

## **Exhibit A Land ESIM Application**

ISAT US, Inc. (“ISAT US”) seeks Special Temporary Authority (“STA”), pursuant to Section 25.120(b)(3) for a period of 30 days to test three new land earth station in motion (“ESIM”) terminals, which if licensed could provide mobile communications services over Inmarsat’s Ka-band Global Xpress satellite system. ISAT US already holds blanket license authority for ESIM that provide broadband communications on maritime and aeronautical platforms<sup>1</sup> (“GX Terminals”) with the Inmarsat 5F2 and Inmarsat 5F3 satellite networks. These current licenses cover operations in the 29.5-30.0 GHz (Earth-to-space) and 19.7-20.2 GHz (space-to-Earth) frequency bands, which are the same frequencies requested in this application. If these tests are successful, ISAT may apply for modification of its existing licenses to add the terminals for regular operations and at that time seek any waivers of FCC technical rules that may be necessary.

### **Land ESIM Terminal Description**

This application seeks a thirty day STA for testing the MilliSat-W, MilliSat-H and Microsat terminals (“Land ESIM terminals”) manufactured by GetSat for operation on land vehicles. The testing will take place at a fixed location in a controlled area at the Inmarsat Government facility in Reston, VA. The terminals, which employ asymmetrical antennas, will operate on the same frequencies as the GX Terminals already licensed by the Commission: 19.7-20.2 GHz (space-to-Earth) and 29.5-30.0 GHz (Earth-to-space). Operations in the

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<sup>1</sup> See Call Signs E140114 and E140029.

frequency bands requested in the application are subject to the U.S. Table of Frequency Allocations in Section 2.106 of the Commission's rules ("U.S. Table") and the Ka-band plan adopted by the Commission. The FCC's Ka-band plan designates the 19.7-20.2 GHz band and the 29.5-30.0 GHz band to GSO FSS on a primary basis. The Commission recently adopted rules for ESIM use of the Ka-band FSS frequency bands requested in this application,<sup>2</sup> but the rules are not yet effective because they have not yet been published in the Federal Register.

Inmarsat is requesting this terminal testing in advance of these rules coming into effect in order to conduct Inmarsat type approval of these terminals. The terminals will be installed on a static mount and operated in a controlled environment providing up to 10Mbps up and downlink data rates. These ESIM terminal types will be operated within the -118 dBW/m<sup>2</sup>/MHz power flux-density at the earth's surface of the I5F2 satellite.

The three terminal types employ asymmetrical antennas so the off-axis antenna pattern (and therefore off-axis EIRP spectral density) varies as a function of the skew angle of the antenna in relation to the GSO plane. The Global Xpress system has the capability to adjust the off-axis EIRP level of the terminals when necessary. In general, the degree of skew is a function of the longitude of the GSO satellite and the geographical position of the antenna terminal. For this application, testing will take place over the Inmarsat 5F2 satellite from the Inmarsat Government facility in Reston, VA. The terminals will not be operated outside of

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<sup>2</sup> *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service, Report and Order and Further Notice of Proposed Rulemaking, FCC 18-138 (rel. Sept. 27, 2018).*

Inmarsat's Reston site under the requested STA. For this location, the azimuth will be 146.8° and the elevation will be 39.3°.

The following sections provide a description of each of the terminal types.

### **MILLISAT-W Terminal**

The technical data required in the Form 312 for the proposed MILLISAT-W earth station is provided in Exhibit B. This terminal type employs a 0.5 x 0.135 meter flat panel antenna and the half-power beamwidth required in Section 25.130(f) is 1.2 degrees. For blanket licensing of transmitting Earth stations in the 29.5-30.0 GHz band, the Commission adopted off-axis EIRP spectral density levels contained in Section 25.138(a). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the proposed terminal type exceeds the 3 dB exceedance allowance of 25.138(a)(3) in the plane perpendicular to the GSO over limited portions of off-axis angle (see Figures 1-5 and 1-6). Although multiple NGSOs have been licensed this year for the Ka-band, all of them have been granted subject to not causing interference to or claiming protection from GSO FSS, and given that no licensed NGSO system actually will be operating in the 29.5-30.0 GHz band during the proposed limited duration STA period, exceeding the levels will not cause any potential interference to other users of the band.

### **MILLISAT-H Terminal**

The technical data required in the Form 312 for the proposed MILLISAT-H earth station is provided in Exhibit B. This terminal type employs a 0.248 x 0.27 meter flat panel antenna, and the half-power beamwidth required in Section 25.130(f) is 2.2 degrees. For blanket licensing of transmitting Earth stations in the 29.5-30.0 GHz band, the Commission adopted off-axis EIRP spectral density levels contained in Section 25.138(a). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the proposed terminal type meets the performance

requirements in Section 25.138 (a) under clear sky conditions, consistent with Section 25.138(a)(3).

### **MICROSAT Terminal**

The technical data required in the Form 312 for the proposed MICROSAT earth station is provided in Exhibit B. This terminal type employs a 0.248 x 0.135 meter flat panel antenna, and the half-power beamwidth required in Section 25.130(f) is 2.4 degrees. For blanket licensing of transmitting Earth stations in the 29.5-30.0 GHz band, the Commission adopted off-axis EIRP spectral density levels contained in Section 25.138(a). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the co-polarized performance of the proposed terminal type meets the requirements of Section 25.138 consistent with Section 25.138(a)(3), but exceeds the values under 25.138(a)(4) to a small extent over a limited off-axis range at 30 GHz. As discussed previously, although multiple NGSOs have been licensed this year for the Ka-band, all of them have been granted subject to not causing interference to or claiming protection from GSO FSS, and given that no licensed NGSO system actually will be operating in the 29.5-30.0 GHz band during the proposed limited duration STA period, exceeding the levels will not cause any potential interference to other users of the band.