

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)	
)	
Application of Astronics AeroSat)	
Corporation for Modification of its)	File No. SES-LIC-20140902-00688
Blanket Earth Stations Aboard Aircraft)	
(“ESAA”) License to Add New Terminal)	Call Sign E140087
and Satellite Points of Communication)	

MODIFICATION APPLICATION

By this application, Astronics AeroSat Corporation (“Astronics AeroSat”) seeks Commission authority to modify to its existing earth stations aboard aircraft (“ESAAs”) blanket license (Call Sign: E140087).¹ First, Astronics AeroSat seeks to add 1,000 new ESAA Ku-band terminals – the HR129 terminal² – to its ESAA blanket license for operation with its FliteStream™ system, a global, in-flight broadband satellite service designed for the business aviation and VVIP market. Second, Astronics AeroSat seeks to add satellite points of communication for the previously licensed HR6400 terminal and the HR129 terminal.

The HR129, manufactured by Astronics AeroSat and designed to be mounted on the tail of “T-tail” business jets (rather than on the aircraft fuselage), has been fully certified for aviation safety and will operate in accordance with the terms of the Astronics AeroSat *ESAA Blanket License* and Section 25.227 of the Commission’s Rules³ governing ESAA operations. These operations, as well as proposed HR6400 operations with additional satellites, will enhance the in-

¹ See Astronics AeroSat, File Nos. SES-LIC-20140902-00688 & SES-AMD-20141117-00858 (Call Sign E140087) (“*ESAA Blanket License*”).

² The HR129 terminal is also known as Astronics AeroSat’s T-200 Series antenna system.

³ 47 C.F.R. § 25.227.

flight broadband connectivity services available to U.S. passengers and promote competition for these services. As discussed herein, grant of this modification application is consistent with Commission precedent and will strongly serve the public interest.

I. BACKGROUND

Astronics AeroSat is a leader in aeronautical communications solutions for commercial aircraft and business jets. For more than a decade, Astronics AeroSat has designed and manufactured antenna systems used to provide in-flight broadband Internet and video services for aircraft passengers and crew. Astronics AeroSat has more recently launched FliteStream™ VVIP, a satellite broadband service designed for the VVIP market. FliteStream™ is the aviation industry's first dedicated global connectivity solution for the business jet and VVIP fleet.

In this application, Astronics AeroSat seeks to operate the new HR129 terminal with certain U.S.-licensed and non-U.S. licensed satellites previously authorized for use in the aeronautical satellite services context, including satellites currently authorized under the *ESAA Blanket License* for HR6400 terminal operations. Astronics AeroSat also seeks to add certain satellites as points of communication for the previously-licensed HR6400 terminal. Granting authority for these operations will allow Astronics AeroSat to extend the coverage and increase the capacity of its global in-flight broadband services.

Pursuant to Section 25.117(c) of the Commission's Rules,⁴ Astronics AeroSat herein provides the attached Technical Appendix, FCC Form 312 and Schedule B for information that is changing as a result of the requested modifications. Astronics AeroSat incorporates by reference the remaining, unchanged technical information previously provided with its *ESAA Blanket*

⁴ 47 C.F.R. § 25.117(c).

License application.⁵ Grant of the proposed modifications would serve the public interest by enabling Astronics AeroSat to provide expanded and improved service to U.S. customers and promoting competition among in-flight connectivity providers.

II. DISCUSSION

A. HR129 Terminal Operations

As set forth in the attached application materials, the HR129 terminal transmits within the same operational envelope as the previously authorized HR6400 terminal and complies with the requirements set forth in Section 25.227 of the Commission's Rules. In particular, the HR129 terminal operates in accordance with the coordination agreements of proposed satellite points of communications, complies with the Commission's two-degree spacing policies, has a pointing accuracy of 0.2° and will automatically cease transmissions if point offset is 0.5° or greater, and otherwise will comply with the Astronics AeroSat's *ESAA Blanket License*. The Technical Appendix, FCC Form 312 and Schedule B contain relevant information relating to the technical parameters, antenna performance information, satellite operator certifications, radiation hazard analysis and general antenna specifications for the HR129 terminal.⁶ Because Astronics AeroSat's ESAA terminal use the iDirect modem to transmit individually on a specific frequency and time slot, there are no aggregation effects and grant of this modification application will not increase the potential for interference from FliteStream™ system operations.

⁵ See *ESAA Blanket License*, Technical Appendix.

⁶ Astronics AeroSat notes that because it is relying on satellite operator certifications, included in the attached Technical Appendix, to demonstrate compatibility with other Ku-band operations, it need not submit the full range of technical data required in the absence of such certifications under Section 25.227. Nonetheless, Astronics AeroSat is submitting substantial technical detail that provides the Commission and interested parties with a comprehensive understanding of the operational characteristics of the HR129 terminal.

The HR129 terminal has been previously licensed by the Commission for experimental and commercial blanket license operations.⁷ More recently, the terminal was added to Astronics AeroSat's experimental license for testing with the FliteStream™ system.⁸ Astronics AeroSat has fully described the FliteStream™ system in prior submissions and hereby incorporates by reference the technical showing regarding the control functionality and other operational characteristics submitted in connection with the prior application.⁹ Astronics AeroSat confirms that it will operate the HR129 consistent with the terms and conditions in Astronics AeroSat's *ESAA Blanket License*.

Astronics AeroSat requests authority for the HR129 terminal to communicate with the following nineteen (19) satellite points of communication and downlink frequency ranges:

⁷ See The Boeing Company, Experimental Radio Station Construction Permit and License, Call Sign WC2XVE (various file numbers); *see also* The Boeing Company, Radio Station Authorization, File No. SES-MFS-20050701-00853 (Call Sign E000723).

⁸ See Astronics AeroSat, File No. 0184-EX-ML-2015 (Call Sign WH2XCJ).

⁹ *ESAA Blanket License*, Technical Appendix.

Table 1: HR129 Terminal Proposed Satellite Points of Communication

Satellite	Licensing Admin. ¹⁰	Orbital Location	Downlink Freq. (GHz) ¹¹	ITU Region Coverage Area	Serves U.S. ¹²
Anik G1	Canada	107.3°	11.7-12.2	R2	No
Apstar 6	China	134° E	10.7-12.75	R3	No
Apstar 7	China	76.5° E	11.45-11.7	R1, R3	No
Asiasat 5	China	100.5° E	11.45-12.2	R1	No
Eutelsat 10A (W2A)	France	10° E	12.5-12.75	R1	No
Eutelsat 70B	France	70.5° E	10.95-11.7; 12.5-12.75	R1, R3	No
Eutelsat 115WB (Satmex 7)	Mexico	114.9°W	11.7-12.2	R2	Yes

¹⁰ Each foreign licensing administration is a member of the World Trade Organization for services covered under the World Trade Organization Basic Telecommunications Agreement. See FCC Form 312 at Item 42; 47 C.F.R. § 25.137(a). Moreover, each of the satellites is either U.S.-licensed or previously been authorized to communicate with U.S.-licensed ESAA terminals. See generally Panasonic Avionics, Call Sign E100089, File Nos. SES-MFS-20150609-00349, SES-STA-20160830-00753 and related file numbers. Thus, Astronics AeroSat need not make a detailed showing with respect to satellite operational parameters, orbital debris mitigation and similar information on which the Commission has passed previously.

¹¹ ESAA uplinks will be operated in all or part of the 14.0-14.5 GHz band depending on available capacity and national/regional restrictions on Ku-band aeronautical uplink operations.

¹² “Yes” indicates that the relevant satellite will be used for ESAA operations in U.S. territory. “No” indicates that ESAA operations will be conducted outside U.S. territory, even if the satellite may have some coverage of the United States.

Satellite	Licensing Admin.¹⁰	Orbital Location	Downlink Freq. (GHz)¹¹	ITU Region Coverage Area	Serves U.S.¹²
Eutelsat 117WA (Satmex 8)	Mexico	116.8°W	11.7-12.2	R2	No
Eutelsat 172A	U.S.	172° E	10.95 - 11.2; 11.45 - 11.7; 12.2 - 12.75	R2, R3	No
IS-14	U.S.	45° W	11.45-11.7	R1, R2	No
IS-15 (JCSAT-85)	U.S.	85° E	12.5-12.75	R1, R2	No
IS-29E	U.S.	50° W	10.95-12.5	R1, R2	Yes
JCSAT-5A	Japan	132° E	12.25-12.75	R3	No
NSS-6	Netherlands	95° E	11.45-11.7; 12.5-12.75	R3	No
Superbird C2	Japan	144° E	12.2-12.75	R3	No
Telstar 11N	U.S.	37.5° W	10.95 - 11.2; 12.25 - 12.75	R1	No
Telstar 12V	U.S.	15° W	10.95-12.2	R1, R2	No
Yamal 300K	Netherlands	183° E	10.95-11.7	R1, R2	Yes
Yamal 401	Russia	90° E	10.95-11.2; 11.45-12.75	R1, R3	No

Astronics AeroSat provides the attached Technical Appendix and Form 312 Schedule B for information relating to the operational characteristics of the HR129 terminal with each satellite

identified in Table 1, including operational areas and link budgets. All of the satellites proposed herein have been previously authorized by the Commission for ESAA operations or, in the case of Telstar 12V, is a U.S.-licensed satellite. Thus, the technical and operational parameters of each satellite are well known to the Commission, including each satellite's orbital debris mitigation and end-of-life plans, and no new showing regarding these issues is required.

The operators of each satellite identified above have reviewed the technical characteristics of Astronics AeroSat's HR129 ESAA terminal operations and confirmed that such operations are consistent with their coordination agreements and will not result in unacceptable interference to other satellites within +/- 6 degrees of the subject satellite.¹³ Attached hereto are letters confirming that the power levels associated with Astronics AeroSat's HR129 ESAA terminal operations with each satellite have been coordinated with the operators of adjacent satellites.¹⁴ In addition, when communicating with the above satellites, Astronics AeroSat confirms that it will operate the HR129 terminal consistent with Section 25.227 of the Commission's Rules.

B. HR6400 Terminal Operations

By this application, Astronics AeroSat also seeks to modify its *ESAA Blanket License* by adding fourteen (14) satellites as authorized points of communication for its previously licensed HR6400 terminal. The Commission is familiar with the technical and operational characteristics of the HR6400 terminal as Astronics AeroSat is currently authorized to operate up to 1,000

¹³ Astronics AeroSat confirms that the statement of Eutelsat regarding consistency of the proposed operations with "existing satellite coordination agreements with the satellites" adjacent to Eutelsat 10A, Eutelsat 70B and Eutelsat 172A includes adjacent satellites within +/-6 degrees of orbital separation from the Eutelsat 10A satellite in accordance with 47 C.F.R. § 25.227(b)(2)(ii). See Technical Appendix, II.

¹⁴ *Id.*

HR6400 terminals on U.S. and foreign-registered aircraft under its *ESAA Blanket License*. The technical characteristics of HR6400 terminal operations with each proposed satellite are provided in the associated FCC Form 312 and Schedule B included in the application for the *ESAA Blanket License*. Astronics AeroSat certifies the remaining information in support of its ESAA License has not changed, including the technical information previously submitted for the HR6400 terminal.

As previously demonstrated by Astronics AeroSat,¹⁵ the proposed HR6400 operations are consistent with the Commission's Rules and policies governing Ku-band ESAAs and the off-axis EIRP spectral density of the HR6400 terminal will comply with the two-degree spacing policies as set forth in Section 25.227(a)(1) of the Commission's Rules at all operational skew angles from 0-55° when operating in the United States. Nevertheless, Astronics AeroSat is applying for ESAA operating authority under Section 25.227(a)(2) and has included in the attached Technical Appendix relevant satellite operator certifications and other technical information required by Section 25.227(b)(2).

Astronics AeroSat also seeks to add the following fourteen (14) satellites as authorized points of communication for its previously licensed HR6400 terminal: Anik G1, Apstar 6, Asiasat 5, Eutelsat 10A, Eutelsat 70B, Eutelsat 115WB, IS-15, IS-29E, JCSAT-5A, NSS-6, Superbird C2, Telstar 12V, Yamal 300K and Yamal 401.¹⁶ The operators of each satellite have reviewed the technical characteristics of Astronics AeroSat's HR6400 ESAA terminal operations and confirmed that such operations are consistent with their coordination agreements and will not result in

¹⁵ See *ESAA Blanket License*, Technical Appendix.

¹⁶ A description of each of these same satellites is provided in Table 1 and Section II.A.1, above, in the discussion regarding the HR129 terminal.

unacceptable interference to other satellites within +/- 6 degrees of the subject satellite. Attached hereto are letters confirming that the power levels associated with Astronics AeroSat's HR6400 ESAA terminal operations with each satellite have been coordinated with operators of adjacent satellites.¹⁷ In addition, when communicating with the above satellites, Astronics AeroSat confirms that it will operate the HR6400 terminal consistent with Section 25.227 of the Commission's Rules.

C. Ground Segment

As indicated in Technical Appendix, the gateway earth stations for Astronics AeroSat's ESAA network are located in various countries around the world to provide global coverage and vary by satellite. Network control for Astronics AeroSat's proposed operations will be provided pursuant to an agreement with Panasonic Avionics Corporation ("Panasonic"), subject to Astronics AeroSat's ultimate direction and control using linked Network Operations Centers ("NOCs") located at both companies' facilities. The primary points of contact at both NOC facilities are identified in the Technical Appendix.

D. Geographic Areas of Operations

Attached in the Technical Appendix, Astronics AeroSat includes depictions of the geographic areas in which its ESAA terminals will operate with each proposed satellite point of communication.¹⁸

¹⁷ See Technical Appendix, II.

¹⁸ See Technical Appendix, I.; see also 47 C.F.R. § 25.227(b)(4).

III. WAIVER REQUEST

Astronics AeroSat respectfully requests a waiver of Section 2.106 of the Commission's Rules¹⁹ to permit space-to-Earth operations in relevant portions of the 10.7-12.75 GHz band. The FCC's Table of Allocations permits use of the 10.95-11.2 GHz and 11.45-11.7 GHz bands (on an unprotected basis) and the 11.7-12.2 GHz and 14.0-14.5 GHz bands (on a primary basis) for ESAA operations.²⁰ Astronics AeroSat also seeks to utilize FSS satellite downlink capacity available in the 12.2-12.75 GHz for ESAA receive operations on an unprotected, non-harmful interference basis outside the United States (principally in Regions 1 and 3).²¹ The Commission may permit such operations for the same reasons it permits ESAA downlink operations in other extended Ku-band receive spectrum.

The Commission may waive its rules for "good cause shown"²² and has previously waived Section 2.106 with respect to operation of Astronics AeroSat's FliteStream™ system in Ku-band downlink spectrum, concluding that unprotected ESAA receive operations in this spectrum are unlikely to interfere with or restrict other co-frequency uses of the band.²³

Because Astronics AeroSat's proposed ESAA receive operations utilize FSS satellite capacity operating consistent with applicable space station licenses and allocations, the Commission may grant a waiver and include all or part of the 10.7-12.75 GHz receive band (depending on the satellite) in the instant ESAA modification. Many other U.S. licensees utilize

¹⁹ 47 C.F.R. § 2.106.

²⁰ *See id.* at n. NG52 and n. NG55.

²¹ The 12.5-12.75 GHz band is allocated for FSS downlinks in Region 1 and the 12.2-12.75 is allocated for FSS downlinks in Region 3.

²² 47 C.F.R. § 1.3.

²³ *See ESAA Blanket License* at Special Condition 6640.

this spectrum worldwide for ESAA terminal receive operations to provide satellite-based, in-flight broadband connectivity. Waiver of Section 2.106 is an essential aspect of affording access to these next-generation aeronautical broadband services to passengers and crew aboard U.S. and foreign-registered aircraft.

IV. PUBLIC INTEREST CONSIDERATIONS

Grant of the requested modification will serve the public interest by enabling the introduction of the HR129 terminal in the U.S. market and provide direct benefits to U.S. consumers that will be able to access improved in-flight mobile broadband services and will further enhance U.S. leadership in in-flight mobile broadband services. This, in turn, will enhance competition in the mobile broadband market by extending the reach of these services to a broader range of aircraft.

In addition, including the requested satellites as authorized points of communication for the HR6400 terminal will serve the public interest by extending the coverage and increasing the capacity of the global FliteStream™ system for airlines and their passengers. These additional points of communications will provide additional bandwidth for the system and ensure that Astronics AeroSat has sufficient bandwidth to meet increasing demand and enhance the in-flight user experience within the relevant service area of the satellite.

V. CONCLUSION

Based on the foregoing, Astronics AeroSat respectfully requests that the Commission grant its request to modify its existing *ESAA Blanket License*, Call Sign E140087, by adding the HR129 terminal and adding new satellite points of communication for the HR129 and previously licensed HR6400 terminal.