean power input from the BCX into the antenna.

[2] **NOTE:** ERP (dBW) = EIRP (dBW) – 2.15 dB.

Table 2: Emission Data

Emission Designator	Modulating Signal	Necessary Bandwidth (KHz)
41K7Q7W	25,000	41.7
41K7Q7W	30,000	41.7
83KQ7W	60,000	83
333KQ7W	240,000	333.33
666KQ7W	480,000	666.67
333KQ7W	25,000 X 7	333.33
666KQ7W	25,000 X 14	666.67

Table 3: Waveforms and types of antennas used as well as the number of carriers

Waveform	Modulation Scheme	Antenna Type	Number of Carriers
B1 (Block 1)	DEQPSK	HGA	1
C1 (NEXT)	QPSK	HGA	1
C2 (NEXT)	QPSK	HGA	1
1XC8 (NEXT)	16 APSK	HGA	1
2XC8 (NEXT)	16 APSK	HGA	2
B8 (open port)	DEQPSK	HGA	8[3]
B16 (open port)	DEQPSK	HGA	16[4]

[3] **NOTE:** Transmits 7 carrier signals. The highest carrier (8^{th}) is not used on uplink.

[4] **NOTE:** Transmits 14 carrier signals. The 8^{th} carrier and 16^{th} carrier are not used on uplink.