



6155 El Camino Real
Carlsbad, CA 92009-1699
Tel: (760) 476-2200
Fax: (760) 929-3941

April 1, 2015

VIA ELECTRONIC FILING

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: ViaSat, Inc., Supplemental Submission; IBFS File Nos. SAT-MOD-20141105-00121, SAT-AMD-20150105-00002; Call Sign S2902

Dear Ms. Dortch:

ViaSat, Inc. (“ViaSat”) supplements its application for modification of market access authorization for the ViaSat-2 satellite, which will operate using Ka-band frequencies under the authority of the United Kingdom at 69.9° W.L. (the “Application”).¹ The Application includes the market access information required pursuant to Section 25.137 of the Commission’s rules, including an orbital debris mitigation showing.² This supplement clarifies and corrects the description of ViaSat’s strategies to mitigate orbital debris contained in the Technical Annex included as Attachment A to the Application.³ The following paragraphs replace Section A.12.2 “Minimizing Accidental Explosions” of the Technical Annex:

In conjunction with the satellite manufacturer, ViaSat has assessed and limited the probability of accidental explosions during and after completion of mission operations through a failure mode verification analysis. The satellite manufacturer has taken steps to ensure that debris generation will not result from the conversion of energy sources on board the satellite into energy that fragments the satellite. All vessel pressures and battery cell voltages will be monitored by telemetry. At end-of-life and once the satellite

¹ See IBFS File Nos. SAT-MOD-20141105-00121, SAT-AMD-20150105-00002, Call Sign S2902.

² See 47 C.F.R. §§ 25.114(d)(14), 25.137(b).

³ Application, Attachment A at A.12.2.

has been placed into its final disposal orbit, ViaSat will remove all stored energy from the spacecraft by depleting any residual fuel, leaving the liquid propellant latch valves open, venting the pressure vessels (except with respect to helium tanks as discussed below) and leaving the batteries in a permanent state of discharge. For xenon propellant, the tanks are vented by opening latch valves downstream of the tanks to allow cold flow through the xenon ion thrusters, and the latch valve is open if negligible xenon remains. Otherwise, the xenon latch valves may remain closed.

The Boeing 702HP spacecraft uses a bus that has a liquid propulsion system consisting of two helium tanks plus two pairs of fuel and oxidizer tanks and uses a xenon ion propulsion system consisting of two xenon tanks. Venting of the excess propellant in the fuel, oxidizer and xenon tanks is performed as part of the end-of-life shutdown operations. The helium tanks provide proper propellant tank pressurization for apogee engine firings during transfer orbit. Consistent with Boeing's practice with respect to a number of its spacecraft buses, both helium tanks are isolated at the end of transfer orbit by firing pyro-valves. The spacecraft's helium system will be sealed when tanks are isolated, resulting in a final pressure of ~230 psi, which is extremely low relative to the design burst pressure of 5250 psig (actual test performance at 6660 psig). Due to the low pressure at end-of-life in the helium tanks and their enclosure in the spacecraft body, an explosive event is extremely unlikely (even in the event of a tank rupture, *e.g.*, a meteorite strike), minimizing the potential of any release of orbital debris.

In the case of applications seeking U.S. market access via non-U.S.-licensed space stations, the Commission has concluded that the orbital debris requirement can be satisfied by showing that the satellite system's debris mitigation plans are subject to direct and effective regulatory oversight by the satellite system's national licensing authority.⁴ The Commission has determined that this requirement may be satisfied by referencing an English language version of the debris mitigation rules or regulations of the national licensing authority and indicating the current status of the national licensing authority's review of its debris mitigation plans.⁵

The ViaSat-2 satellite will be operated under the authority of the United Kingdom, and will be subject to the United Kingdom Outer Space Act 1986 ("Outer Space Act"). The Outer Space Act ensures compliance with the U.K.'s obligations under international treaties and principles covering the use of outer space and specifies that the U.K. licensing authority has the

⁴ *Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567 ¶¶ 94, 95 (2004) ("*Orbital Debris Second Report and Order*");

⁵ *Id.* at ¶ 95; *Globalstar Licensee LLC, GUSA Licensee LLC, GCL Licensee LLC*, Order, DA 11-520 ¶¶ 30-32 (rel. Mar. 18, 2011) (concluding that French Space Operations law and technical regulations provide for direct and effective regulation of debris mitigation measures by France, resulting in a finding that Globalstar provided adequate orbital debris mitigation showing); *O3b Limited*, IBFS File No. SES-LIC-20100723-00952, Call Sign E100088, Condition 90045 (granted Sept. 25, 2012) (determining that O3b's request for a waiver of Section 25.283(c) for unvented pressure vessels was unnecessary, finding that O3b is subject to direct and effective regulation by the United Kingdom concerning orbital debris mitigation) ("*O3b Grant*").

power to require licensees to conduct operations in such a manner as to “prevent the contamination of outer space,” to “avoid any breach of the United Kingdom’s international obligations,” and to impose conditions “governing the disposal of the payload in outer space on the termination of operations under the license.”⁶ In addition, the UK Space Agency, the U.K. agency charged with licensing activities in outer space, including the launch and operation of space objects, has issued published guidance on the Outer Space Act requirements, which requires applications for a space activities license to provide information regarding the plans for disposal of the space object at the end of life, including whether the propellant and pressurant tanks are vented.⁷ The UK Space Agency evaluates such applications pursuant to published standards, including the IADC Space Debris Mitigations Guidelines.

ViaSat is planning to prepare the application for launch and operating authority for filing with the UK Space Agency well ahead of the scheduled launch. The application will describe the end-of-life plan for ViaSat-2 as described above. ViaSat submits that the foregoing demonstration of the U.K.’s authority over ViaSat-2 provides direct and effective regulatory oversight regulation of the space activities of ViaSat-2, and thus satisfies the requirements of Section 25.114(d)(14) and Section 25.283(c).⁸

Please contact the undersigned if you have any questions regarding this submission.

Respectfully submitted,

/s/

Daryl T. Hunter
Sr. Director, Regulatory Affairs

⁶ Outer Space Act 1986, 1986 Ch. 38, § 5(2)(e) (1986) (U.K.).

⁷ See Revised Guidance for Applicants, Outer Space Act 1986, Annex A, Section 1.3 available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/320158/Guidance_for_applicants_-_June_2014.pdf.

⁸ See *O3b Grant*. Out of an abundance of caution, and to the extent necessary, ViaSat respectfully seeks a waiver of this one aspect of Section 25.283(c) as it applies to the helium tanks on ViaSat-2, given the direct and effective oversight of the U.K. and given that the very low pressure in the helium tanks at the satellite’s end-of-life and their enclosure in the spacecraft body makes the potential for release of orbital debris extremely unlikely.