Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Application of Intelsat License LLC to Modify its Existing Ku-band Earth Stations Aboard Aircraft ("ESAA") Blanket License to Add Vehicle-Mounted Earth Stations ("VMES") Operating Authority and New Terminals	)	Call Sign E170121
	)	File No. _____

APPLICATION FOR ESAA BLANKET LICENSE MODIFICATION

By this application, Intelsat License LLC ("Intelsat") seeks modification of its existing Ku-band earth stations aboard aircraft ("ESAA") blanket license, Call Sign E170121,[1] by adding authority to operate up to 1000 of each of two (2) new terminal types – the Astronics AeroSat FliteStream™ T-310 ("HR129") and FliteStream™ F-310 ("HR6400") – on private, commercial and government aircraft in U.S. and international airspace and on stationary and in-motion vehicles within the United States. In addition, Intelsat seeks to add authority to operate its previously licensed ESAA terminals – the Rantec Airborne SATCOM ("Rantec") and the Smith's Interconnect (f/k/a TECOM) KuStream® 1500 ("TECOM") terminals – as vehicle-mounted earth stations ("VMES") pursuant to Section 25.226 of the Commission's rules, 47 C.F.R. § 25.226, initially to enable ground-based evaluation, maintenance, and testing of the terminals in support of commercial operations. The modifications sought herein will improve Intelsat's operational flexibility and enhance the offerings of the IntelsatOne® Flex network, thus facilitating U.S. leadership in satellite-based, mobile broadband services. Moreover, grant of the requested authority would be consistent with Commission rules and precedent and would serve the public interest by promoting competition in the in-flight connectivity market.

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[1] *See* Intelsat License LLC, File No. SES-LIC-20170626-00682, Call Sign E170121 (the "*ESAA Blanket License*").

Pursuant to Section 25.117(c) of the Commission's rules, 47 C.F.R. § 25.117(c), Intelsat provides in the FCC Form 312 Schedule B and Technical Appendix information that is changing as a result of the requested modification. In addition, Intelsat seeks certain waivers, consistent with Commission precedent, but will otherwise operate these mobile earth station terminals in accordance with the Commission's rules governing Ku-band ESAAs[2] and VMESs,[3] future rules governing such terminals,[4] and applicable international requirements. The earth station information previously provided for the TECOM and Rantec terminals will not change and Intelsat incorporates by reference the earth station information in its *ESAA Blanket License* application in support of its request for VMES operating authority.

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[2] *See* 47 C.F.R. § 25.227; *see also Revisions to 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; Service Rules and Procedures to Govern the Use of Aeronautical Mobile Satellite Service Earth Stations in Frequency Bands Allocated to the Fixed Satellite Service*, IB Docket Nos. 12-376 & 05-20, Notice of Proposed Rulemaking and Report and Order, FCC 12-161 (rel. Dec. 28, 2012) ("*ESAA Order*").

[3] *See* 47 C.F.R. § 25.226; *see also Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed-Satellite Service*, IB Docket No. 07-101, Order on Reconsideration, FCC 13-1 (rel. Jan. 8, 2013) ("*VMES Order*").

[4] *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*, Notice of Proposed Rulemaking, IB Docket No. 17-95 (rel. May 19, 2017) ("*ESIMs NPRM*") (proposing to consolidate and streamline the technical, operational and coordination requirements of Sections 25.221, 25.222, 25.226 and 25.227 of the Commission's rules governing VMESs, ESAAs and earth stations onboard vessels ("ESVs")).

I. BACKGROUND

Intelsat is a worldwide leader in providing innovative broadband satellite services and currently holds numerous FCC licenses to operate geostationary satellite orbit ("GSO") FSS satellites and earth station facilities. The IntelsatOne® Flex network aggregates Intelsat's global wide beam and Intelsat Epic^{NG}® high throughput satellite ("HTS") fleet and the IntelsatOne® terrestrial network into a simplified ecosystem that enables Intelsat and its distribution partners to easily and cost efficiently scale service delivery capability to meet customer demand. Intelsat's proposed ESAA/VMES network is an integral part of its global IntelsatOne® Flex offering. Intelsat has fully described the network in its prior submission and hereby incorporates by reference the technical showing regarding the control functionality and other operational characteristics previously submitted.[5] The proposed VMES operations will initially function to support the ESAA portion of the network by providing ongoing troubleshooting, maintenance, and evaluation of the mobile terminals to optimize earth station performance.

Under its *ESAA Blanket License*, Intelsat is authorized to operate two terminals – one each from TECOM and Rantec – with various Intelsat satellites and any U.S.-licensed or non-U.S.-licensed satellite on the Commission's Permitted Space Station List ("Permitted List").[6] Here, Intelsat seeks to modify its *ESAA Blanket License* to add VMES and ESAA operating authority for the HR129 and HR6400 terminals, two terminals that have been previously authorized by the Commission for similar ESAA operations[7] to the licensed points of

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[5] *See ESAA Blanket License*, Technical Appendix, I.

[6] *See* FCC Permitted Space Station List, *available at:* https://www.fcc.gov/permitted-space-station-list.

[7] *See, e.g.*, Astronics AeroSat Corporation, File No. SES-MFS-20170319-00302, Call Sign E140087 (authorization to operate the HR129 and HR6400 terminals).

communication. Moreover, Intelsat seeks to add VMES operating authority to operate the previously-licensed TECOM and Rantec terminals, consistent with its existing special temporary authorization ("STA") to operate the Rantec terminal as an in-motion VMES in various locations throughout the United States.[8] Below, Intelsat provides an overview of its proposed blanket mobile terminal operations and demonstrates that it will operate the HR129 and HR6400 terminals in accordance with Commission rules and precedent.

II. DISCUSSION

A. VMES Operating Authority for Rantec and TECOM Terminals

Currently in its *ESAA Blanket License*, Intelsat is authorized to operate the Rantec and TECOM terminals pursuant to Section 25.227 of the Commission's rules, 47 C.F.R. § 25.227, governing Ku-band ESAAs. Intelsat does not seek to make any changes to its existing ESAA operating authority and will continue to operate the terminals consistent with the terms and conditions in that license. Here, Intelsat seeks to add VMES operating authority for the Rantec and TECOM terminals pursuant to Section 25.226 of the Commission's rules, 47 C.F.R. § 25.226, governing Ku-band VMESs.

Intelsat's proposal to operate the terminals in both ESAA and VMES applications is consistent with Commission precedent[9] and the ongoing ESIMs NPRM. The proposal in the ESIMs NPRM to consolidate mobile earth station rules under a single earth stations in motion classification illustrates the fundamental similarities between Sections 25.226 and 25.227 of the Commission's rules and the duplicative nature of separate VMES and ESAA licensing.

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[8] *See* Intelsat License LLC, SES-STA-20180103-00007, Call Sign E170121 (granted on Jan. 10, 2018).

[9] *See* Kymeta Corporation, File No. SES-LIC-201702223-00195 and subsequent amendments and modifications, Call Sign E170070 (granting an ESV/VMES blanket license).

Although the ESIM rules have not yet been finalized, grant of Intelsat's request for hybrid VMES/ESAA operating authority is appropriate because, as the Commission recognizes, the "core rules" applicable to both ESAAs and VMESs are identical.[10] Thus, Intelsat relies on its previously submitted materials to support its immediate request to add VMES authority for the Rantec and TECOM terminals.[11]

Intelsat seeks to add VMES authority for the Rantec and TECOM terminals initially to conduct stationary and mobile ground-based terminal evaluation, maintenance, and testing activities that will support the ESAA portion of the IntelsatOne® Flex network and enable Intelsat to optimize terminal performance for aeronautical applications. Grant of VMES operating authority will also provide Intelsat with the operational flexibility to support U.S. customers immediately as VMES service needs arise.

B. ESAA and VMES OPERATING AUTHORITY FOR HR129 AND HR6400 TERMINALS

In the following sections, Intelsat demonstrates that it will operate the HR129 and HR6400 terminals consistent with the Commission's requirements governing ESAAs and VMESs.

i. HR129 Terminal Operations

Intelsat seeks authorization to operate the HR129 terminal under the provisions of

[10] *Id.* ¶ 20. The "core rules" include: (i) antenna pointing accuracy requirements, (ii) EIRP density limits, (iii) the self-monitoring (self-diagnostics) requirement, (iv) the network control and monitoring center requirement, (v) logging requirements, and (vi) the installation requirements related to radiation safety.

[11] When operating the terminals pursuant to VMES authority, Intelsat will not operate in the 12.2-12.75 GHz band and will limit its VMES operations to the 10.95-11.2 GHz, 11.45-12.2 GHz and 14.0-14.5 GHz bands.

Sections 25.226(a)(1) and 25.227(a)(1) of the Commission's rules, 47 C.F.R. §§ 25.226(a)(1) and 25.227(a)(1), applicable to VMES and ESAA terminals that use transmitters with off-axis EIRP spectral densities ("ESDs") lower than or equal to the levels in paragraph (a)(1)(i) of each section.[12] The HR129 terminal, which has been previously licensed by the Commission for ESAA operations,[13] incorporates a circular parabolic antenna mounted inside a radome that is installed on the fuselage, the upper tail stabilizer of the aircraft, or on top of or within a vehicle. Below, Intelsat demonstrates that the HR129 terminal, which will support streaming of highly reliable high-definition video as well as full Internet connectivity, will comply with the relevant requirements for both ESAA and VMES operating authority.

1. Sections 25.226(a)(1) and 25.227(a)(1) Compliance

The HR129 terminal complies with the requirements set forth in Sections 25.226(a)(1) and 25.227(a)(1) of the Commission's rules, 47 C.F.R. §§ 25.226(a)(1) and 25.227(a)(1), designed to facilitate Ku-band ESAA and VMES operations in a two-degree spacing environment. Specifically, with respect to Sections 25.226(a)(1)(i) and 25.227(a)(1)(i), the HR129 terminal will operate at off-axis EIRP spectral density ("ESD") levels well below the off-axis ESD masks set forth in that section, and thus will protect co-frequency operations from harmful interference.[14] In addition, the HR129 terminal fully meets the pointing accuracy requirements of Sections 25.226(a)(1)(ii)(A) and 25.227(a)(1)(ii)(A) with a pointing accuracy of

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[12] The Commission's off-axis ESD masks applicable to ESAAs and VMESs are identical.

[13] *Supra* n.6.

[14] Intelsat's terminals will be monitored by the Intelsat Secure Operating Center ("ISOC") and, because they use the iDirect modem and network management functionality that assigns individual time slots for each terminal's transmissions, there is no potential for aggregation of transmissions resulting in an exceedance of the levels set forth in the applicable mask.

less than or equal to 0.2º between the orbital location of the target satellite and the axis of the main lobe of the antenna. In accordance with Sections 25.226(a)(1)(iii)(A) and 25.227(a)(1)(iii)(A), the HR129 terminal is designed to ensure that all emissions from the terminal automatically cease within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the antenna exceeds 0.5°, and transmission will not resume until such angle is less than or equal to 0.2°. Below, Intelsat provides the additional information required by Sections 25.226(b)(1) and 25.227(b)(1) of the Commission's rules.

2. Sections 25.226(b)(1) and 25.227(b)(1) Compliance

§§ 25.226(b)(1) and 25.227(b)(1) Specification of off-axis EIRP density calculated in accord with Section 25.115(g)(1): In the Technical Appendix § IV, Intelsat provides the off-axis ESD plots pursuant to Section 25.115(g)(1) of the Commission's rules, 47 C.F.R. § 25.115(g)(1). The HR129 terminal uses a circular parabolic antenna with no skew angle issues. The charts show that the ESD remains below permitted limits in all cases.

§§ 25.226(b)(1)(iii) and 25.227(b)(1)(iii) Tracking Error and Cessation of Operations: The HR129 terminal has a pointing accuracy of 0.2º, will automatically cease transmissions if point offset is 0.5º or greater and automatically cease transmissions within 100 milliseconds if they generate an ESD that exceeds the specifications provided to the target satellite operator. Off-axis ESD will be controlled to permissible two-degree spacing levels or the coordinated limits for the satellite, whichever is greater, and control will be achieved by limiting maximum ESD, as applicable.

In the Technical Appendix and Form 312 Schedule B, Intelsat provides additional information on the operational characteristics of the HR129 terminal, and demonstrates that it will operate in compliance with the Commission's ESAA and VMES rules and policies. The

HR129 terminal has operated in the United States pursuant to Commission authority on a commercial basis, *see, supra,* n.2, without any reported interference and in compliance with the ESAA and VMES rules embodied in Sections 25.226 and 25.227. Thus, operation of the HR129 terminal as part of the IntelsatOne® Flex network will not increase the potential for interference to other lawfully operating spectrum users.

ii. HR6400 Terminal Operations

Intelsat seeks authorization to operate the HR6400 terminal under the provisions of Sections 25.226(a)(2) and 25.227(a)(2) of the Commission's rules, 47 C.F.R. §§ 25.226(a)(2) and 25.227(a)(2), applicable to VMES and ESAA terminals that use transmitters with off-axis ESD levels in excess of those in paragraph (a)(1)(i) of each section. The HR6400 terminal is a low profile, aerodynamic antenna system designed to support high transmit and receive data rates, and has previously been authorized by the Commission for commercial ESAA operations.[15] The HR6400 antenna system will be used to provide broadband Internet access and connectivity to passengers and crew aboard private, commercial and government aircraft and for ongoing stationary and mobile vehicle-mounted operations in the United States.

1. Sections 25.226(a)(2) and 25.227(a)(2) Compliance

Although the HR6400 terminal conforms in most respects with the requirements in Sections 25.226(a)(1) and 25.227(a)(1), Intelsat seeks licensing of this terminal under Sections 25.226(a)(2) and 25.227(a)(2). Like many mobile terminals, the HR6400 terminal utilizes a low-profile antenna that is narrower in the elevation plane than in the azimuth plane and, as a result, the HR6400 antenna exceeds off-axis ESD limits specified in Sections 25.226(a)(1)(i)(B) and

[15] *Supra* n.2.

25.227(a)(1)(i)(B) in the plane perpendicular to the GSO arc at certain power levels and skew angles.[16]

Nonetheless, the HR6400 terminal operates at off-axis ESD levels well below the off-axis ESD masks set forth in Sections 25.226(a)(1)(i)(A) and (a)(1)(i)(C), and 25.227(a)(1)(i)(A) and (a)(1)(i)(C) to prevent adjacent satellite interference and facilitate Ku-band ESAA operations in a two-degree spacing environment.[17] In accord with Sections 25.226(a)(1)(ii)(A) and 25.227(a)(1)(ii)(A), the HR6400 terminal uses a mechanically steered aperture and aircraft attitude data (*i.e.*, yaw, roll, pitch, yaw rate, roll rate, pitch rate, and heading vector), together with location of the terminal (latitude, longitude, and altitude), to reliably maintains 0.2º pointing accuracy through all anticipated flight maneuvers. In accord with Sections 25.226(a)(1)(iii)(A) and 25.227(a)(1)(iii)(A), if for any reason the pointing offset between the angle of the orbital location of the target satellite and the axis of the main lobe of the antenna were to exceed 0.5º, the terminal would automatically mute transmissions within 100 milliseconds and would delay resumption of transmissions until pointing accuracy were again within 0.2º.

As required by Sections 25.226(a)(2)(i) and 25.227(a)(2)(i), Intelsat submits the satellite operator certification letter required under Sections 25.226(b)(2) and 25.227(b)(2). As required by Sections 25.226(a)(2)(ii) and 25.227(a)(2)(ii), and as stated above, the HR6400 terminal is self-monitoring and capable of shutting itself off, and would cease emissions within 100 milliseconds after generating off-axis EIRP-density in excess of the specifications supplied to the target satellite operator.

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[16] Out of an abundance of caution, Intelsat has also requested waivers of 25.226(a)(1)(i)(B) and 25.227(a)(1)(i)(B) of the Commission's rules.

[17] *See* Technical Appendix, V.A.

2. Sections 25.226(b)(2) and 25.227(b)(2) Compliance

Intelsat provides the information required under Sections 25.226(b)(2) and 25.227(b)(2) of the Commission's rules. In addition to the information provided in the Technical Appendix, Intelsat states as follows:

§§ 25.226(b)(2)(i) and 25.227(b)(2)(i) Off-axis EIRP Density: In the Technical Appendix, § V, Intelsat provides off-axis ESD plots for the HR6400 terminal at various skew angles, pursuant to Sections 25.226(b)(2)(i) and 25.227(b)(2)(i) of the Commission's rules. Although Intelsat is applying under Sections 25.226(a)(2) and 25.227(a)(2) of the Commission's rules, which permit mobile terminal operations with off-axis ESD levels in excess of the levels specified in Sections 25.226(a)(1) and 25.227(a)(1), the terminals off-axis ESD will remain well below the off-axis limits for all off-axis ranges in the plane tangent to the GSO arc.

§§ 25.226(b)(2)(ii) and 25.227(b)(2)(ii) Certifications required under 25.220(d): The HR6400 terminal will operate in a manner consistent with Intelsat's coordination agreements with each satellite operator, so that they will not result in unacceptable interference to other satellites within +/- 6º of the subject satellite point of communication. As part of this Application, Intelsat certifies that the proposed operations are consistent with coordination agreements with operators of all adjacent satellite networks within 6º of orbital separation from the target satellites with which the HR6400 terminal will communicate.[18] If the Commission were to authorize new non-geostationary satellite constellations to operate in the subject VMES and ESAA bands in the future, Intelsat would work to reach an appropriate agreement to coordinate its operation of its HR6400 terminals.

[18] *See* Technical Appendix, III.

§§ 25.226(b)(2)(iii) and 25.227(b)(2)(iii) Cessation of Operations: Off-axis ESD will be controlled to permissible two-degree spacing levels or the coordinated limits for the satellite, whichever is greater, and control will be achieved by limiting maximum ESD and skew angle, as applicable. Moreover, as noted, the HR6400 terminal has a pointing accuracy of 0.2º, will automatically cease transmissions if point offset is 0.5º or greater, and will automatically cease transmissions within 100 milliseconds if it generates an EIRP density that exceeds the specifications provided to the target satellite operator.

§§ 25.226(b)(2)(iv) and 25.227(b)(2)(iv) Simultaneously transmitting terminals: Intelsat's terminals will be monitored by its ISOC and, because they use the iDirect modem and network management functionality, which assigns individual time slots for each terminal's transmissions, there is no potential for aggregation of transmissions resulting in an exceedance of the off-axis ESD levels coordinated with the target satellite operator. Intelsat's proposed operations of its terminals will not increase the potential for interference to other co-frequency operations in the United States.

As set forth in the Technical Appendix, with the exception of its limited exceedance of the off-axis ESD levels away from the GSO arc, the HR6400 terminal will otherwise operate in compliance with the Commission's VMES and ESAA rules and policies. The HR6400 terminal has operated in the United States pursuant to Commission authority without any reported interference and in compliance with the ESAA rules embodied in Section 25.227. Thus, operation of the HR6400 terminal as part of the Intelsat network will not increase the potential for interference to other lawfully operating spectrum users. In the attached Technical Appendix and Form 312 Schedule B, Intelsat provides additional information on the characteristics of the HR6400 terminal.

iii. Satellite Points of Communication

Intelsat seeks authority to operate the HR129 and HR6400 ESAA terminals with all previously authorized satellites in its *ESAA Blanket License.* Uplinks from the terminals will occur in portions of the 14.0-14.5 GHz band and downlinks will occur in portions of the 10.95-11.2 band and 11.45-12.2 GHz band. As discussed below, Intelsat is requesting authority to utilize FSS satellite capacity available on these satellites in the 12.2-12.75 GHz band for ESAA receive operations only on an unprotected, non-harmful interference basis and only outside the United States (principally in Regions 1 and 3), subject to any necessary authorizations from foreign administrations, and in accordance with existing conditions in the *ESAA Blanket License*.[19] Because Intelsat seeks authority to operate these terminals in VMES applications only within the United States, Intelsat will only operate the terminals pursuant to VMES authority in the bands authorized in Section 25.226 (*i.e.*, 10.95-11.2 GHz, 11.45-12.2 GHz and 14.0-14.5 GHz, and will not use the 12.2-12.75 GHz band for that purpose. A complete list of existing satellites and associated gateways are provided in the Technical Appendix, § VI and Intelsat provides the HR129 and HR6400 ESAA operating parameters in the Form 312 Schedule B.

3. Permitted List Authority

In addition to the specific satellite points of communication in the *ESAA Blanket License*, pursuant to Sections 25.226(b)(9) and 25.227(a)(12) of the Commission's rules, 47 C.F.R. §§ 25.226(b)(9) and 25.227(a)(12), Intelsat is also requesting authority to operate the HR129 and HR6400 terminals with all U.S.-licensed satellites and non-U.S. licensed satellites on the

[19] The 12.5-12.75 GHz band is allocated for FSS downlinks in Region 1 and the 12.2-12.75 GHz band is allocated for FSS downlinks in Region 3.

Commission's Permitted Space Station List.[20] Permitted List authority is appropriate here because Intelsat will operate the terminals at all times within the relevant off-axis ESD limits in the plane tangent to the GSO arc (*i.e.*, consistent with two-degree spacing levels).[21] Accordingly, there is no potential for interference into adjacent GSO FSS satellite operations. Intelsat will operate the terminals with these satellites in permissible portions of the Ku-band at power levels compliant with the Commission's rules, and otherwise in accordance with operational conditions imposed by the Commission. This authority will provide Intelsat with operational flexibility to help facilitate the reliability and performance of its proposed operations. Depictions of the geographic areas in which its VMES and ESAA terminals will operate with each proposed satellite point of communication are also included.[22]

iv. Non-Conforming, Non-Interference ESAA Operations

The FCC's Table of Allocations permits use of the 10.95-11.2 GHz and 11.45-11.7 GHz (space-to-Earth) bands on an unprotected basis, and the 11.7-12.2 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space) bands on a primary basis for ESAA operations.[23] In this

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[20] *See* Approved Space Station List, http://transition.fcc.gov/ib/sd/se/ssal.xlsx(last updated on May 5, 2017), available at: https://www.fcc.gov/approved-space-station-list.

[21] Sections 25.226(b)(9) and 25.227(a)(12) permits terminals that comply with the off-axis EIRP spectral density ("ESD") limits to request Permitted List authority. The ESAA terminals fully comply with the off-axis ESD masks for GSO operations in Sections 25.226(a)(i)(A) and 25.226(a)(i)(C), and 25.227(a)(i)(A) and 25.227(a)(i)(C). Still, elsewhere in this Application, Intelsat requests a waiver of Sections 25.226(a)(i)(B) and 25.227(a)(i)(B) with respect to the HR6400 terminal because it incorporates a low-profile antenna and thus exceeds the ESD mask in the plane perpendicular to the GSO arc. Although Intelsat is seeking authority for the HR6400 terminal under Sections 25.226(a)(2) and 25.227(a)(2), it seeks this waiver to the extent required to permit HR6400 terminal operations with Permitted List satellites.

[22] *See* Technical Appendix, II; *see also* 47 C.F.R. § 25.227(b)(4).

[23] *See* 47 C.F.R. § 2.106, n. NG52 and NG55; 47 C.F.R. § 25.227.

application, Intelsat seeks authority for the HR129 and HR6400 to communicate with certain satellites in the 12.2-12.75 GHz downlink band for ESAA operations, as shown in the Technical Appendix accompanying this Application. Intelsat seeks to utilize this additional downlink capacity on an unprotected, non-harmful interference basis outside the United States, on the same conditions that are currently contained in the *ESAA Blanket License*.

Specifically, the *ESAA Blanket License* currently contains the following conditions:

> 900414 Reception of downlink transmissions is on a non-interference, non-protected basis from the following geostationary orbit space stations: IS-17 (Call Sign: S2814) at 66º E.L. in the 12.2-12.75 GHz frequency band; IS-18 (Call Sign: S2817) at 180º E.L. in the 12.25-12.75 GHz frequency band; IS-20 (Call Sign: S2847) at 68.5º E.L. in the 12.5-12.75 GHz frequency band; IS-22 (Call Sign: S2846) at 72.1º E.L. in the 12.25-12.75 GHz frequency band; and IS-37 (Call Sign: S2972) at 18º W.L. in the 12.5-12.75 GHz frequency band. When receiving transmissions from these satellites in these frequency bands, the ESAA operations authorized herein must accept interference from any authorized user of the band.
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> 900415 Reception of downlink transmissions in ITU Region 2 is on a non-interference, non-protected basis from the following geostationary orbit space stations: Horizons 3e (S2947) at 169° E.L. in the 12.2-12.75 GHz frequency band; IS-19 (Call Sign: S2850) at 166º E.L. in the 12.25-12.75 GHz frequency band; IS-33e (Call Sign S2939) at 60.0° E.L. in the 12.5- 12.6 GHz frequency band. Operations are not authorized in these bands over the U.S. and its territories.

Given that Intelsat's ESAA receive operations present a negligible risk of interference to other spectrum users, Intelsat requests that the Commission permit ESAA operations using the HR129 and HR6400 in the 12.2-12.75 GHz band under the same conditions that currently apply to the Rantec and TECOM terminals currently authorized under the *ESAA Blanket License.* Such a grant would serve the public interest because use of this downlink (receive) spectrum is essential to Intelsat's in-flight broadband connectivity offerings in Ku-band spectrum and presents a negligible risk of interference to other spectrum users.

v. Ground Segment

The Ground Segment consists of equipment located at Intelsat and commercial teleport facilities (*i.e.*, gateway earth stations), which facilitate network control and connection to the

terrestrial telecommunications network. A complete table reflecting all satellites and gateways in the Intelsat VMES/ESAA network is included in the Technical Appendix.

Control and monitoring of the Intelsat VMES/ESAA network will be provided by the ISOC in Ellenwood, Georgia, United States on a 24/7 basis. The primary points of contact at both NOC facilities have been previously provided to the Commission by Intelsat and is included in the Technical Appendix.[24]

III. WAIVER REQUEST

A. Waiver of Sections 25.226(a)(1)(i)(B) and 25.227(a)(1)(i)(B) to Exceed ESD Limits in the Plane Perpendicular to the GSO Arc

Intelsat requests that the Commission extend the limited waiver of Section 25.227(a)(1)(i)(B) of the Commission's rules, 47 C.F.R. § 25.227(a)(1)(i)(B), that is already contained in the *ESAA Blanket License* to permit operation of the HR6400 terminal at off-axis ESD limits in the plane perpendicular to the GSO arc in excess of those set forth in Section 25.227(a)(1)(i)(B). In addition, Intelsat requests that the Commission grant a similar waiver of Section 25.226(a)(1)(i)(B) to permit both TECOM and HR6400 terminal operations at levels in excess of the Commission's ESD mask for VMES operations.

The Commission previously granted a similar waiver in the *ESAA Blanket License* applicable to the previously-authorized TECOM terminal, as follows:

> 900416 Intelsat's request for a limited waiver of Section 25.227(a)(1)(i)(B) of the Commission's rules, 47 C.F.R. § 25.227(a)(1)(i)(B), to permit operation of the TECOM terminal at off-axis eirp limits in the plane perpendicular to the GSO arc in excess of those set forth in Section 25.227(a)(1)(i)(B), is GRANTED, as conditioned: In the event a future NGSO network is deployed in the Ku-band that would receive interference from the higher off-axis radiated power, Intelsat must coordinate with the NGSO network in order to facilitate co-frequency operations and must modify its ESAA operations to reflect any coordination agreement reached. In the event a coordination agreement is not reached, Intelsat must comply with the eirp density limits set forth in section 25.227(a)(1)(i)(B).

[24] *See* Technical Appendix I.

Intelsat requests that the Commission extend this waiver to permit operation of the HR6400 under similar conditions and also grant an identical waiver to permit operations in the context of VMES operations.

Sections 25.226(a)(1)(i)(B) and 25.227(a)(1)(i)(B) are principally intended to protect NGSO FSS systems.[25] The Commission recently granted the request of OneWeb for U.S. market access for its NGSO FSS constellation, and additional Ku-band NGSO FSS satellite applications are pending following the recent processing round involving proposed U.S. and foreign-licensed systems.[26] Intelsat seeks authority to operate pursuant to satellite operator agreements and is willing to coordinate with OneWeb and any future operator of a Ku-band NGSO system, in accord with the existing *ESAA Blanket License* condition, to the extent necessary to resolve any interference issues that arise.

As discussed, the HR6400 terminal utilizes a low-profile antenna that is narrower in the elevation plane than in the azimuth plane and, as a result, that terminal exceeds off-axis ESD limits specified in Sections 25.226(a)(1)(i)(B) and 25.227(a)(1)(i)(B) in the plane perpendicular to the GSO arc at certain power levels and skew angles. This is an issue with all low-profile mobile terminals.

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[25] *See Revisions to 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*, IB Docket No. 12-376, Notice of Proposed Rulemaking and Report and Order, FCC 12-161, 27 FCC Rcd 16510 (2012), at ¶¶ 54-55.

[26] *See WorldVu Satellites Limited Petition for a Declaratory Ruling Granting Access to the U.S. Market for the OneWeb NGSO FSS System*, File No. SAT-LOI-20160428-00041, Call Sign S2963, Order and Declaratory Ruling, FCC 17-77, 32 FCC Rcd 5366 (2017).

Grant of this waiver is consistent with Commission precedent involving Intelsat's near-identical ESAA terminal operations that exceed the off-axis ESD mask away from the GSO plane.[27] In this case, good cause exists because it will allow Intelsat to operate the HR6400 terminal as effectively as possible and facilitate flexible ESAA operations. The Commission should therefore grant this waiver in connection with Intelsat's proposed ESAA operations.

IV. PUBLIC INTEREST STATEMENT

Grant of the requested modification to add new terminal types will serve the public interest by extending the coverage and increasing the capacity and operational flexibility of Intelsat's global ESAA network for U.S. airlines and their passengers. This will provide a direct benefit to U.S. consumers that will be able to access new in-flight broadband applications and will further enhance U.S. leadership in mobile broadband services. In addition, grant of VMES operating authority under its existing license will allow Intelsat to perform ongoing evaluation of its terminals, thus improving the ESAA services on the network, as well as serve customers in need of ground-based mobile satellite connectivity.

Grant of this modification application will also serve the public interest by promoting competition in the market for in-flight connectivity services to the benefit of travelers in the United States and internationally. In particular, users of the ESAA services on Intelsat's network will enjoy increased productivity, operational efficiencies, and other benefits from

[27] *See, e.g.*, Intelsat License LLC, File No. SES-LIC-20170626-00682, Call Sign E170121 (granting a waiver for the TECOM ESAA terminal). The Commission has also routinely granted similar waivers in connection with authorizations for Vehicle Mounted Earth Stations, *see, e.g.*, ThinKom Solutions Inc., File No. SES-LIC-20120822-00768, Call Sign E120174, Application, Technical Annex at 19 (granted March 8, 2013); RaySat Antenna Systems, LLC (now Gilat North America, LLC), File No. SES-MFS-20120517-00446, Application, Narrative at 23, and License, Call Sign E060448, at Condition 6582 (granted April 1, 2013).

expanded access to in-flight broadband connectivity. This, in turn, will enhance competition in the air transportation market by enabling aircraft equipped with the Intelsat ESAAs to compete with aircraft operators and air carriers offering terrestrial and satellite-based connectivity to passengers.

Intelsat has provided the technical and operational information necessary for the Commission to grant this modification pursuant to Sections 25.226 and 25.227 of the Commission's rules. Intelsat has established that its terminals can operate with the proposed satellite points of communication consistent with applicable coordination agreements and that its proposed operations are compatible with other co-frequency services, or otherwise requested a waiver. Thus, grant of the requested modification would be consistent with Commission rules, policies and precedent facilitating Ku-band VMES and ESAA operations, and would serve the public interest.

V. CONCLUSION

For the foregoing reasons, Intelsat requests that the Commission grant this modification application to add the HR129 and HR6400 terminals to its *ESAA Blanket License* for operations on aircraft and on stationary and in-motion vehicles within the United States, and add VMES operating authority for its previously licensed TECOM and Rantec terminals.