



## Exhibit A

### Modification of Ku band Aeronautical Antennas

By this application, Viasat, Inc. ("Viasat") seeks to modify license call sign E050318 authorizing the operation of Ku-band earth station antenna models mounted on aircraft ("ESAAs") in the following manner:

- (i) add two Ku-band earth station models mounted on aircraft, the VR-12C and the VR-18;
- (ii) add the Ku-band aperture of Viasat's KuKarray earth station (the Ka band aperture is already otherwise authorized under separate authorizations<sup>1</sup>);
- (iii) add spacecraft points of communication; and
- (iv) adjust the current license conditions for E050318 to reflect the primary status of ESIMs in the 11.7-12.2 GHz and 14.0-14.5 GHz bands.

Viasat also requests a minor modification to correct the existing license for E050318 to include the 11.45-11.7 GHz band. Viasat requested authority for this band on a non-conforming basis when it added Telstar-11N and GE-23 as points of communication.<sup>2</sup> The Commission granted that authority and specified in the license conditions that this band was included (see condition 386). However, the particulars of operation in the reference copy of the license in IBFS omit this band.

No other modifications to the license are proposed by this application.

#### 1. Request to Add New Earth Station Models

Viasat currently is authorized to operate two earth station antenna models mounted on aircraft, namely two variants of Viasat 30 cm antennas. With this application, Viasat requests the addition of three new antenna models: (i) VR-12C, (ii) VR-18, and (iii) the Ku-band aperture of the KuKarray.

The Viasat-manufactured VR-12C is a newer version of the current 30 cm parabolic antennas currently authorized by the license. This antenna model's gain pattern performance is

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<sup>1</sup> See FCC IBFS Call Signs E120075 and E180006.

<sup>2</sup> See SES-MFS-20090624-00789; SES-AFS-20091117-01463.



consistent with the 30 cm antennas currently authorized, however, the solid-state power amplifier (“SSPA”) maximum output power has been increased to 20 W. This antenna is backwards-compatible with the currently licensed 30 cm antennas and can operate at same power levels as the current antennas, but the additional power output is an important option for business jet service offerings for increased data throughput when conditions permit.

The Viasat-manufactured VR-18 is a 45 cm parabolic antenna with a 20 W SSPA. The larger aperture allows for improved off-axis performance as compared to the currently authorized antennas, and as a result higher data rates are achieved. This antenna model typically will be installed on larger aircraft.

The Viasat-manufactured KuKarray is a mechanically steered, rectangular horn-array antenna with two apertures, a Ka-band aperture and a Ku-band aperture. The Ka-band aperture is already authorized on other Viasat Ka-band licenses.<sup>3</sup> Therefore, this application only addresses the Ku-band aperture and bold text is used in the **KuKarray** antenna name going forward to highlight that the discussion only applies to the Ku-band aperture. The Ku-band aperture uses a 25 W SSPA and is typically installed on large commercial airlines and DoD transport aircraft. The ability to switch between bands offers the customer greater coverage options and flexibility in operating on the best available network.

The new antenna models will operate using emission designators reflecting higher power levels and different carrier bandwidths than currently authorized for the existing earth station models. With the introduction of new antenna types to the Viasat Ku-band network more flexibility in the network has been introduced. Larger antennas and higher available EIRP allows operation at new carrier bandwidths providing more efficient use of spectrum and more service offerings to meet customer requirements.

All antennas will be operated under the control of the NCMC and will comply with the requirements of Section 25.228 governing the operation of earth stations in motion (“ESIMs”). Each individual antenna terminal is self-monitoring and capable of automatically ceasing or reducing emissions within 100 milliseconds if the transmitter exceeds the relevant off-axis EIRP density limits.

The U.S. point of contact available 24 hours a day, seven days a week, with authority and ability to cease all emissions from the ESIMs is:

349 Inverness Drive South  
Englewood, CO 80112  
Tel: 720-493-7300

The VR-12C and VR18 antennas fully comply with the Section 25.218(f) off-axis EIRP density envelopes for FSS earth stations transmitting in the 14.0-14.5 GHz band, as illustrated by the antenna patterns included as Exhibit B. For these antennas, Viasat requests a limited

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<sup>3</sup> See FCC IBFS Call Signs E120075 and E180006.



waiver of the requirement in Section 25.115(g)(1) to provide certain antenna patterns to off-axis angles of +/- 180 degrees. Antenna patterns for the VR-12C and the VR-18 antenna are provided for off-axis angles of +/- 70 degrees. Viasat was unable to produce plots for angles out to +/- 180 degrees due to the limitations of the near-field pattern range. However, as illustrated by the plots provided, the amplitude of the sidelobes out to 70 degrees is far below the limit. Therefore, plots for a wider range of off-axis angles would not provide any additional information necessary to determine compliance. Therefore, a limited waiver is warranted.

The **KuKarray** antenna complies with the limits in Section 25.218(f)(1) in the GSO arc, including when operating at angles that are skewed with respect to the GSO arc, as detailed in the attached Technical Description, but contains some limited exceedances in the plane perpendicular to the GSO arc. The exceedances are described in the Attachment 1 Technical Description. As demonstrated in that attachment, the proposed operations of the **KuKarray** antenna are unlikely to cause harmful interference into NGSO systems, and are unlikely to even be perceptible to such operators given the dynamic environment in which ESIMs and NGSO satellites operate. To the extent necessary, Viasat requests a waiver of the limit in Section 25.218(f)(2), as detailed below in section 4.

## 2. Satellite Points of Communication and Geographic Service Area

With this application Viasat seeks to add all satellites in the Permitted Space Station List as points of communication for the VR-12 and VR-18 antennas. Pursuant to Section 25.115(k)(1), earth stations that qualify for routine processing in the conventional or extended Ku-bands, including ESAAs transmitting in the 14.0-14.5 GHz band, may designate the Permitted Space Station List as a point of communication. The fully-conforming VR-12 and VR-18 antennas qualify for such treatment. The changing requirements in the Ku-band network may require the addition of new satellites as well as the removal of satellites that no longer satisfy the requirements of the network. Modifying the licenses to specify the Permitted Space Station List simplifies the license and reduces administrative burdens of having to seek license modifications to add or remove permitted list satellites. Viasat seeks to operate the VR-12 and VR-18 antennas throughout the authorized coverage area of satellites on the Permitted Space Station List.

Although the **KuKarray** antenna complies with all limits in Section 25.218(f)(1) applicable to the plane tangent to the GSO arc, Viasat does not seek Permitted Space Station List as a point of communication at this time and will communicate with SES-10 at 67° W.L. and Eutelsat 174A at 174° E.L. The coverage area and the frequencies are as follows:

- SES-10: 11.7-12.2 GHz and 14.0-14.5 GHz; Mexico, Central America, the Gulf of Mexico and Caribbean.<sup>4</sup>

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<sup>4</sup> See File No. SAT-PPL-20160117-00005, Call Sign S2950.



- Eutelsat 174A: 11.45-11.7 GHz and 14.0-14.5 GHz; Alaska, Hawaii, Pacific Ocean Region.<sup>5</sup>

Both satellites are authorized by the Commission to serve the United States. ESAAs may be operated both on the ground when the aircraft is parked, during take-off and landing, and in the air within the geographic areas identified in the Form 312.

### **3. License Conditions Consistent with Section 25.228**

Viasat respectfully requests that the Commission modify the license conditions to reflect the status of ESAAs as an application of the FSS with primary status in the 11.7-12.2 GHz and 14.0-14.5 GHz bands and authority to operate in the 10.7-11.7 GHz band subject to the condition that these earth stations may not claim protection from fixed service transmissions. The original application and subsequent modifications were granted prior to the Commission's adoption in 2014 of the current allocation and service rules for ESAAs in these bands.<sup>6</sup> Therefore, the license conditions currently reflect operations on an unprotected, non-interference basis, because the Commission granted the license pursuant to a waiver of the U.S. Table of Frequency Allocations and the Commission's Ku band plan. In 2018, the Commission streamlined and consolidated the rules for ESIMs, including ESAAs, to be consistent with routine processing procedures for earth stations conforming to the relevant off-axis EIRP spectral density limits in Section 25.218.<sup>7</sup> Viasat has operated its Ku band ESAA earth stations in accordance with the conditions in the Order and Authorization,<sup>8</sup> which are consistent with the current requirements in Section 25.228.

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<sup>5</sup> See File No. SAT-RPL-20170927-00136, Call Sign S2610.

<sup>6</sup> *Revisions of Parts 2 and 25 of the Commission's Rules to Govern the Use of Earth Stations Aboard Aircraft Communicating with Fixed-Satellite Service Geostationary-Orbit Space Stations Operating in the 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz and 14.0-14.5 GHz Frequency Bands*, Second Report and Order and Order on Reconsideration, FCC 14-45 (2014).

<sup>7</sup> *See 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 (2018).

<sup>8</sup> *See Viasat, Inc., Application for Blanket Authority for Operation of 1,000 Technical Identical Ku-Band Aircraft Earth Stations in the United States and Over Territorial Waters*, File No. SES-LIC-20051028-01494, Call Sign E050318, Order and Authorization, DA 07-4674 (rel. Nov. 20, 2007).



#### 4. Waiver Requests

Viasat respectfully requests a waiver of the off-axis EIRP spectral density limits in Section 25.218(f)(2) for the plane perpendicular to the GSO arc for the **Ku**Karray antenna. To the extent necessary, Viasat also requests a waiver of the coordination requirements in Section 25.220, referencing coordination among satellite networks in a two-degree spaced environment. As discussed above, the **Ku**Karray antenna complies with the off-axis EIRP density limits in the plane tangent to the GSO arc under all operating conditions, and thus certifications from GSO satellite operators regarding coordination with satellite systems within +/- 6 degrees are not required for the operation of the **Ku**Karray antenna. Moreover, GSO satellite operators in the Ku band are not required to coordinate with co-frequency NGSO systems because NGSO systems must not cause unacceptable interference to, or claim protection from, a GSO FSS network and must operate in compliance with the applicable EPFD limits in Article 22, Section II of the ITU Radio Regulations.

The Commission may waive its rules for good cause shown.<sup>9</sup> "Waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the general rule," including when a waiver would result in "more effective implementation of overall policy."<sup>10</sup> Grant of a waiver in this case would not undermine the purpose of the Section 25.218(f)(2) limits, which facilitate co-frequency operations between GSO FSS and NGSO FSS systems. In the attached Technical Description, Viasat demonstrates that operation of the **Ku**Karray antenna would not cause harmful interference to NGSO systems operating in the 14.0-14.5 GHz band, and is fully compatible with authorized NGSO systems. Viasat's analysis shows that the exceedances in the plane perpendicular to the GSO arc are unlikely to result in any impact to NGSO systems.

Further, grant of a waiver in this case will serve the public interest because it would allow the deployment of the **Ku**Karray antenna, which would enable the expansion of broadband service to passengers and crew on board aircraft on international routes over the Pacific Ocean and Latin America. Therefore, Viasat requests that the Commission expeditiously grant this application and the associated waiver requests.

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<sup>9</sup> 47 C.F.R. § 1.3; see also *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969), *cert. denied*, 409 U.S. 1027 (1972); *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990).

<sup>10</sup> *GE American Communications, Inc.*, 16 FCC Rcd 11038 ¶ 9 (2001); see also *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1166 (D.C. Cir. 1990) (grant of a waiver is warranted where the requested waiver "would not undermine the policy objective of the rule in question and would otherwise serve the public interest").