

APPLICATION FOR EXPERIMENTAL SPECIAL TEMPORARY AUTHORIZATION

Pursuant to Sections 5.54(a)(2) and 5.61 of the rules of the Federal Communication Commission (the “FCC” or “Commission”),¹ UltiSat Inc. (“UltiSat”) respectfully requests experimental special temporary authorization (“STA”) for a period of six (6) months commencing on November 1, 2019, to perform ground and flight testing and demonstration of a new earth station aboard aircraft (“ESAA”)² terminal that will provide state-of-the-art solutions for United States Government (“USG”) users. UltiSat seeks this STA to demonstrate the functionality and performance of the Skytech Model BB45Ku/Ka, a dual-band version of the previously authorized BB45 Ku-band terminal, in the 29.0-30.0 GHz (Earth-to-space) band. As described herein, grant of this application is consistent with Commission rules and precedent and will serve the public interest.

I. BACKGROUND

UltiSat provides diverse satellite-based communications services for government and commercial customers. The BB45 terminal is a stabilized antenna system that provides high-quality broadband satellite communications for aeronautical application and is designed to operate in fixed-satellite service (“FSS”) frequencies to provide mission-critical delivery of voice, video and data communications. The antenna is mechanically steerable and is intended for tail or fuselage-mounting. UltiSat successfully tested the Ku-band version of the BB45 terminal under a prior experimental STA for USG intelligence, surveillance and reconnaissance

¹ 47 C.F.R. §§ 5.54(a)(1) & 5.61.

² ESAAAs and other broadband mobility terminals are now collectively known as earth stations in motion (“ESIMs”). *See* 47 C.F.R. § 25.228.

(“ISR”) operations³ and subsequently obtained a commercial STA for the same operations.⁴

UltiSat has since secured regular authority to operate the BB45 terminal in the Ku-band under its ESAA blanket license.⁵

The BB45 terminal is also capable of operating in Ka-band frequencies and is the first mobile terminal in the world to support multi-band mode in Federal and non-Federal spectrum.⁶ UltiSat seeks this experimental STA to test and demonstrate the BB45 terminal in the Ka-band from 29.0-30.0 GHz to support specific USG use cases. During the six (6) month STA term, UltiSat seeks to conduct testing at four (4) fixed locations in the southeastern United States for ground electromagnetic interference (“EMI”) evaluation and system integration, as well as perform real-world flight testing on certain USG aircraft. Information relating to the ground testing, flight test routes and scope of operations are described in Exhibit 1.⁷

UltiSat provides the attached Technical Appendix and FCC Form 442 for information relating to the operational parameters and other technical specifications of its proposed stationary test and demonstration operations, including radiation hazard analysis and off-axis EIRP spectral density (“ESD”) performance patterns.⁸ UltiSat will operate the BB45 terminal in accordance

³ The BB45 terminal was previously authorized for testing and demonstration in the Ku-band. *See* UltiSat, Inc., File No. 0201-EX-ST-2018, Call Sign WM9XHN (“*Experimental STA*”).

⁴ *See* UltiSat, Inc., File Nos. SES-STA-20180621-01477 & SES-STA-20180724-01969 (“*Commercial STA*”).

⁵ *See* UltiSat, Inc., File No. SES-MOD-20181209-03440, Call Sign E181298 (“*ESAA Blanket License*”).

⁶ Here, UltiSat does not seek authority to operate the BB45 terminal in Federal Ka-band frequencies.

⁷ Due to the highly sensitive nature and security implications of the proposed operations, UltiSat requests certain information relating to its government contract be treated as confidential. *See* Confidential Treatment Request and Confidential Exhibit 1.

⁸ To the extent the Commission wishes to review the underlying data tables, UltiSat reserves the right to supplement this application with additional performance information. Off-axis ESD and gain calculations were performed at 0.1° increments over an angular range of -180° to 180°.

with the Commission's rules at all times will adhere to its obligations under Part 5 of the Commission's rules to avoid interference to existing authorized spectrum users and will operate on an unprotected, non-interference basis during the term of the STA.⁹ Grant of this experimental STA will enable the integration and evaluation of UltiSat's next-generation satellite communication technology meant to improve USG defense capabilities.

II. DISCUSSION

This STA will allow UltiSat and its partners to begin the initial assessment and demonstration of the BB45 terminal in the 29.0-30.0 GHz band in real-world conditions. Although the proposed operations will support USG operations, UltiSat is a commercial applicant and, during the STA term, the terminals will be owned and controlled by UltiSat, and thus it seeks this STA to ensure appropriate Commission authority during experimental operations. UltiSat provides confidential information regarding the USG customer and program which describes the nature and scope of the proposed experimental activities.¹⁰ In addition, the relevant technical characteristics of the proposed operations are described fully for public disclosure in the attached Form 442 and Technical Appendix.

The control point operator will maintain control of all transmissions and will cease transmission immediately upon request of a satellite operator or in the unlikely event of harmful interference. UltiSat personnel will be available at all times during testing and have the ability to immediately cease operations as appropriate.

⁹ If UltiSat learns its experimental operations are causing interference into existing spectrum users, it will not resume transmissions until the it establishes to the satisfaction of the Commission that further harmful interference will not be caused to any authorized radio service. 47 C.F.R. § 5.84.

¹⁰ See Confidential Exhibit 1.

The stop buzzer contact during experimental operations is:

NOC, UltiSat, Inc.
Attn: Tim Wiegand
708 Quince Orchard Rd., Suite 120
Gaithersburg, MD, 20878, USA
NOC@ultisat.com
+1.240.243.5138 (Office)
+1 240.949.6011 (Skype)

Although UltiSat acknowledges that its temporary experimental operations have no regulatory status vis-à-vis other authorized users of the band, the various Commission allocations in the 29.0-30.0 GHz band are summarized below to help assess spectrum compatibility.

A. Ka-Band Operations

During the STA term, UltiSat seeks authority to operate the BB45 terminal in commercial Ka-band frequencies from 29.0-30.0 GHz (Earth-to-space) with the Inmarsat-5 F2 satellite¹¹ consistent with United States Table of Frequency Allocations (“Table of Allocations”)¹² and the Commission’s Ka-band Plan (“Ka-band Plan”).¹³ The Inmarsat-5 F2 satellite, located at 55°

¹¹ During Ka-band testing, the forward link (gateway-to-remote) carrier will originate from Inmarsat's teleport in Lino Lakes, Minnesota.

¹² 47 C.F.R. §2.106.

¹³ See *In the Matter of Use of Spectrum Bands Above 24 GHz for Mobile Radio Servs.*, FCC 16-89 (2016) (“*Spectrum Frontiers Order*”) (modifying allocation of other sections of Ka-band but leaving 29.0 – 30.0 GHz as allocated by previous orders); *In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, 11 FCC Rcd. 19005, ¶¶ 40-49 (1996) (“*Ka-band Plan R&O*”). See also *In the Matter of Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, 15 FCC Rcd 13430, ¶¶ 28 and 34 (2000) (“*Redesignation of Ka-band Plan R&O*”).

W.L., is a U.K.-licensed satellite that has been previously authorized by the Commission to serve the U.S. market.¹⁴ To minimize the potential for interference into other spectrum users, UltiSat will operate the BB45 terminal at all times within the off-axis EIRP spectral density limits specified in Sections 25.218 and 25.228 of the Commission's rules, and otherwise comply with the Commission's two-degree spacing policy.¹⁵ Indeed, the Commission's new ESIM rules set forth in Section 25.228 explicitly contemplate aeronautical operations in Ka-band frequencies. Below, UltiSat provides an overview of its proposed Ka-band experimental operations.

1. 29.0-30.0 GHz Band (Earth-to-space)

In the 29.0-29.1 GHz band, GSO FSS operations are secondary to NGSO FSS systems.¹⁶ In the 29.1-29.25 GHz band, MSS feeder link operations are co-primary with LMDS with no allocation for GSO FSS operations.¹⁷ Finally, in the 29.25-30.0 GHz (Earth-to-space) band, GSO FSS systems operate on a primary basis.¹⁸

When operating in the 29.0-29.1 GHz band, UltiSat will not cause harmful interference to NGSO FSS systems and it will accommodate any existing or future authorized NGSO FSS

¹⁴ See *In the Matter of Inmarsat Mobile Networks, Inc., Application to Operate a Fixed-Satellite Service Gateway Earth Station in Lino Lakes, Minnesota with the Inmarsat-5 F2 Space Station*, Order of Authorization and Declaratory Ruling, File No. SES-LIC-20120426-00397, Call Sign E120072 (“*Inmarsat-5 F2 Market Access*”) (granting U.S. market access for the Inmarsat-5 F2 satellite in the 17.7-20.2 GHz (space-to-Earth) and 27.5-30.0 GHz (Earth-to-space) bands in the context of a gateway earth station application).

¹⁵ See 47 C.F.R. §§ 25.218, 25.228. Technical Appendix, Section II. UltiSat notes that the off-axis EIRP mask traditionally applicable to Ka-band terminals set forth in Section 25.218 of the Commission's rules is applicable by reference in the ESIM provisions of Section 25.228. The off-axis EIRP for Ka-band blanket licensed user terminals was previously located in Section 25.138 of the Commission's rules.

¹⁶ See *Ka-band Plan R&O* at ¶ 40.

¹⁷ *Id.*

¹⁸ *Id.*

licensees to the extent necessary to avoid harmful interference. Currently, O3b Limited (“O3b”) operates the only commercial Ka-band NGSO FSS system.¹⁹ Moreover, Inmarsat previously established compatibility between O3b and U.S. earth station operations with the Inmarsat-5 F2 in its U.S. market access request. UltiSat’s operations will be similarly compatible.²⁰

In the 29.1-29.25 GHz band, UltiSat will operate the BB45 terminal without causing harmful interference to authorized MSS feeder links or LMDS systems operating in conformance with the Table of Allocations. Iridium has three feeder-link earth stations in the United States that are currently authorized to operate in the band: one in Tempe, Arizona; one in Fairbanks, Alaska; and one in Wahiawa, Hawaii.²¹ The geographic separation between these MSS feeder link earth stations and UltiSat’s proposed experimental test operations in the southeastern United States is approximately 1500 miles, so there is no potential for interference into MSS feeder link operations.

With respect to LMDS, although review of the Commission’s Universal Licensing System (“ULS”) reveals there are certain co-frequency LMDS links in the vicinity of the proposed UltiSat ground test sites, harmful interference is highly unlikely because, in all cases, the ground tests will be performed within fully secured commercial and government facilities inaccessible to the general public. Given the power levels and attenuation characteristics, limited test duration, and other factors, there will be no material potential for interference into LMDS

¹⁹ See O3b Limited, File No. SAT-LOI-20141029-00118 and related amendments and modifications, Call Sign S2935 (“*O3b License*”).

²⁰ *Supra* n.13.

²¹ These earth stations are licensed by the Commission under call signs E960131 (Tempe, AZ), E050282 and E060300 (Fairbanks, AK), which are licensed to Iridium, and E980049 (Wahiawa, HI), which is licensed to General Dynamics Satellite Communication Services, LLC.

operations. To the extent that the proposed test flight path may intersect with terrestrial LMDS links, there is little potential for interference because the BB45 terminal will be pointing upwards and transmitting towards the satellite and cumulative sidelobe effects of the BB45 terminal and LMDS receiver will ensure the potential for interference is *de minimis*.

In the 29.25-30.0 GHz band, GSO FSS operations have a primary allocation and are co-primary with MSS feeder links in the 29.25-29.5 GHz band.²² As noted above, there is no potential for interference into existing MSS feeder link operations given the large geographic separation presented here, during both ground and flight testing.

Based on the foregoing, UltiSat establishes it can operate the BB45 terminal without adversely affecting other spectrum users. UltiSat will operate the BB45 terminal in accordance with off-axis EIRP limits and/or other technical specifications applicable to the 29.0-30.0 GHz band and will immediately alter, suspend or terminate its operations upon notification that such operations are causing harmful interference to any authorized radio system operating in conformance with the Ka-band Plan or Table of Allocations.

Accordingly, this application will facilitate the USG's ability to have access to new and innovative high-data rate broadband communication services that can support critical security operations and improve the USG's ability to apply next-generation technology solutions.

III. PUBLIC INTEREST CONSIDERATIONS

In accordance with Section 5.63(c)(1), UltiSat anticipates that its proposed experimental operations will contribute greatly to the radio art and serve the public interest. The proposed evaluations will help demonstrate the capabilities of an innovative satellite terminal in real-world USG security applications and promote potential solutions for multi-band operations examined

²² See *Ka-band Plan R&O* ¶ 40; see also 47 C.F.R. §2.106, footnotes NG62, NG166.

in the trials. In addition, grant of the requested authority will allow UltiSat and its partners to develop important information about equipment capabilities, customer acceptance, and integration of its equipment with other government applications and operations. Finally, the experimental authority sought herein will facilitate the provision of advanced, versatile and easily deployable satellite terminal solutions for USG defense applications to the benefit of the public.

IV. Conclusion

Based on the foregoing, UltiSat respectfully requests that the Commission grant this request for an experimental STA to perform ground and flight testing and evaluation of the BB45 terminal in the 29.0-30.0 GHz band for a period of six (6) months to support a USG customer, commencing on November 1, 2019.