

APPLICATION FOR EARTH STATION SPECIAL TEMPORARY AUTHORITY

APPLICANT INFORMATION Enter a description of this application to identify it on the main menu:
Request for a 180-day STA for Ka-band ESV operations

1. Applicant

Name: Harris CapRock Communications, Inc. **Phone Number:** 832-668-2753
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Street: 4400 S. Sam Houston Parkway Ea **E-Mail:** ellenann.sands@harris.com
City: Houston **State:** TX
Country: USA **Zipcode:** 77048
Attention: Ms. EllenAnn Sands



File # SES-STA-20160224-00171
Call Sign E060157 **Grant Date** 4/5/16
(or other identifier)
Term Dates
From: 5/25/16 **To:** 11/21/16
Approved: Paul E. Black



File # SES-STA-20160224-00171

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From: 5/25/16 To: 11/21/16

Approved: Paul E. Glass

Applicant: Harris CapRock Communications, Inc.
Call Sign: E060157
File No.: SES-STA-20160224-00171
Special Temporary Authority

Harris CapRock Communications (“Harris CapRock”) is granted special temporary authority (STA) for 180 days, commencing May 25, 2016 to operate ten, 2.4m SpaceTrack, Model ST5000 2.4m, earth stations aboard vessels (ESVs) to communicate with O3b Limited’s (O3b), O3B-A (S2935) Fixed Satellite Service (FSS) non-geosynchronous orbit (NGSO) satellites in the 27.6-28.4 GHz and 28.6-29.1 GHz (Earth-to-space) and 17.8-18.6 GHz and 18.8-19.3 GHz (space-to-Earth) frequency bands. The ESVs will be operating in the Gulf of Mexico region, certain coordinated ports in South Florida, the Caribbean region north of the 13° North Latitude, and other ocean regions 125 kilometers away from U.S. shoreline. Authorized operations are subject to the Commission’s Rules, and the following conditions.

1. Operations are limited to the following frequency bands and emissions:

Frequency Band	Emissions	Maximum E.I.R.P.	Maximum E.I.R.P. Density
27.6-28.4 GHz	40M0G7D	69.4 dBW	29.4 dBW/4kHz
27.6-28.4 GHz	1M00G7D	69.4 dBW	29.4 dBW/4kHz
17.8-18.6 GHz	40M0G7D		
17.8-18.6 GHz	1M00G7D		
28.6-29.1GHz	40M0G7D	69.4 dBW	29.4 dBW/4kHz
28.6-29.1GHz	1M00G7D	69.4 dBW	29.4 dBW/4kHz
18.8-19.3 GHz	40M0G7D		
18.8-19.3GHz	1M00G7D		

2. Minimum earth station antenna elevation angle for all operations must be 10° above the geographic horizon.

3. Harris CapRock shall take all necessary measures to ensure that the earth stations on maritime vessels do not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits defined in 47 C.F.R §§ 1.1307(b) and 1.1310 wherever such exposures might occur. Measures must be taken to ensure compliance with limits for both occupational controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. Requirements for restrictions can be determined by predictions based on calculations, modeling or by field measurements. The FCC's OET Bulletin 65 (available on-line at www.fcc.gov/oet/rfsafety) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for workers. The licensee shall ensure installation of terminals on the maritime vessels by qualified installers who have an understanding of the antenna's radiation environment and the measures best suited to maximize protection of the general public and persons operating the maritime vessel and equipment. A terminal exhibiting radiation exposure levels exceeding 1.0 mW/cm² in accessible areas, such as at the exterior surface of the radome, shall have a label attached to the surface of the terminal warning about the radiation hazard and shall include

thereon a diagram showing the regions around the terminal where the radiation levels could exceed 1.0 mW/cm². Transmitter(s) must be turned off during antenna maintenance to ensure compliance with FCC-specified safety guidelines for human exposure to radiofrequency radiation in the region between the antenna feed and the reflector.

4. Harris CapRock's earth stations on maritime vessels authorized herein must employ a tracking algorithm that is resistant to capturing and tracking adjacent satellite signals, and each station must be capable of inhibiting its own transmission in the event it detects unintended satellite tracking.
5. Harris CapRock's earth stations on maritime vessels authorized herein must be monitored and controlled by a ground-based network control and monitoring center. Such stations must be able to receive "enable transmission" and "disable transmission" commands from the network control center and must cease transmission immediately after receiving a "parameter change" command until receiving an "enable transmission" command from the network control center. The network control center must monitor operation of each earth station to determine if it is malfunctioning, and each earth station on maritime vessels must self-monitor and automatically cease transmission within 100 milliseconds on detecting an operational fault that could cause harmful interference.
6. Operation in the territorial waters of any country other than the United States must be in compliance with the applicable laws, regulations, and licensing procedures of that country, as well as with the conditions of this authorization.
7. The licensee must comply with any pertinent limits and provisions established by the International Telecommunication Union to protect other services allocated internationally.
8. The U.S. Table of Frequency Allocations, Section 2.106 of the Commission's rules, and the Ka-band Plan is waived to the extent noted herein. Harris CapRock is authorized to operate in the 27.6-28.4 GHz and 28.6-29.1 GHz (Earth-to-space) and 17.8-18.6 GHz and 18.8-19.3 GHz frequency bands for maritime use, on a non-harmful interference basis, that is, Harris CapRock must not cause harmful interference to, and must not claim protection from interference caused to it by, any other lawfully operating station, and must cease transmission(s) immediately upon notice of such interference.
9. Operation of earth stations on maritime vessels authorized herein are subject to any requirements the Commission may adopt in any future proceeding concerning operations in the 27.6-28.4 GHz and 28.6-29.1 GHz (Earth-to-space) and 17.8-18.6 GHz and 18.8-19.3 GHz frequency bands including, but not limited to, earth stations on maritime vessels communicating with geostationary and non-geostationary orbit space stations.
10. Harris CapRock's earth stations on maritime vessels authorized herein must be in compliance with the terms of coordination agreements with operators of NGSO FSS space stations operating in the 27.6-28.4 GHz and 28.6-29.1 GHz (Earth-to-space) and 17.8-18.6 GHz and 18.8-19.3 GHz frequency bands. In the event another NGSO system commences operations in the U.S. market in the 27.6-28.4 GHz and 28.6-29.1 GHz (Earth-to-space) and 17.8-18.6 GHz

and 18.8-19.3 GHz frequency bands, maritime earth stations operating pursuant to this authorization must cease operation unless and until such operation has been coordinated with the new NGSO system operator or O3b Limited demonstrates that such operation will not cause harmful interference to the new NGSO system.

11. Operation in the territorial waters of any country other than the United States must be in compliance with the applicable laws, regulations, and licensing procedures of that country, as well as with the conditions of this grant.

12. The licensee must maintain the following records for each antenna on maritime vessels: a record of the ship location (i.e., latitude and longitude), transmit frequency, channel bandwidth and satellite used. These records shall be time annotated and maintained for a period of not less than 1 year. Records will be obtained at time intervals of no greater than every 20 minutes while the antenna is transmitting. The licensee will make this data available upon request to a coordinator, fixed system operator, fixed satellite system operator, or the Commission within 24 hours of the request.

13. The grant of this authorization, is without prejudice to any action on any pending or future applications or waiver requests filed to provide additional services to, from, or within the United States using O3b Limited's NGSO system. Harris CapRock's remote control point for these ESV terminals. 4400 S. Sam Houston Pkwy. E, Houston, TX, Tel. 832-668-2775, is a material term of this authorization and may not be changed without prior authorization under Section 25.117 of the Commission's rules. See Public Notice, The International Bureau provides Guidance Concerning the Relocation of Earth Station Remote Control Points, DA 06-978 (rel. May 4, 2006).

14. Harris CapRock must maintain a U.S. point of contact available 24 hours per day, seven days per week, with the authority and ability to terminate operations authorized herein.

15. Grant of this STA is without prejudice to any determination that the Commission may make regarding other pending and/or future Harris CapRock applications.

16. Any action taken or expense incurred as a result of operations pursuant to this special temporary authority is solely at Harris CapRock's risk.

17. This action is issued pursuant to Section 0.261 of the Commission's rules on delegated authority, 47 C.F.R. § 0.261, and is effective immediately.

2. Contact

Name: Carlos Nalda **Phone Number:** 571-332-5626
Company: LMI Advisors **Fax Number:**
Street: 8601 James Creek Drive **E-Mail:** cnalda@lmiadvisors.com
City: Springfield **State:** VA
Country: USA **Zipcode:** 22152 -
Attention: **Relationship:** Other

(If your application is related to an application filed with the Commission, enter either the file number or the IB Submission ID of the related application. Please enter only one.)

3. Reference File Number or Submission ID

4a. Is a fee submitted with this application?

If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).

Governmental Entity Noncommercial educational licensee

Other (please explain):

4b. Fee Classification CGV - Fixed Satellite VSAT System

5. Type Request

Use Prior to Grant Change Station Location Other

6. Requested Use Prior Date

02/29/2016

7. City N/A

8. Latitude

(dd mm ss.s h) 0 0 0.0

9. State	10. Longitude (dd mm ss.s h) 0 0 0.0
11. Please supply any need attachments. Attachment 1: Technical Appendix Attachment 2: Draft 312 Schedule B Attachment 3: Narrative Statement	
12. Description. (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.) <div style="border: 1px solid black; padding: 5px;"> <p>Harris CapRock seeks a 180-day STA to operate its new ESV terminal in the Ka-band while communicating with O3b's Ka-band NGSO FSS system. (See Narrative Statement).</p> </div>	
13. By checking Yes, the undersigned certifies that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application"; party to the application; for these purposes. Yes <input checked="" type="radio"/> No <input type="radio"/>	
14. Name of Person Signing EllenAnn Sands	15. Title of Person Signing Legal Counsel
WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).	

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

In the Matter of

Application of Harris CapRock)	
Communications, Inc. for a 180-Day)	
Special Temporary Authorization (“STA”))	Call Sign: E060157
to Operate Earth Stations Onboard Vessel)	
(“ESV”) Terminals in the 27.6-28.4 GHz)	File No:
(Earth-to-space), 28.6-29.1 (Earth-to-space),)	
17.8-18.6 GHz (space-to-Earth) and 18.8-)	
19.3 GHz (space-to-Earth) Frequency Bands)	

Application for Special Temporary Authorization

Harris CapRock Communications, Inc. (“Harris CapRock”), pursuant to Section 25.120 of the Commission’s Rules, 47 C.F.R. § 25.120, seeks a 180-day special temporary authorization (“STA”) to operate certain earth station onboard vessel (“ESV”) terminals – Harris CapRock’s new 2.4m multi-band SpaceTrack (Model ST5000-2.4) – in the 27.6-28.4 GHz (Earth-to-space) band, 28.6-29.1 GHz (Earth-to-space) band, 17.8-18.6 GHz (space-to-Earth) band and 18.8-19.3 GHz (space-to-Earth) band while communicating with O3b Limited’s (“O3b”) Ka-band non-geostationary satellite orbit (“NGSO”) fixed-satellite service (“FSS”) system. This request supplements Harris CapRock’s concurrently filed 60-day STA application¹ and is consistent with a license modification application for long-term operating authority that will be filed shortly.

The ST5000-2.4 terminal will operate on U.S.-registered and non-U.S. registered maritime vessels and enhance Harris CapRock’s authorized ESV network, which provides a wide array of essential satellite communications services to vessels in motion, stationary oil drilling platforms and mobile rigs. As discussed herein, grant of the requested STA and associated waivers to permit Ka-band maritime operations is

¹ See Application of Harris CapRock Communications, Inc. for a 60-Day Special Temporary Authorization (“STA”) to Operate an Earth Stations Onboard Vessel (“ESV”) Terminals in the 27.6-28.4 GHz (Earth-to-space), 28.6-29.1 (Earth-to-space), 17.8-18.6 GHz (space-to-Earth) and 18.8-19.3 GHz (space-to-Earth) Frequency Bands (filed February 24, 2016) (“60-day STA Application”).

consistent with Commission precedent and would strongly serve the public interest.

I. BACKGROUND

As the Commission is aware, Harris CapRock has been engaged in extensive development and testing of its ST5000-2.4 terminal,² an innovative maritime earth station terminal designed to communicate in C-band, Ku-band and Ka-band FSS frequencies. Harris CapRock has filed a commercial modification application to authorize the ST5000-2.4 terminal to operate in C-band and Ku-band frequencies,³ the pendency of which effectively precludes the filing of another modification application to add Ka-band operational authority and necessitates this request to enable the ST5000-2.4 terminal to communicate O3b's Ka-band NGSO FSS system. Harris CapRock intends to file a license modification application to authorize long-term Ka-band operations of the ST5000-2.4 terminal at the earliest practicable time.

The Technical Appendix and draft FCC Form 312 and Schedule B contain relevant information relating to the technical parameters, antenna performance information, radiation hazard analysis and general antenna specifications for the ST5000-2.4 terminal. Harris CapRock requests a waiver of certain rules necessary to facilitate ST5000-2.4 Ka-band operations in the maritime context as proposed herein. Furthermore, Harris CapRock's operations of the ST5000-2.4 terminal will be consistent with the terms and conditions imposed on ESV terminal operations with the O3b system.

A. O3b's NGSO FSS System

In 2015, the Commission granted O3b's Petition for Declaratory Ruling seeking market access to serve the United States.⁴ In that application, O3b submitted a Schedule S describing the technical characteristics of its satellite system. Harris CapRock will operate the ST5000-2.4 terminals consistent with the technical parameters outlined in the

² See, e.g., Harris CapRock, File No. 0734-EX-ST-2015 (authorization expired Jan. 22, 2016); File No. 0454-EX-ST-2015 (authorization expired Nov. 12, 2015).

³ See Harris CapRock, File Nos. SES-MOD-20150915-00599 & SES-AMD-20151205-00907 (Call Sign E060157) ("*Pending Modification Application*").

⁴ See O3b Limited, File No. SAT-LOI-20141029-00118, Call Sign S2935 (granted Jan. 22, 2015).

O3b Schedule S.

The Commission has granted Ka-band ESV operating authority to O3b for maritime operations nearly identical to those proposed herein. In May 2014, the Commission granted O3b a blanket ESV license and a related waiver to operate one hundred ESV terminals on U.S. and non-U.S.-registered vessels in NGSO primary Ka-band spectrum, 28.6-29.1 GHz (Earth-to-space) and 18.8-19.3 GHz (space-to-Earth).⁵ In September 2014, the Commission granted authority to O3b to operate ESV terminals on three non-U.S.-registered vessels in GSO primary Ka-band spectrum, 28.35-28.4 GHz (Earth-to-space) and 18.3-18.6 GHz (space-to-Earth).⁶ In May 2015, the Commission granted O3b maritime operating authority to operate terminals on six non-U.S.-registered maritime vessels in the local multipoint distribution service (“LMDS”) primary uplink band, 27.6-28.35 GHz (Earth-to-space), and the fixed service (“FS”) primary downlink band, 17.8-18.3 GHz (space-to-Earth).⁷ Most recently, in January 2016, the Commission granted O3b a waiver to operate on up to thirty foreign-flagged vessels in the in the 27.6-28.4 GHz, 17.8-18.6 GHz and 18.8-19.3 GHz bands.⁸

The foregoing constitutes extensive precedent for Commission licensing of Ka-band maritime terminals to communicate with O3b’s NGSO FSS system. The proposed operations of the ST5000-2.4 terminal are virtually identical to those authorized in the Commission decisions noted above, and thus can be authorized on the same basis as the prior grants to O3b. Grant of the requested STA will enhance competition and enable

⁵ See O3b Limited, File No. SES-LIC-20130528-00455 (Call Sign E130098); Letter from Jose Albuquerque, Chief, Satellite Division and Mark Settle, Chief, Policy and Rules Division, to Joslyn Read, O3b Limited, DA 14-637 (rel. May 13, 2014).

⁶ See File No. SES-MSC-20140318-00150, Letter from Jose Albuquerque, Chief, Satellite Division and Mark Settle, Chief, Policy and Rules Division, to Suzanne Malloy, O3b Limited, DA 14-1369 (rel. September 22, 2014).

⁷ See SES-MSC-20150206-00066, Letter from Jose Albuquerque, Chief, Satellite Division and Mark Settle, Chief, Policy and Rules Division, to Suzanne Malloy, O3b Limited, DA 15-601 (rel. May 20, 2015).

⁸ See File No. SES-MSC-20151021-00760, Letter from Jose Albuquerque, Chief, Satellite Division and Mark Settle, Chief, Policy and Rules Division, to Suzanne Malloy, O3b Limited, DA 16-99 (rel. January 29, 2016).

more efficient provision of critical communications services to government users and commercial customers in the maritime, oil and gas, and other industries.

Harris CapRock notes that O3b has previously completed all necessary coordination with U.S. government satellite networks operating in the Ka-band, including GSO and NGSO networks. O3b has also completed coordination with the U.S. government under footnote US334 of the United States Table of Frequency Allocations (“Table of Allocations”). Harris CapRock’s proposed operations will be in accordance with all existing and future coordination agreements between O3b and other authorized Ka-band spectrum users. Finally, Harris CapRock will operate pursuant to the terms of O3b’s U.S. market access grant and, to the extent relevant, will fully satisfy any conditions of the grant to communicate with O3b’s NGSO system.⁹

II. SPECTRUM USE

The Table of Allocations and the Commission’s Ka-band Plan (“Ka-band Plan”) identify various spectrum allocations for NGSO FSS operations but no rules have been adopted for mobile earth stations or ESV operations in these bands. In the absence of such rules, Harris CapRock intends to operate the ST5000-2.4 terminal on a non-conforming (unprotected and non-interference) basis at all times when the terminals are in motion. When the ESVs are stationary, Harris CapRock will operate the ST5000-2.4 in accordance with the Table of Allocations and Ka-band Plan or, to the extent necessary, seek a limited waiver of the Commission’s Rules to operate the terminal on a non-conforming basis. Because the Commission has not adopted technical rules governing Ka-band ESV maritime operations, Harris CapRock will comply with the Commission’s general rules and policies governing Ku-band ESV operations.¹⁰

Harris CapRock seeks to communicate with O3b’s Ka-band NGSO FSS system in the following bands: 27.6-28.4 GHz (Earth-to-space), 28.6-29.1 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth) and 18.8-19.3 GHz (space-to-Earth). Issues associated with Ka-band maritime terminal operations in these band segments are discussed below.

⁹ See O3b Limited, File No.SAT-LOI-20141029-00118 (Call Sign S2935) (granted Jan. 22, 2015).

¹⁰ See 47 C.F.R. 25.222; Technical Appendix, IV & V (Tracking Report).

A. Uplink Frequencies and Ka-band Designation

a. Primary NGSO FSS Uplink

The Table of Allocations and Ka-band Plan provide that the 28.6-29.1 GHz (Earth-to-space) band may be used by NGSO FSS systems on a primary basis and by GSO FSS systems on a secondary basis.¹¹ Accordingly, when the ESVs are stationary, Harris CapRock will operate the ESVs on a primary basis in the 28.6-29.1 GHz band. When the ESVs are in motion, however, Harris CapRock intends to operate the ST5000-2.4 terminal on a non-conforming (unprotected and non-interference) basis.

As discussed in Section III, below, Harris CapRock respectfully requests a waiver of the Table of Allocations, 47 C.F.R. §2.106, and Ka-band Plan to the extent necessary to permit its non-conforming use of the 28.6-29.1 GHz band.¹² Harris CapRock demonstrates that it can operate the ST5000-2.4 terminal without causing harmful interference to authorized spectrum users and agrees to accept any harmful interference from other services while operating on a non-conforming, unprotected basis. In addition, Harris CapRock will not claim protection from conforming uses of the 28.6-29.1 GHz band while the ESVs are in motion.

b. Secondary NGSO FSS Uplink

The Commission's Table of Allocations and Ka-band Plan provide that LMDS systems operate on a primary basis and FSS systems on a secondary basis in the 27.5-28.35 GHz (Earth-to-space) band.¹³ In addition, GSO FSS systems operate on a primary basis and NGSO FSS systems operate on a secondary basis in the 28.35-28.4 GHz (Earth-

¹¹ *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, ¶¶ 57-58 and 78 (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*”).

¹² See United States Table of Frequency Allocations, 47 C.F.R. §2.106.

¹³ See *Ka-band Plan R&O* ¶¶ 59-62; see also *Redesignation of Ka-band R&O* ¶ 28.

to-space) band.¹⁴

Accordingly, when the ESVs are stationary, Harris CapRock will operate the ST5000-2.4 terminal on a secondary, non-harmful interference basis to LMDS in the 27.6-28.35 GHz band and to GSO FSS systems in the 28.35-28.4 GHz band. When the terminal is in motion, however, Harris CapRock will operate the ST5000-2.4 on a non-conforming (unprotected and non-interference) basis.

Harris CapRock notes that its proposed operations in the 27.6-28.35 GHz band are consistent with the Commission's view on the type of FSS operations that would not cause harmful interference to primary LMDS stations in the band. The Commission has previously stated that FSS operations in this band are limited to "gateway-type" operations.¹⁵ The Commission's main concern is ubiquitous terminals that could interfere with LMDS operations.¹⁶ Although the rules limit operations in some bands to gateway earth stations only, the 27.5-28.35 GHz band is not among them and there is no requirement that earth stations actually serve as gateways.

Harris CapRock's proposed stationary ESV operations at a small number of port and offshore locations will be limited in scope and consistent with the Commission's views on high data-rate, gateway-type operations. The Commission has previously recognized that Ka-band maritime earth station operations are consistent with its view of

¹⁴ *Ka-band Plan R&O* ¶ 42; see also *Redesignation of Ka-band Plan R&O* ¶ 28.

¹⁵ The Commission's references to "gateway-type" service in the 27.5-28.35 GHz band are not intended as a requirement that all earth stations in the band serve as gateway earth stations. Rather, the mention of "gateway-type" service in the 27.5-28.35 GHz band serves as an example of what the Commission's envisions as the type of service that FSS operators would be able to provide on a secondary basis without causing interference to primary LMDS stations in the band.

¹⁶ *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, Third Report and Order*, 12 FCC Rcd 22310, 22327, ¶ 42 (1997).

“gateway-type” operations.¹⁷ Accordingly, Harris CapRock can be permitted to operate on a secondary basis to LMDS in the 27.6-28.35 GHz band.

As a secondary user, Harris CapRock’s proposed NGSO FSS operations in the 27.6-28.35 GHz band must not cause interference to primary LMDS stations. The attached Comsearch coordination reports demonstrate that Harris CapRock may operate the ST5000-2.4 terminal without causing harmful interference to LMDS licensees. Harris CapRock has completed coordination of its proposed Ka-band ESV operations in the 27.6-28.35 GHz band with existing terrestrial licenses in the port areas where equipped vessels will be docked.¹⁸ No objections were received from incumbent licensees. Furthermore, Harris CapRock agrees not to cause harmful interference to future primary LMDS operations in the band and will accommodate any future LMDS licensees to the extent necessary to avoid harmful interference.

As a secondary user in the 28.35-28.4 GHz band, Harris CapRock must operate the ST5000-2.4 terminal on a secondary basis to GSO FSS system and not cause harmful interference to U.S.-licensed GSO FSS operations. Harris CapRock will operate the terminal consistent with the off-axis EIRP limits specified in Section 25.138 of the Commission’s Rules to ensure no interference with GSO FSS Ka-band satellite operations.¹⁹ Furthermore, as discussed, the ST5000-2.4 terminal is designed to meet certain FCC ESV operational requirements for Ku-band ESVs, including the pointing accuracy, automatic cessation and recording requirements.²⁰ Finally, O3b has demonstrated that operations of its Ka-band NGSO system comply with relevant Equivalent Power Flux Density (“EPFD”) limits,²¹ thus providing the required level of

¹⁷ See O3b Limited, File No. SES-MS-20150206-00066.

¹⁸ Frequency coordination reports have been completed for port locations in Fort Lauderdale, Florida, Miami, Florida, Port Canaveral, Florida and San Juan, Puerto Rico. See Technical Appendix, VII.

¹⁹ See 47 C.F.R. § 25.138; Technical Appendix, I.

²⁰ See Technical Appendix, V.

²¹ See O3b Limited, File No. SES-MS-20150206-00066, Technical Appendix A.7; *contactMEO Communications, LLC*, 21 FCC Rcd 4035, 4043-4044 (IB 2006) (where the Commission held that compliance with the ITU’s EPFD limits provides a sufficient basis

protection to GSO FSS systems.

When the ST5000-2.4 is in motion, Harris CapRock intends to operate the terminal on a non-conforming (unprotected and non-interference) basis in the 27.6-28.4 GHz band. As discussed in Section III, below, Harris CapRock respectfully requests a waiver of the Table of Allocations, 47 C.F.R. §2.106, and Ka-band Plan to the extent necessary to permit its non-conforming use of the 27.6-28.4 GHz band.²² Harris CapRock demonstrates that it can operate the ST5000-2.4 terminal without causing harmful interference to authorized spectrum users and agrees to accept any harmful interference from other services while operating on a non-conforming, unprotected basis. In addition, Harris CapRock will not claim protection from conforming uses of the 27.6-28.4 GHz band while the ESVs are in motion.

B. Downlink Frequencies and Ka-band Designation

a. Primary NGSO FSS Downlink

The Table of Allocations and the Commission's Ka-band Plan provide that the 18.8-19.3 GHz (space-to-Earth) band may be used by NGSO FSS operations on a primary basis.²³ Accordingly, when the ESVs are stationary, Harris CapRock will operate the ESVs on a primary basis in the 18.8-19.3 GHz band. Because the Commission has not adopted rules governing Ka-band terminal operations onboard maritime vessels, Harris CapRock intends to operate the ESVs on a non-conforming basis when the vessels are in motion.

As discussed in Section III, below, Harris CapRock respectfully requests a waiver of the Table of Allocations, 47 C.F.R. §2.106, and Ka-band Plan to the extent necessary to permit its non-conforming use of the 18.8-19.3 GHz band.²⁴ Harris CapRock

for an NGSO FSS system to operate on a non-interference basis in a band in which GSO FSS systems are primary).

²² See United States Table of Frequency Allocations, 47 C.F.R. §2.106.

²³ See *Ka-band Plan R&O* ¶¶ 59-62; see also *Redesignation of Ka-band R&O* ¶ 28. Note that low power point-to-multipoint terrestrial fixed systems may continue to be licensed and operate on a co-primary basis with NGSO/FSS in the 18.82-18.87 GHz and 19.16-19.21 GHz bands.

²⁴ See United States Table of Frequency Allocations, 47 C.F.R. §2.106.

demonstrates that it can operate the ST5000-2.4 terminal without causing harmful interference to authorized spectrum users and agrees to accept any harmful interference from other services while operating on a non-conforming, unprotected basis. In addition, Harris CapRock will not claim protection from conforming uses of the 18.8-19.3 GHz band while the ESVs are in motion.

b. Downlink with No NGSO FSS Allocation

The Table of Allocations and the Commission's Ka-band Plan provide that the 17.8-18.3 GHz band may be used by FS systems on a primary basis and NGSO FSS systems are non-conforming.²⁵ Similarly, the Table of Allocations and Ka-band Plan provide that in the 18.3-18.6 GHz band, FSS services are limited to GSO FSS operations.²⁶ Accordingly, Harris CapRock will operate its ESVs on a non-conforming basis while stationary or in motion in the 17.8-18.6 GHz band.

As discussed in Section III, below, Harris CapRock respectfully requests a waiver of the Table of Allocations, 47 C.F.R. §2.106, and Ka-band Plan to the extent necessary to permit its non-conforming use of the 17.8-18.6 GHz band.²⁷ Harris CapRock demonstrates that it can operate the ST5000-2.4 terminal without causing harmful interference to authorized spectrum users and agrees to accept any harmful interference from other services while operating on a non-conforming, unprotected basis. In addition, Harris CapRock will not claim protection from conforming uses of the 17.8-18.6 GHz band while the ESVs are in motion.

III. WAIVER REQUESTS

Harris CapRock is seeking a waiver of the U.S. Table of Frequency Allocations, 47 C.F.R. § 2.106, and the Commission's Ka-band plan to the extent necessary to permit non-conforming operation of the ST5000-2.4 terminal. In considering requests for non-conforming uses, the Commission has indicated it would grant such waivers when there is little potential for interference into any service authorized under the Table of

²⁵ See *Redesignation of Ka-band Plan R&O* ¶¶ 28 and 34.

²⁶ *Id.*; see United States Table of Frequency Allocations, footnote NG164.

²⁷ See United States Table of Frequency Allocations, 47 C.F.R. §2.106.

Allocations and when the non-conforming operator accepts any interference from authorized services.²⁸ In the following sections, Harris CapRock demonstrates it can operate the ST5000-2.4 terminal on a non-conforming basis consistent with Commission policies and precedent.

A. 28.6-29.1 GHz Uplink Band

When the ESVs are in motion, Harris CapRock proposes to operate the ST5000-2.4 terminal on a non-conforming basis in the 28.6-29.1 GHz band. Harris CapRock will not claim protection from conforming uses of the spectrum while the ESVs are in motion and agrees to accept any harmful interference from other services. In addition, Harris CapRock will immediately terminate its ESV operations upon notification that such operations are not permitted under the terms of a coordination agreement with, or are causing harmful interference to, any lawfully operating radio system in the 28.6-29.1 GHz band in conformance with the Table of Allocations. Harris CapRock's operations will be in accordance with any coordination agreement that has been or will be reached between O3b and other lawfully operating spectrum users.

There is little to no potential for interference to existing secondary GSO FSS systems in these bands.²⁹ While there are no rules for mobile maritime operations in the Ka-band, Harris CapRock will operate the proposed terminals within the off-axis EIRP limits specified in Section 25.138 of the Commission's Rules and will otherwise comply with the Commission's two-degree spacing policy.³⁰ As discussed in the attached Technical Appendix, the ST5000-2.4 terminal is designed to meet the FCC's requirements for Ku-band ESV operations, including: (i) pointing accuracy of 0.2° or better; (ii) automatic cessation of emissions within 100 ms if pointing offset exceeds 0.5°;

²⁸ See Letter from Jose Albuquerque, Chief, Satellite Division and Mark Settle, Chief, Policy and Rules Division, to Suzanne Malloy, O3b Limited, DA 14-1369 (rel. September 22, 2014); *Contactmeo Communications, LLC*, Order and Authorization, 21 FCC Rcd 4035, 4044 (IB 2006); *ViaSat AMSS Order*, File No. SES-MFS-20090624-00789; see also 47 C.F.R. § 1.3.

²⁹ There is no potential for interference into other NGSO FSS systems because O3b's system is currently the only authorized NGSO FSS system in the United States.

³⁰ See 47 C.F.R. § 25.138; Technical Appendix, Section III.

and (iii) transmissions will not resume until pointing accuracy is within 0.2°. ³¹ Harris CapRock has also designed a system to record a vessel's location, transmit frequency, channel bandwidth and satellite used, which can be made available to a FSS operator within 24 hours of a request.

Article 22 of the ITU Radio Regulations sets forth standards for interference protection of GSO satellite networks from NGSO satellite systems. As previously demonstrated by O3b, operations of the subject Ka-band NGSO system comply with the relevant EPFD uplink limits in the 28.6-29.1 GHz band. ³² Harris CapRock will operate the ST5000-2.4 consistent with the EPFD limits of O3b's system to provide the required level of protection from GSO FSS systems operating in the 28.6-29.1 GHz band.

B. 27.6-28.4 GHz Uplink Band

When the ESVs are in motion, Harris CapRock proposes to operate the ST5000-2.4 terminal on a non-conforming basis in the 27.6-28.4 GHz band. Harris CapRock will not claim protection from conforming uses of the spectrum while the ESVs are in motion and agrees to accept any harmful interference from other services while operating on a non-conforming, unprotected basis. In addition, Harris CapRock will immediately terminate its ESV operations upon notification that such operations are not permitted under the terms of a coordination agreement with, or are causing harmful interference to, any lawfully operating radio system in the 27.6-28.4 GHz band in conformance with the Table of Allocations. Harris CapRock's operations will be in accordance with any coordination agreement that has been or will be reached between O3b and other lawfully operating spectrum users.

There is little to no potential for interference to LMDS or GSO FSS operations from Harris CapRock's proposed ESV operations in the 27.6-28.4 GHz band. Not only has Harris CapRock coordinated the relevant port areas, but while the ESVs are in motion

³¹ See Technical Appendix, IV. & V.

³² See O3b Limited, File No. *See* File No. SES-LIC-20130528-00455, Technical Appendix, A.7; *contactMEO Communications, LLC*, 21 FCC Rcd 4035, 4043-4044 (IB 2006) (where the Commission held that compliance with the ITU's EPFD limits provides a sufficient basis for an NGSO FSS system to operate on a non-interference basis in a band in which GSO FSS systems are primary).

the subject vessels will be sufficient distance from the U.S. coastline to prevent harmful interference to potentially affected terrestrial licensees. In addition, operations of the ST5000-2.4 will be consistent with the EPFD uplink limits in the 27.6-28.4 GHz band to protect authorized spectrum users pursuant to Article 22 of the ITU Radio Regulations.³³ Furthermore, Harris CapRock will operate the proposed terminals within the off-axis EIRP limits specified in Section 25.138 of the Commission's Rules and observe the Commission's Ku-band ESV requirements for pointing accuracy, recording and automatic cessation. Thus, while the ESVs are in motion, Harris CapRock can operate on a non-conforming basis without causing harmful interference to authorized GSO FSS or LMDS operations in the 27.6-28.4 GHz band.

C. 18.8-19.3 GHz Downlink Band

When the ESVs are in motion, Harris CapRock proposes to operate the ST5000-2.4 terminal on a non-conforming basis in the 18.8-19.3 GHz band. Harris CapRock will not claim protection from conforming uses of the spectrum while the ESVs are in motion and agrees to accept any harmful interference from other services while operating on an unprotected, non-conforming basis. In addition, Harris CapRock will immediately terminate its ESV operations upon notification that such operations are not permitted under the terms of a coordination agreement with, or are causing harmful interference to, any lawfully operating radio system in the 18.8-19.3 GHz band in conformance with the Table of Allocations. Harris CapRock's operations will also be in accordance with any coordination agreement that has been or will be reached between O3b and other lawfully operating spectrum users.

Because there are no other Ka-band NGSO FSS systems authorized in the United States, Harris CapRock's proposed operations will not cause harmful interference to other NGSO FSS systems. Furthermore, as previously demonstrated by O3b, operations of the subject Ka-band NGSO system comply with the relevant Power Flux Density ("PFD")

³³ See O3b Limited, File No. SES-MS-20150206-00066, Technical Appendix A.7; *contactMEO Communications, LLC*, 21 FCC Rcd 4035, 4043-4044 (IB 2006) (where the Commission held that compliance with the ITU's EPFD limits provides a sufficient basis for an NGSO FSS system to operate on a non-interference basis in a band in which GSO FSS systems are primary).

downlink limits for the 18.8-19.3 GHz band designed to protect terrestrial FS services.³⁴ Harris CapRock's proposed ESV operations are consistent with the PFD limits of O3b's system and will provide the required level of protection from terrestrial FS systems operating in the 18.8-19.3 GHz band when the ESVs are in motion. Furthermore, the ESVs will operate within the off-axis EIRP limits specified in Section 25.138 of the Commission's Rules and observe the Commission's Ku-band ESV requirements for pointing accuracy, recording and automatic cessation to ensure no harmful interference to authorized FS operations.

D. 17.8-18.6 GHz Downlink Band

When the ESVs are stationary or in motion, Harris CapRock proposes to operate the ST5000-2.4 terminal on a non-conforming basis in the 17.8-18.6 GHz band. Harris CapRock will not claim protection from conforming uses of the spectrum while the ESVs are in motion and agrees to accept any harmful interference from other services while operating on an unprotected, non-conforming basis. In addition, Harris CapRock will immediately terminate its ESV operations upon notification that such operations are not permitted under the terms of a coordination agreement with, or are causing harmful interference to, any lawfully operating radio system in the 17.8-18.6 GHz band in conformance with the Table of Allocations. Harris CapRock's operations will be in accordance with any coordination agreement that has been or will be reached between O3b and other lawfully operating spectrum users.

There is no potential for the proposed operations to cause interference to other spectrum users because they are receive operations and would be the victim of interference from terrestrial transmit operations. As previously demonstrated by O3b, operations of its Ka-band NGSO system comply with the relevant PFD downlink limits for the 17.8-18.6 GHz band designed to protect terrestrial FS services.³⁵ Operations of

³⁴ See O3b Limited, File No. SES-LIC-20130528-00455, Technical Appendix, A.5-A.7. Fixed Service stations in the United States operating in the 18.8-19.3 GHz band are no longer co-primary with FSS users in this band. (*See* 47 C.F.R. § 101.85(b)(2).)

³⁵ See O3b Limited, File No. SES-MS-C-20150206-00066, Technical Appendix A.5

the O3b system also comply with EPFD downlink limits in the 18.3-18.6 GHz band,³⁶ therefore providing the required level of protection from GSO FSS systems operating in the band. Furthermore, the ESVs will operate within the off-axis EIRP limits specified in Section 25.138 and observe the Commission's Ku-band ESV pointing accuracy, recording and automatic cessation requirements to ensure that there is no harmful interference to GSO FSS systems in this band.

E. Waiver Precedent

There is strong Commission precedent for granting the waivers requested herein. The Commission has granted virtually identical waivers to O3b for its non-conforming use of the Ka-band for maritime operations.³⁷ Harris CapRock's proposed ESV operations are fundamentally the same as O3b's authorized operations. The Commission also has granted similar waivers to enable Ka-band aeronautical operations in the absence of rules governing Ka-band earth stations aboard aircraft ("ESAAs").³⁸

Harris CapRock has demonstrated that it can operate the ST5000-2.4 terminal in the maritime context on a non-conforming basis in each band without causing harmful interference to authorized users and agrees to accept any harmful interference from other authorized systems. Accordingly, grant of the requested waivers is consistent with Commission precedent and will not undermine other uses of the subject bands.

IV. EXPEDITED CONSIDERATION

Contemporaneous with this STA application, Harris CapRock has filed a request for 60-day STA to operate the ST5000-2.4 terminal and communicate with O3b's NGSO FSS system. Harris CapRock has requested interim 60-day operating authority to afford the Commission time to place this STA application on public notice for comment by interested parties.

As the Commission is aware, the pendency of a separate modification application

³⁶ *Id.* A.7

³⁷ *See* File No. SES-LIC-20130528-00455 (Call Sign E130098); File No. SES-MSC-20140318-00150; File No. SES-MSC-20150206-00066; File No. SES-MSC-20151021-00760; Section I.A.

³⁸ *See* ViaSat Authorization, File No. SES-LIC-20120427-00404, Call Sign E120075.

to add the ST5000-2.4 in the C-band and Ku-band to Harris CapRock's ESV license effectively precludes filing a new modification to add Ka-band operating authority to the license.³⁹ Harris CapRock has consulted with Commission staff and concluded, as a result of processing limitations within the International Bureau Filing System (IBFS), it is necessary to file requests for STA authority to support initial ST5000-2.4 Ka-band operations.

Expeditious processing of this STA request will ensure that the substantial public benefits of ST5000-2.4 terminal operations can be realized until such time as Harris CapRock is able to file its contemplated modification application for long-term operating authority. Harris CapRock acknowledges that any action on the requested STA will not affect the Commission's ultimate determination with respect to the forthcoming modification application.

V. PUBLIC INTEREST

Grant of the requested 180-day STA will strongly serve the public interest. Authorizing operation of the ST5000-2.4 terminal will allow Harris CapRock to provide more robust broadband satellite communications services to a wide array of users, including vessels in motion, marine barges and remote oil platforms that may be unable to obtain communications services through alternative facilities. The ST5000-2.4 multi-band terminal also will enhance operational flexibility and available satellite capacity by utilizing Ka-band spectrum, in addition to other commercial FSS bands, to meet maritime customer needs. Users will be able to utilize high-speed Internet access, corporate VPN, e-mail, voice and other services, including emergency communications to support employees in remote locations, throughout international and U.S. waterways.

Near-term deployment of this terminal will also ensure that Harris CapRock (a U.S. equipment manufacturer and service provider) and other U.S. interests can participate more fully in the development of these important new services and improve competition among maritime service providers. Moreover, Harris CapRock has expended considerable effort in preparing equipment and personnel to facilitate near-term introduction of the ST5000-2.4 terminal and grant of the requested authority will allow commercial and government customers to benefit from the expansion of maritime

³⁹ See *Pending Modification Application*.

satellite communications services.

VI. CONCLUSION

In view of the foregoing, the public interest would be served by a grant of the requested 180-day STA to allow Harris CapRock to operate the ST5000-2.4 terminal in the Ka-band with the O3b system as described herein.

Approved by OMB
3060-0678

Date & Time Filed:
File Number: ---

FCC APPLICATION FOR SPACE AND EARTH STATION:MOD OR AMD - MAIN FORM	FCC Use Only
FCC 312 MAIN FORM FOR OFFICIAL USE ONLY	

APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:
Modification to add Ka-band ESV to Call Sign E060157

1-8. Legal Name of Applicant			
Name:	Harris CapRock Communications, Inc.	Phone Number:	832-668-2753
DBA Name:		Fax Number:	832-668-2780
Street:	4400 S. Sam Houston Parkway Ea	E-Mail:	ellenann.sands@harris.com
City:	Houston	State:	TX
Country:	USA	Zipcode:	77048 -
Attention: Ms. EllenAnn Sands			

9-16. Name of Contact Representative			
Name:	Carlos Nalda	Phone Number:	571-332-5626
Company:	LMI Advisors	Fax Number:	
Street:	8601 James Creek Drive	E-Mail:	cnalda@lmiadvisors.com
City:	Springfield	State:	VA
Country:	USA	Zipcode:	22152-
Attention: Mr. Carlos M. Nalda		Relationship:	Other

CLASSIFICATION OF FILING

17. Choose the button next to the classification that applies to this filing for both questions a. and b. Choose only one for 17a and only one for 17b. <input checked="" type="radio"/> a1. Earth Station <input type="radio"/> a2. Space Station	(N/A) b1. Application for License of New Station (N/A) b2. Application for Registration of New Domestic Receive-Only Station <input type="radio"/> b3. Amendment to a Pending Application <input checked="" type="radio"/> b4. Modification of License or Registration b5. Assignment of License or Registration b6. Transfer of Control of License or Registration <input type="radio"/> b7. Notification of Minor Modification (N/A) b8. Application for License of New Receive-Only Station Using Non-U.S. Licensed Satellite (N/A) b9. Letter of Intent to Use Non-U.S. Licensed Satellite to Provide Service in the United States (N/A) b10. Other (Please specify) (N/A) b11. Application for Earth Station to Access a Non-U.S. satellite Not Currently Authorized to Provide the Proposed Service in the Proposed Frequencies in the United States.
--	---

17c. Is a fee submitted with this application? <input checked="" type="radio"/> If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114). <input type="radio"/> Governmental Entity <input type="radio"/> Noncommercial educational licensee <input type="radio"/> Other (please explain):

17d. Fee Classification CGV - Fixed Satellite VSAT System
--

18. If this filing is in reference to an existing station, enter: (a) Call sign of station: E060157	19. If this filing is an amendment to a pending application enter both fields, if this filing is a modification please enter only the file number: (a) Date pending application was filed: (b) File number: SESAMD20151205009
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TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Select all that apply:

- a. Fixed Satellite
 b. Mobile Satellite
 c. Radiodetermination Satellite
 d. Earth Exploration Satellite
 e. Direct to Home Fixed Satellite
 f. Digital Audio Radio Service
 g. Other (please specify)
 ESV

21. STATUS: Choose the button next to the applicable status. Choose only one.

- Common Carrier Non-Common Carrier

22. If earth station applicant, check all that apply.

- Using U.S. licensed satellites
 Using Non-U.S. licensed satellites

23. If applicant is providing INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one. Are these facilities:

- Connected to a Public Switched Network Not connected to a Public Switched Network N/A

24. FREQUENCY BAND(S): Place an 'X' in the box(es) next to all applicable frequency band(s).

- a. C-Band (4/6 GHz) b. Ku-Band (12/14 GHz)
 c. Other (Please specify upper and lower frequencies in MHz.)

Frequency Lower: 17800 Frequency Upper: 29100 (Please specify additional frequencies in an attachment)

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.

- a. Fixed Earth Station
 b. Temporary-Fixed Earth Station
 c. 12/14 GHz VSAT Network
 d. Mobile Earth Station
 e. Geostationary Space Station
 f. Non-Geostationary Space Station
 g. Other (please specify) ESV

26. TYPE OF EARTH STATION FACILITY:

- Transmit/Receive Transmit-Only Receive-Only N/A

"For Space Station applications, select N/A."

PURPOSE OF MODIFICATION

27. The purpose of this proposed modification is to: (Place an 'X' in the box(es) next to all that apply.)

- a -- authorization to add new emission designator and related service
 b -- authorization to change emission designator and related service
 c -- authorization to increase EIRP and EIRP density
 d -- authorization to replace antenna
 e -- authorization to add antenna
 f -- authorization to relocate fixed station
 g -- authorization to change frequency(ies)
 h -- authorization to add frequency
 i -- authorization to add Points of Communication (satellites & countries)
 j -- authorization to change Points of Communication (satellites & countries)
 k -- authorization for facilities for which environmental assessment and radiation hazard reporting is required
 l -- authorization to change orbit location
 m -- authorization to perform fleet management
 n -- authorization to extend milestones
 o -- Other (Please specify)

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. 1.1308 and 1.1311, as an exhibit to this application. A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments. Yes No

ALIEN OWNERSHIP Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30-34.

29. Is the applicant a foreign government or the representative of any foreign government?	<input type="radio"/> Yes <input checked="" type="radio"/> No
30. Is the applicant an alien or the representative of an alien?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
31. Is the applicant a corporation organized under the laws of any foreign government?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.	

BASIC QUALIFICATIONS

35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules? If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.	<input checked="" type="radio"/> Yes <input type="radio"/> No
36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explanation of circumstances.	<input type="radio"/> Yes <input checked="" type="radio"/> No
37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explanation of circumstances.	<input type="radio"/> Yes <input checked="" type="radio"/> No
38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition? If Yes, attach as an exhibit, an explanation of circumstances	<input type="radio"/> Yes <input checked="" type="radio"/> No
39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhibit, an explanation of the circumstances.	<input type="radio"/> Yes <input checked="" type="radio"/> No
40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting 10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.	
41. By checking Yes, the undersigned certifies, that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. <i>See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes.</i>	<input checked="" type="radio"/> Yes <input type="radio"/> No
42a. Does the applicant intend to use a non-U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in 47 C.F.R. 25.137, as appropriate. If No, proceed to question 43.	<input checked="" type="radio"/> Yes <input type="radio"/> No
42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station? U.K.	
43. Description. (Summarize the nature of the application and the services to be provided). Harris CapRock seeks Commission authority to modify its existing ESV license to add a new terminal (Model ST5000-2.4) to the license for operations in the Ka-band while communicating with O3b's NGSO FCC system.	

43a. Geographic Service Rule Certification By selecting A, the undersigned certifies that the applicant is not subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25.	<input checked="" type="radio"/> A
By selecting B, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will comply with such requirements.	<input type="radio"/> B
By selecting C, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will not comply with such requirements because it is not feasible as a technical matter to do so, or that, while technically feasible, such services would require so many compromises in satellite design and operation as to make it economically unreasonable. A narrative description and technical analysis demonstrating	<input type="radio"/> C

this claim are attached.

-->

CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Choose the button next to applicable response.)

- Individual
- Unincorporated Association
- Partnership
- Corporation
- Governmental Entity
- Other (please specify)

45. Name of Person Signing
EllenAnn Sands

46. Title of Person Signing
Legal Counsel

**WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT
(U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION
(U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).**

SATELLITE EARTH STATION AUTHORIZATIONS FCC Form 312 - Schedule B:(Technical and Operational Description)

FOR OFFICIAL USE ONLY

Location of Earth Station Site

E1: Site Identifier: ST5000-2.4	E5. Call Sign: E060157	
E2: Contact Name Network Control Center	E6. Phone Number: 832-668-2775	
E3. Street: 4400 S. Sam Houston Pkwy, E.	E7. City: Houston	
E4. State TX	E8. County:	
E10. Area of Operation:	E9. Zip Code 77046	
E11. Latitude: 0° 0' 0.0 "	U.S. and International Waterways	
E12. Longitude: 0° 0' 0.0 "		
E13. Lat/Lon Coordinates are:	<input checked="" type="radio"/> NAD-27	<input type="radio"/> NAD-83 <input checked="" type="radio"/> N/A
E14. Site Elevation (AMSL):	0.0 meters	

E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurement? If NO, provide as a technical analysis showing compliance with two-degree spacing policy.	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
--	---

E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non-geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements?	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> N/A
--	---

E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	<input checked="" type="radio"/> Yes <input type="radio"/> No
--	---

E18. Is frequency coordination required? If YES, attach a frequency coordination report as	<input checked="" type="radio"/> Yes <input type="radio"/> No
--	---

E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as	<input type="radio"/> Yes <input checked="" type="radio"/> No
--	---

E20. FAA Notification - (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and/or the

**FAA's study regarding the potential hazard of the structure to aviation?
FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE
RETURN OF THIS APPLICATION.**

Yes No

POINTS OF COMMUNICATION

Satellite Name:O3B-A (S2935) | O3B-A | Eq. NGSO If you selected OTHER, please enter the following:

E21. Common Name:	E22. ITU Name:
E23. Orbit Location:	E24. Country:

Satellite Name:O3B-A (S2935) | O3B-A | Eq. NGSO If you selected OTHER, please enter the following:

E21. Common Name:	E22. ITU Name:
E23. Orbit Location:	E24. Country:

POINTS OF COMMUNICATION (Destination Points)

E25. Site Identifier: ST5000-2.4	E27. Country: USA
E26. Common Name:	

E25. Site Identifier: ST5000-2.4	E27. Country: USA
E26. Common Name:	

ANTENNA

Site ID	E28. Antenna Id	E29. Quantity	E30. Manufacturer	E31. Model	E32. Antenna Size	E41/42. Antenna Gain Transmint and/or Recieve(____dBi at ____GHz)
ST5000-2.4	ST5000 Ka	1000	Harris CapRock	ST5000	2.4	55.2 dBi at 30.0
ST5000-2.4	ST5000 Ka	1000	Harris CapRock	ST5000	2.4	54.7 dBi at 28.36
ST5000-2.4	ST5000 Ka	1000	Harris CapRock	ST5000	2.4	54.7 dBi at 28.36

E28. Antenna Id	E33/34. Diameter Minor/Major(meters)	E35. Above Ground Level(meters)	E36. Above Sea Level(meters)	E37. Building Height Above Ground Level(meters)	E38. Total Input Power at antenna flange(Watts)	E39. Maximum Antenna Height Above Rooftop(meters)	E40. Total EIRP for al carriers(dBW)
ST5000 Ka	0.0/0.0	0.0	0.0	0.0	26.4	0.0	69.4

FREQUENCY

E28. Antenna Id	E43/44. Frequency Bands(MHz)	E45. T/R Mode	E46. Antenna Polarization(H,V,L,R)	E47. Emission Designator	E48. Maximum EIRP per Carrier(dBW)	E49. Maximum ERIP Density per Carrier(dBW/4kHz)
ST5000 Ka	17800 18600	R	Horizontal and Vertical	1M00G7D	0.0	0.0

E50. Modulation and Services Up to 32APSK

ST5000 Ka	17800 18600	R	Horizontal and Vertical	40M0G7D	0.0	0.0
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E50. Modulation and Services Up to 32APSK

ST5000 Ka	18800 19300	R	Horizontal and Vertical	1M00G7D	0.0	0.0
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E50. Modulation and Services Up to 32APSK

ST5000 Ka	18800 19300	R	Horizontal and Vertical	40M0G7D	0.0	0.0
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E50. Modulation and Services Up to 32APSK

ST5000 Ka	27600 28400	T	Horizontal and Vertical	1M00G7D	69.4	45.4
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E50. Modulation and Services Up to 32APSK

ST5000						
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Ka	27600 28400	T	Horizontal and Vertical	40M0G7D	69.4	29.4
E50. Modulation and Services Up to 32APSK						
ST5000 Ka	28600 29100	T	Horizontal and Vertical	1M00G7D	69.4	45.4
E50. Modulation and Services Up to 32APSK						
ST5000 Ka	28600 29100	T	Horizontal and Vertical	40M0G7D	69.4	29.4
E50. Modulation and Services Up to 32APSK						

FREQUENCY COORDINATION

E28. Antenna Id	E51. Satellite Orbit Type	E52/53. Frequency Limits(MHz)	E54/55. Range of Satellite Arc Eastern/Western Limit	E56. Earth Station Azimuth Angle Eastern Limit	E57. Antenna Elevation Angle Eastern Limit	E58. Earth Station Azimuth Angle Western Limit	E59. Antenna Elevation Angle Western Limit	E60. Maximum EIRP Density toward the Horizon(dBW/4kHz)
ST5000 Ka	Non-Geostationary	17800 18600	0.0/0.0	100.0	5.0	260.0	5.0	0.0
	Non-Geostationary	17800 18600	0.0/0.0	100.0	5.0	260.0	5.0	0.0
	Non-Geostationary	18800 19300	0.0/0.0	100.0	5.0	260.0	5.0	0.0
	Non-Geostationary	18800 19300	0.0/0.0	100.0	5.0	260.0	5.0	0.0
	Non-Geostationary	27600 28400	0.0/0.0	100.0	5.0	260.0	5.0	4.7
	Non-Geostationary	27600 28400	0.0/0.0	100.0	5.0	260.0	5.0	4.7
	Non-Geostationary	28600 29100	0.0/0.0	100.0	5.0	260.0	5.0	4.7
	Non-Geostationary	28600 29100	0.0/0.0	100.0	5.0	260.0	5.0	4.7

REMOTE CONTROL POINT LOCATION

E61. Call Sign N/A NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed.			E66. Phone Number 832-668-2775		
E62. Street Address 4400 S. Sam Houston Pkwy. E					
E63. City Houston		E68. County Harris		E67/68. State/Country TX/ USA	E64. Zip Code 77046

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