Thales InFlyt Experience
Exhibit A

Experimentation Description of Application for a Fixed Antenna Earth Station (AES)

Thales InFlyt Experience, a subsidiary of Thales USA, Inc. seeks an experimental license to operate a fixed antenna earth station to communicate with the Inmarsat-5 F2 ("I5F2") satellite, which has been authorized by the Commission[1] to serve the CONUS in the proposed frequency ranges. The terminal will operate at the 29.5-30.0 GHz (transmit) band and the 19.7-20.2 GHz (receive) band on Inmarsat-5 F2 at the 55º W.L. and Inmarsat-5 F3 at the 0º E.L. orbital locations

This proposed fixed earth terminal will be a copy of the Ka band terminals already authorized to communicate with Inmarsat-5 F2. ISAT-US currently holds a blanket license authorization under call sign E140114 (SES-LIC-20141030-00832) to operate up-to 8,000 terminals in the 19.7-20.2 GHz, and 29.5-30.0 GHz bands using the Inmarsat-5 F2 satellite. The fixed antenna proposed in this application will operate on these same frequencies when communicating with Inmarsat-5 F2 at the 55º W.L and Inmarsat-5 F3 (which was recently launched) at the 0º E.L. orbital locations, and thus, Thales would like to requests the Commission to grant the experimental license for this fixed antenna earth station to be operated on the roof top of Thales building at 51 Discovery Irvine, California 92618. The basis proposed license for this terminal is the same as those were already approved in the ISAT-US Blanket License, Antenna ID MCS 8200

AES System Description

The Antenna Earth Station (AES) consists of:

- One Honeywell MCS-8200 antenna, Model #90000380-1
- One Honeywell Ka-Band Aircraft Networking Data Unit (KANDU), Model #90401566
- One Honeywell Ka-Band Radio Frequency Unit (KRFU), Model #90401203
- One Honeywell Modem Manager Unit (Modman), Model # 90400012
- One Honeywell Airplane Personality Module Unit (APM), Model # 90401121
- One Honeywell Ka-Band Radome, Model # 90400017

Figure 1 below, shows a sketch of the AES system on top of Thales Building 51 with the end-to-end system operations.

Thales will be using this antenna system to experiment the two way communications with Inmarsat Global Express Satellites, Inmarsat-5F2 (Atlantic Ocean Region, AOR) and Inmarsat-5F3 (Pacific Ocean Region, POR). This AES antenna receives the satellite downlink signals at K-Band frequency band, 19.2GHz to 20.2GHz, and transmits with a maximum EIRP of 48dBW at Ka-Band frequency, 29.5GHz to 30.0GHz. Various modulation formats are used per DVB-S2 up-to 32APSK, with the emissions identification as registered in the application form 442.

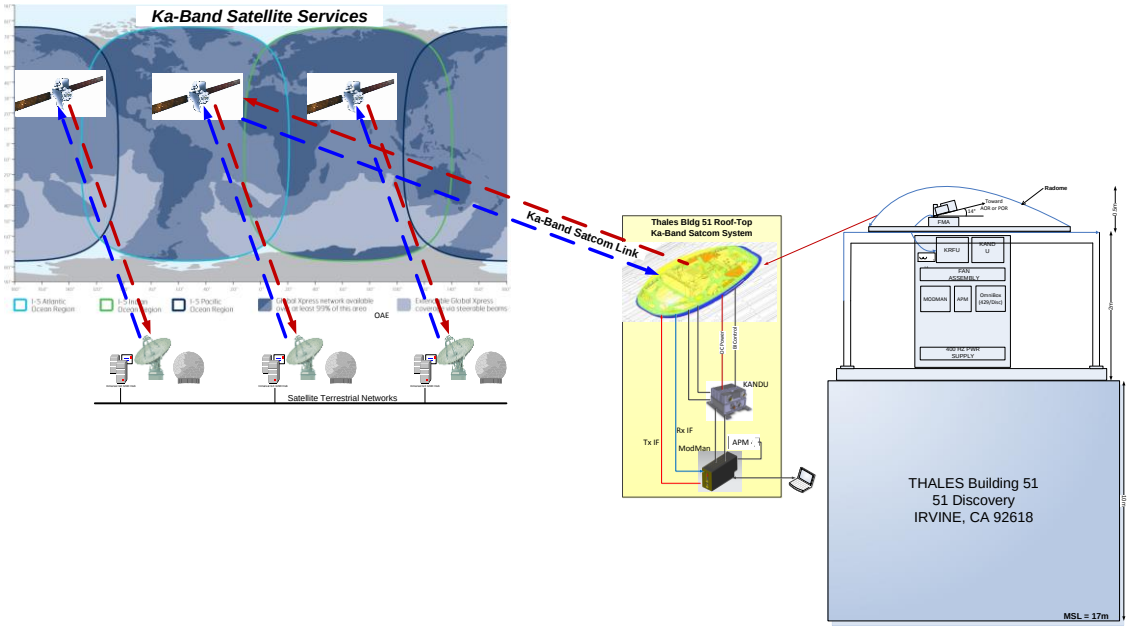

Figure 1: AES System End-to-End Operations

MCS-8200 antenna, Model #90000380-1

The Ka-Band antenna includes the antenna aperture which employs a low profile and flat plate phased array for beam forming that includes the transmit and receive feeds (with fixed polarizations RHCP for transmit (TX), and LHCP for receive (RX)). Frequency isolation of transmit and receive paths is accomplished via filters located in the aperture. The RF connections between the aperture and transmit and receive (to the Low Noise Amplifier) paths are via waveguides. Control and power signals are from the Antenna Control Module of the KANDU unit to the antenna. The positioner provides mechanical beam steering in azimuth and elevation.

Ka-Band Aircraft Networking Data Unit (KANDU), Model #90401566

The KANDU contains the power supply for the antenna, the control and monitoring functions for the antenna, and in particular the antenna pointing algorithms.

It has three data interfaces: one to the ModMan, one to the KRFU, and the third one interfaces to the aircraft inertial reference system (IRS).

It contains (all or part) of the positioning algorithm to allow the pointing of the antenna, using inputs from the Inertial Reference Unit (IRU) information. The KANDU also provides power supply (38 VDC) and control (Ethernet/Discrete Signals) to the Antenna, and communicates with the KRFU via discrete signals and/or an Ethernet interface. The IRS interface receives the position and attitude data from the ARINC-429 interface, the navigation data is used in conjunction with the satellite orbital position provided over the Modman interface to calculate the antenna pointing direction to the satellite.

Ka-Band Radio Frequency Unit (KRFU), Model #90401203

The Ka-Radio Frequency Unit (KRFU) is used for frequency conversions and RF signal amplification. The KRFU consists of a Power Supply Unit, a fixed Frequency Synthesizer Oscillator Unit to tune the frequency across the Ka-Band, a Block Up-Converter to convert from

the Modman transmit IF frequencies (950-1950MHz) to Ka-band frequencies (29.5GHz to 30.0 GHz), a High Power Amplifier (HPA) increases the RF signal strength ready for the antenna transmission, and lastly, a Block Down-Converter to convert the receive K-band frequencies (19.2 GHz to 20.2 GHz) to IF (950-2150MHz) signal to feed the ModMan IF receive input.

Modem Manager Unit (Modman), Model # 90400012

The main function of the Modman is to provide the data modulation, demodulation (modem), and baseband processing. It controls the Intermediate Frequency (IF) signal levels for the Ka-band Radio Frequency Unit (KRFU) to avoid operating in the saturation mode. The Modman also provides configuration discrete signals, satellite position reporting and antenna pointing control, as well as accumulating the system BITE and status.

Airplane Personality Module Unit (APM), Model # 90401121

The APM contains a memory device and stores the configuration data for the system

Ka-Band Radome, Model # 90400017

This Ka-Band radome is to protect the antenna and equipment from the environment.

MCS 8200 Antenna Terminal Performance

The Honeywell MCS-8200 terminal is a two-axis (azimuth & elevation) motorized antenna with the rectangular array aperture dimensions of 61 cm and 19 cm. The antenna performance is fully compliant with the requirements in Section 25.138(a), as illustrated by the off-axis EIRP spectral density plots attached hereto as Exhibit B. Since the antenna is not symmetrical, the antenna gain beam patterns are not evenly distributed between the azimuth and elevation axes. Therefore, the off-axis EIRP spectral density mask is controlled based on the skew angles in relation to the GSO plane to ensure protection of other GSO Fixed Satellite Services networks.

The plot in Figure 2 below shows the maximum on-axis EIRP spectral density levels at skew angles from 0 to 90 degrees, as seen from the I5F2 and I5F3 satellites at the 55º W.L. and 0º E.L orbital locations, compared with the EIRP spectral density limits in Section 25.138(a). Note that the EIRP spectral density levels plotted in the graph correspond to the levels shown in the antenna patterns provided in Exhibit B. The blue shaded area in the plot represents the approximation of the skew angles at Thales building 51, where the MCS 8200 antenna will be operated.

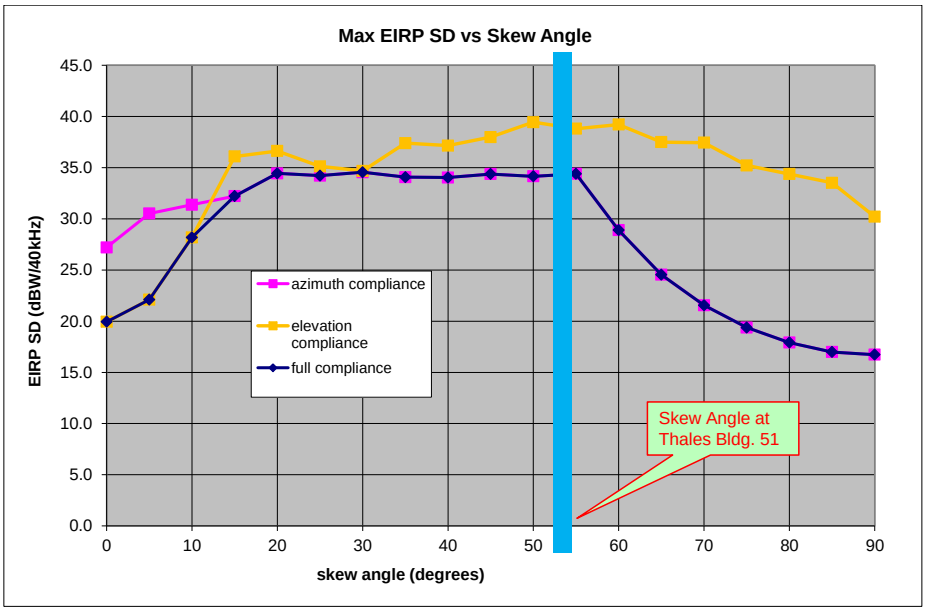

Figure 2: Antenna Maximum EIRP Spectral Density Level

Radiation Hazard Analysis

A radiation hazard analysis for the proposed antenna is attached hereto as Exhibit C. As demonstrated by the results of the analysis, the maximum permissible exposure limit (MPE) is met for protection of the General Population/Uncontrolled Exposures, 1 mW/cm^2, averaged over a thirty minute period (Title 47, Chapter 1, subchapter A, §1.1310). In addition, the system has the muting function that will prohibit the RF transmission when one or more of the following conditions occur:

- A-429 data is invalid or not present
- Transmit Control Analog Discrete is Enabled
- Antenna pointing error is detected to be outside of the 0.5 degree window.

This automatic feature coupled with the terminal's use of uplink power control and non-continuous operation will not cause harmful interference to other authorized operations in this frequency band, 29.5-30 GHz. It also ensures that the general population will not be exposed to the levels of electromagnetic radiation that exceed the Commission's limits.

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1 ISAT-US, Inc., a subsidiary of Inmarsat Global Ltd. ("Inmarsat"), is blanket licensed under call sign E140114 to operate up to 8000 user terminals in the 19.7-20.2 GHz and 29.5-30.0 GHz bands on INMARSAT 5F2 satellite @ 55 W.L. (U. K. licensed).

See File No. SES-LIC-20141030-00832 (granted Aug. 11, 2015) ("ISAT-US Blanket License"