Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)		
	)		
Application of Raysat Antenna Systems, LLC for Authority to Operate Vehicle-Mounted Earth Stations ("VMESs") in the 14.0-14.5 GHz and 11.7-12.2 GHz Frequency Bands	)	File Nos.	SES-LIC-20060629-01083 SES-LIC-20060629-02248 SES-LIC-20060629-02249 SES-LIC-20060629-02250 SES-LIC-20060629-02251 SES-LIC-20060629-02252
	)	Call Signs	E060101 E060447 E060448 E060449 E060450 E060451

APPLICATION FOR LICENSE MODIFICATION

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May 17, 2012

SUMMARY

Raysat Antenna Systems LLC ("RAS") hereby submits this modification application to convert its existing blanket Land-Mobile Satellite Service ("LMSS") licenses to vehicle-mounted earth station ("VMES") licenses. In addition, RAS requests that its blanket VMES licenses include three new terminals – the StealthRay 3000, StealthRay 5000 and E-7000 – as well as new emissions, satellite points of communications and, in two cases, new hub earth stations.

As described herein, RAS terminals operate consistent with the VMES rules and policies set forth in Section 25.226 of the Commission's rules. Indeed, all of RAS's new terminals have operated on an experimental basis without interference incident. Consistent with these previously authorized operations, RAS respectfully requests waiver of two Commission rules. First, given the low-profile nature of its terminals, RAS seeks waiver of off-axis EIRP spectral density limits for regions outside the GSO arc where no services exist or are under consideration. Second, RAS seeks a waiver to the extent necessary to permit its VMES terminals to operate with ALSAT because they are fully compliant with the Commission's two-degree spacing policy.

Modifying RAS's existing licenses as requested herein would permit RAS to expand the range of mobile satellite voice and data communications to government, military and commercial customers and thus would strongly serve the public interest.

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APPLICATION FOR LICENSE MODIFICATION

Raysat Antenna Systems, LLC ("RAS"), by its attorneys and pursuant to Section 25.117 of the Commission's rules, 47 C.F.R. § 25.117, hereby submits this application for modification of the above-captioned licenses. RAS seeks to convert its existing Land Mobile-Satellite Service ("LMSS") licenses to blanket vehicle-mounted earth station ("VMES") licenses consistent with the Commission's adoption of VMES service rules.[1] The existing LMSS licenses authorize operation of up to 400 "StealthRay" terminals in the 14.0-14.5 GHz and 11.7-12.2 GHz band ("Ku-band").

RAS also seeks to operate several new terminals under its blanket VMES licenses – the StealthRay 3000, the StealthRay 5000 and the E-7000. Each terminal complies with the off-axis

[1] *SeeAmendment 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, Report and Order, 24 FCC Rcd 10369, FCC 09-64, (rel. July 31, 2009) ("*VMES Order*").

EIRP spectral density limits and pointing accuracy requirements in the VMES rules, and RAS seeks authority to operate up to 400 units of each terminal type.

I. CONVERSION OF RAS'S LMSS LICENSES TO VMES LICENSES

In 2008, the Commission granted RAS authority to operate up to 400 StealthRay LMSS terminals in the Ku-band.[2] At the time RAS received its LMSS licenses, the Commission's VMES rules were not yet effective. The Commission authorized RAS's operations on a secondary basis and contemplated that RAS would ultimately modify its license to operate under the VMES regulatory framework.[3] The instant modification application seeks to convert RAS's existing LMSS licenses to VMES licenses, including operational authority on a primary basis.

RAS's compliance with the Commission's two-degree spacing policy and other technical and operational requirements designed to protect co-frequency services was well documented in RAS's applications associated with the original StealthRay terminal, which are hereby incorporated by reference. From protection of adjacent FSS satellite operations to NASA TDRSS operations to radio astronomy sites with observations in the band, RAS's VMES operations will not cause harmful interference to co-frequency spectrum users.

The principal difference between RAS's authorized secondary LMSS operations and operations under the VMES rules set forth in Section 25.226 is the interval for data logging. The *Raysat Authorization Order* requires data logging every 20 minutes whereas Section 25.226(a)(6) request data logging every five (5) minutes. RAS will comply with the more frequent data

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[2]*See Application of Raysat Antenna Systems, LLC for Authority to Operate 400 Land Mobile-Satellite Service ("LMSS") Earth Stations in the 14.0-14.5 GHz and 11.7-12.2 GHz Frequency Bands,* Order and Authorization, File Nos. SES-LIC-20060629-01083, *et seq.*, DA 08-401, ¶ 8 (Int'l Bur. and OET, Feb. 15, 2008) ("*Raysat Authorization Order*").*See* Call Signs E060101, E060447, E060448, E060449, E060450 and E060451.

[3]*See Raysat Authorization Order*, ¶ 8.

logging requirement for all VMES operations. RAS's operations are otherwise consistent with the Commission's VMES rules and policies and thus may be authorized under Section 25.226 of the Rules.

II. THE STEALTHRAY 3000, STEALTHRAY 5000 AND THE E-7000 TERMINALS SATISFY THE REQUIREMENTS FOR VMES LICENSING

In addition to the original StealthRay terminal, RAS requests that the Commission authorize several other terminals for operation under RAS blanket VMES licenses. The StealthRay 3000, StealthRay 5000 and E-7000 terminals operate in a manner similar to the StealthRay, and each has operated on an experimental basis without incident. As explained below, each terminal can be authorized under the Commission's VMES rules.

A. Description of the New Terminals

RAS has extensive experience manufacturing and operating vehicle-mounted terminals in the Ku-band to provide mobile satellite voice and data communications to government, military and commercial customers. RAS's initial product is the StealthRay terminal, which is a full tracking antenna designed for "on-the-move" applications. The StealthRay 3000 is a derivative of that terminal with a larger BUC for increased transmit power.[4] The StealthRay 5000 is a modified StealthRay with a larger transmit panel for increased data transmission performance.

[4] RAS has included the StealthRay 2000 and StealthRay 3000 as a single terminal type because they use an electrically identical antenna. The only difference is that the 3000 has an integrated BUC and the 2000 has an external BUC, giving the StealthRay 3000 slightly higher transmit power (due to lower losses between the BUC and antenna). Thus, the StealthRay 2000's transmit characteristics are within those of the StealthRay 3000. Treating these electrically identical versions of the StealthRay antenna as a single terminal type and authorizing the highest proposed transmit power is consistent with Commission policies. *See* 47 C.F.R. § 25.118; *see also* Experimental Radio Station License Call Sign WE2XTX (various file numbers).

The E-7000 is RAS's latest product, offering a higher-performance transmit antenna for on-the-move applications.

As noted above, the operating characteristics of the original StealthRay terminal were examined fully in the context of the Commission's review of RAS's LMSS application. All the RAS terminals utilize general operational concepts which will be reexamined briefly here before turning to the specifics of each terminal.

The RAS VMES terminals will automatically search for and acquire the designated satellite and maintain precise pointing via automatic control of the azimuth, elevation and polarization angles while the vehicle is on the move. The terminal consists of an antenna unit, a controller and a satellite communication modem. The terminal uses Global Positioning System ("GPS") signals to determine its location for acquiring the appropriate satellite. The initial acquisition time is less than 60 seconds, and the terminal is capable of tracking through the azimuth plane at a tracking speed of 60° per second. The antenna is mechanically aligned in azimuth and elevation plane and peaks in azimuth through mechanical scanning and in elevation through multiple receive beams.

Using the terminal's positional information along with the known orbit longitude of the target satellite, the elevation angle to the satellite and the polarization angles are calculated and set. Tracking is enhanced with the use of 3-axis gyroscopes which correlate the RSSI values with the antenna position. The antenna is then rotated in azimuth. The signal level at the receive signal strength indicator ("RSSI") is constantly sampled. If the received power exceeds the specified threshold, the terminal tracks on the signal and waits for an acknowledgement from the modem. If the modem sends an acknowledgement of a signal lock, the terminal will commence communicating with the serving satellite. If the modem does not acknowledge the signal, the terminal stops tracking and continues to rotate in azimuth until it finds the next signal. This process continues until the correct signal is found.

1. The StealthRay 3000 Terminal

The StealthRay 3000 terminal uses the same antenna as the original StealthRay terminal but is paired with a larger block upconverter ("BUC") which increases the maximum EIRP of the StealthRay 3000 antenna to 41.2 dBW. RAS will spread the StealthRay 3000 transmissions over a wider bandwidth (*i.e.*, up to 12.36 MHz) in order to maintain the transmitted power density at or below the authorized -18.1 dBW/4kHz value. This will ensure that the input power spectral density ("PSD") is consistent with the Commission's VMES emissions mask and two-degree spacing policies. The Commission has granted a series of experimental authorizations for the StealthRay 3000, most recently a two-year experimental license on November 18, 2011.[5] A simplified block diagram of the major components in the tracking and acquisition system is shown in Figure 1.

[5] ELS File No. 0245-EX-ML-2011 (Call Sign WE2XTX) (Nov. 18, 2011).

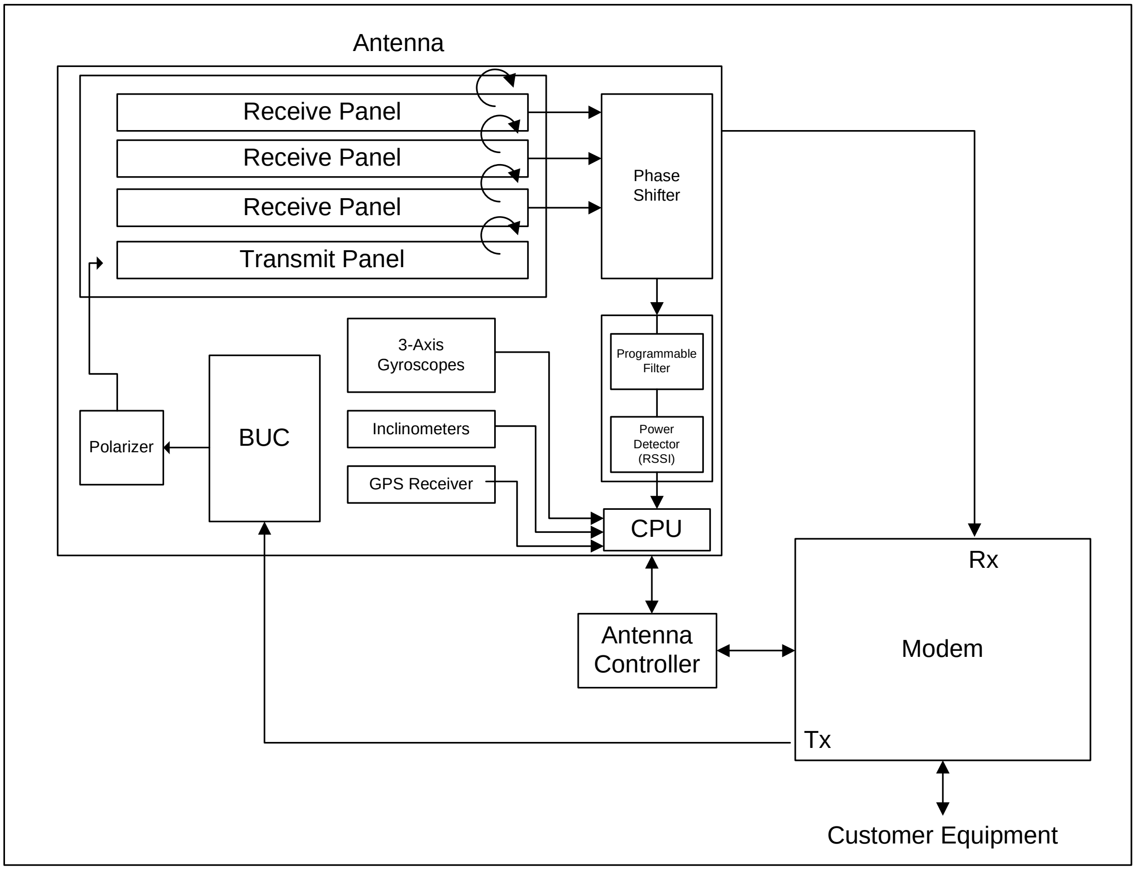
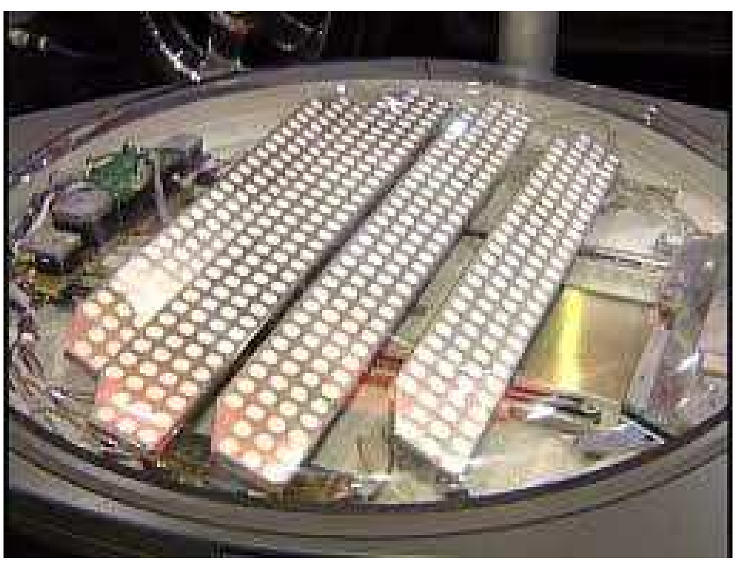


Figure 1. StealthRay 3000 Block Diagram

The basic layout and dimensions of the StealthRay 3000 can be viewed in Figure 2.



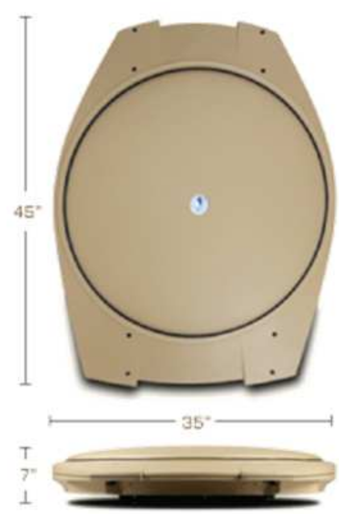


Figure 2. StealthRay 3000 Configuration

2. The StealthRay 5000 Terminal

RAS developed the StealthRay 5000 in response to customer requests for an antenna with higher transmit data rates. The major difference between the StealthRay 5000 terminal and the authorized StealthRay terminal is that the StealthRay 5000 has a larger transmit panel array (composed of two linked transmit panels), allowing for enhanced transmit performance. The StealthRay 5000 terminal is currently operating pursuant to a two-year experimental license.[6]

The maximum EIRP of the StealthRay 5000 is 43.4 dBW. RAS will employ a wider transmit bandwidth of up to 13.52 MHz to remain fully compliant with the Commission's off-axis EIRP spectral density limits.

The StealthRay 5000 consists of a 23.25 x 6.75 transmit panel array along with two separate receive panels, which are mounted on a rotatable platform. The platform rotates in azimuth to orient the panels toward the satellite and the panels tilt to set the elevation angle. The antenna also has a polarization control mechanism that sets the correct polarization angle for both transmit and receive. A picture of the StealthRay 5000 is shown in Figure 3 and a drawing of the terminal assembly is shown in Figure 4.

Figure 3. StealthRay 5000 Exterior

[6] ELS File No. 0580-EX-ST-2010 (Call Sign WF2XXN).

Figure 4. StealthRay 5000 Configuration

As with all RAS terminals, the StealthRay 5000 has active control of the azimuth, elevation and polarization angles. The terminal moves mechanically in the azimuth and elevation planes. For satellite acquisition and reacquisition, the proven principles implemented in currently authorized StealthRay terminals will be applied. A simplified block diagram of the major components in the tracking and acquisition system is shown in Figure 5.

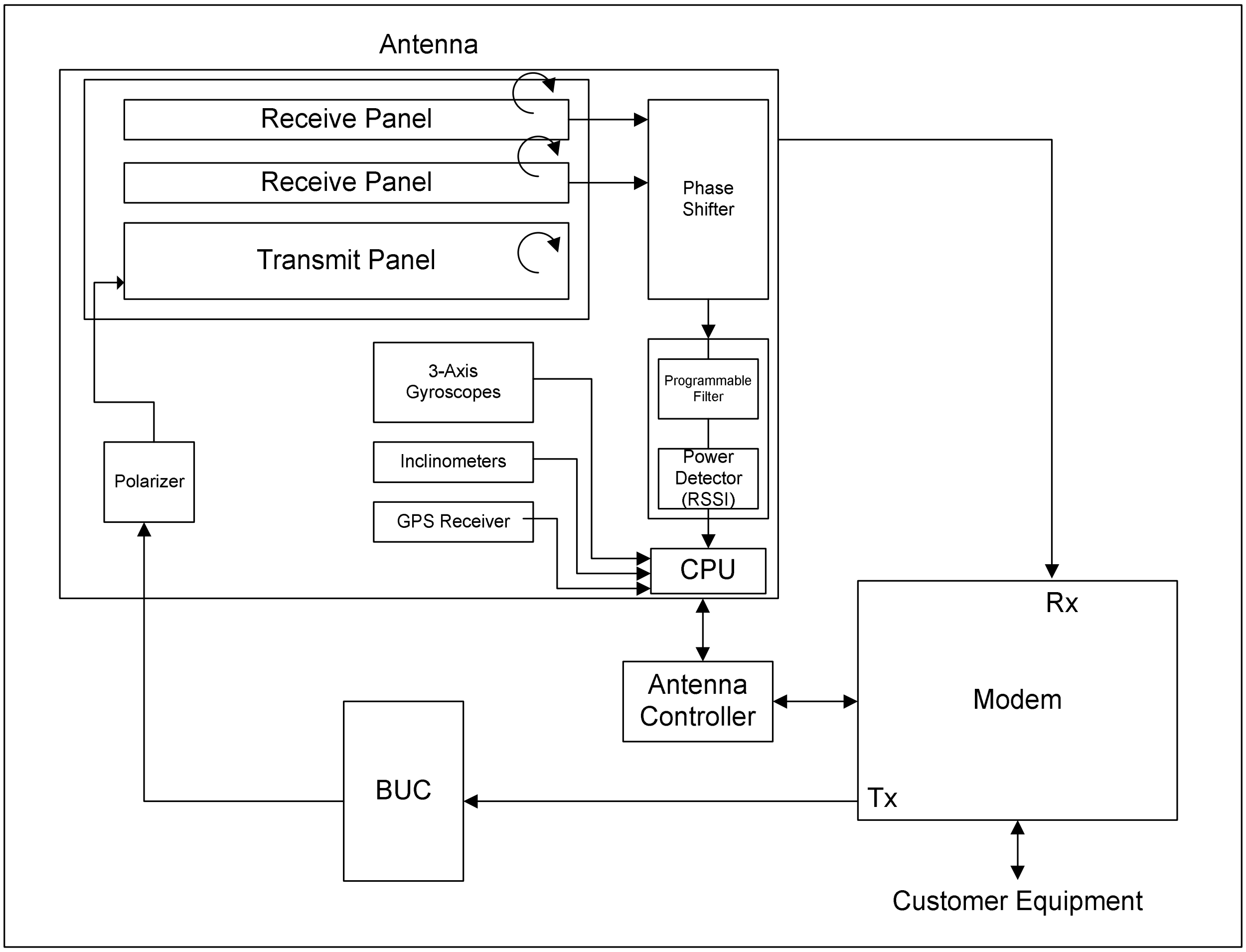


Figure 5. StealthRay 5000 Block Diagram

3. The E-7000 Terminal

The E-7000 is RAS's latest technological innovation. It was designed in response to a customer's request for higher data rate throughput. The E-7000 builds upon RAS's proven StealthRay platform, and enhances the design by switching the original printed circuit antenna panel for a waveguide design, resulting in higher performance. The panel is capable of both transmit and receive operations. As with all of RAS's terminals, it is capable of tracking in the azimuth, elevation and polarization planes. Figure 6 below shows the E-7000 terminal with the waveguide antenna exposed.

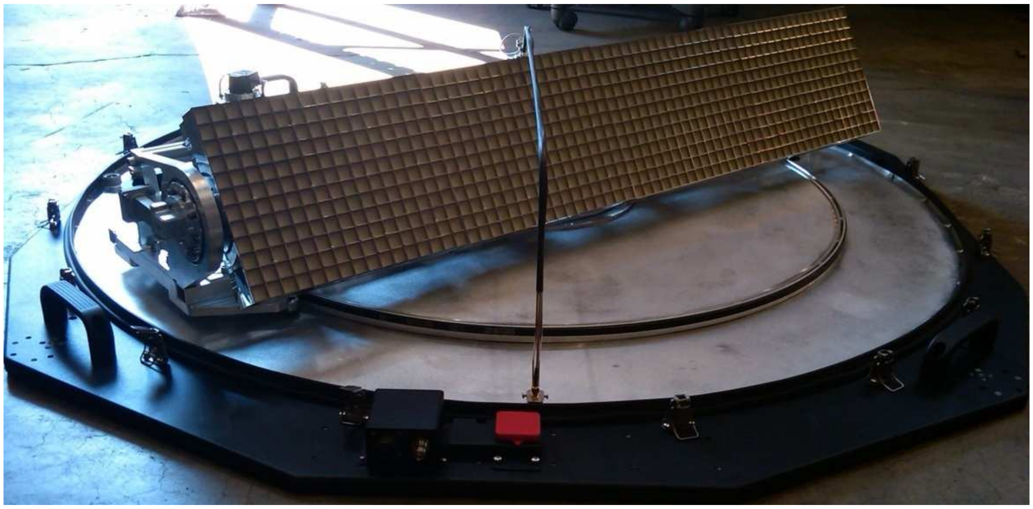


Figure 6. E-7000 Configuration

For satellite acquisition, the E-7000 continues to use the same proven methodology used in previous RAS terminals. Figure 7 below is a block diagram of the E-7000.

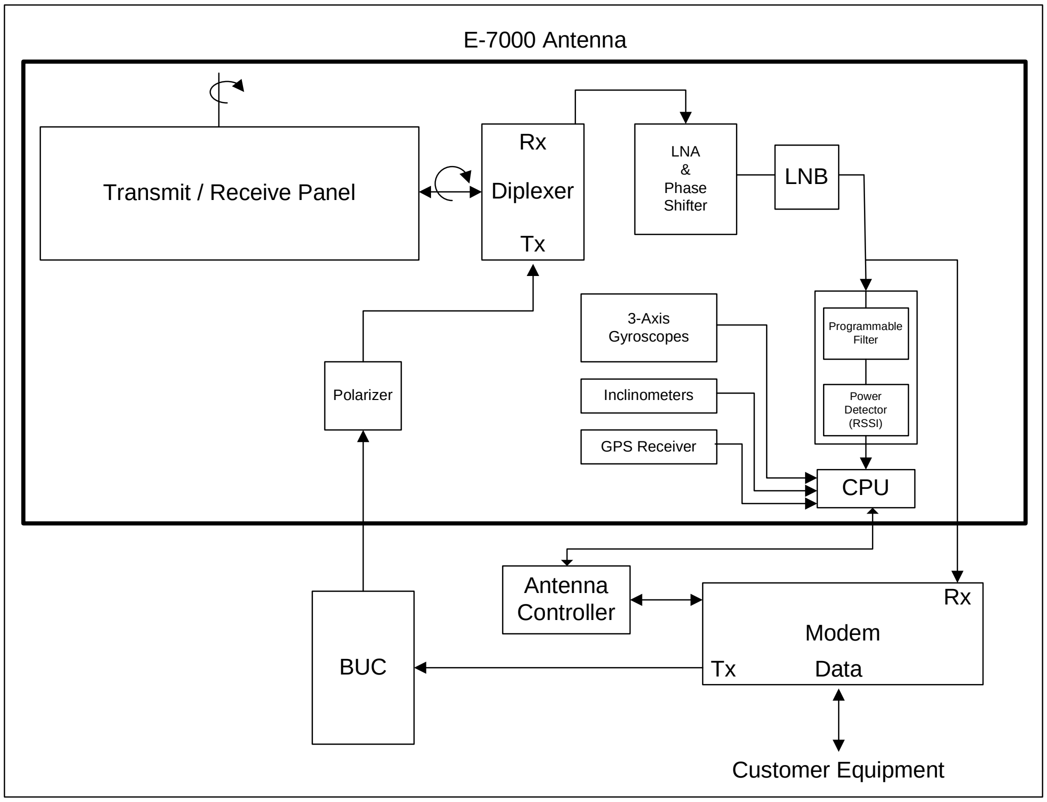


Figure 7. E-7000 Block Diagram

The E-7000 terminal has also received experimental authority from the Commission. On October 5, 2012, the Commission granted a six-month, experimental STA.[7]The experimental STA provides authorized power of 50.9 dBW EIRP and emission designators of 7.04 MHz and 9.72 MHz bandwidths.[8] For commercial operation, the terminal will use a bandwidth of up to 21.57 MHz.

B. Satellite Points of Communication, Hubs and Network Control Center

The RAS VMES network will communicate in the 14.0-14.5 GHz (transmit) and 11.7-12.2 GHz (receive) bands. The terminals will communicate in conventional Ku-band frequencies with ALSAT and specifically with the following satellite points of communication: Horizons 1 @ 127° W; AMC-21 @ 125° W; SES-1 @ 101° W; Galaxy-16 @ 99° W; AMC-5 @ 81° W; AMC-6 @ 72° W; Telstar-14 @ 63° W; Amazonas 2 @ 61° W. RAS requests that each of these satellites be included as an authorized point of communication for each license.

Table 2 below lists the six hub earth stations currently authorized for RAS's LMSS network, as modified in 2009.The far right column ("Associated Hub Earth Station (New)" in the table lists the hub earth stations for which RAS seeks authority in the requested blanket VMES license.

[7] ELS File No. 0583-EX-ST-2011 (Call Sign WF9XEG) (Oct. 5, 2011).

[8] Id.

RAS Call Sign	Associated Hub Earth Station	Associated Hub Earth Station (New)
E060101	Spacenet, McLean, VA (Call Sign E860326)	SAME
E060447	Intelsat, Hagerstown, MD (Call Signs E040140, E040141, E040414, E040475, E070139)	SAME
E060448	HNS, Germantown, MD (Call Sign E000166)	SAME
E060449	Intelsat, Riverside, CA (Call Sign E020126)	SAME
E060450	SES New Skies, Manassas, VA (Call Sign E000102)	Spacenet Chicago, IL (Call sign E4412)
E060451	HNS, North Las Vegas, NV (Call Sign E940460)	Spacenet Atlanta, GA (Call Sign E86013)

Table 2. Hub Earth Stations

C. Emissions Designators

The requested emissions designators for the StealthRay 3000, StealthRay 5000 and E-7000 are listed in the Table 3 below.

Terminal	Frequencies	Emissions Designators
StealthRay 3000	11.7-12.2 Receive	1M45G7W, 36M0G7W
	14.0-14.5 Transmit	4M05G7W, 8M06G7W, 12M36G7W
StealthRay 5000	11.7-12.2 Receive	1M45G7W, 26M8G7W
	14.0-14.5 Transmit	4M05G7W, 10M13G7W, 13M52G7W
E-7000	11.7-12.2 Receive	724K1G7W, 54M0G7W
	14.0-14.5 Transmit	7M04G7W, 9M72G7W, 21M57G7W

Table 3. Emissions Designators

Link budgets for the StealthRay 3000, the StealthRay 5000 and E-7000 at each of these emissions designators are included in the Technical Exhibits attached hereto.

D. Compliance with the Ku-Band VMES Rules

Each of the proposed RAS terminals complies with the Commission's essential VMES rules, including off-axis EIRP spectral density limits and antenna pointing accuracy.[9]

1. Off-Axis EIRP Spectral Density Limits

RAS's terminals meet the Commission's VMES off-axis EIRP spectral-density limits consistent with the Commission's two-degree spacing policies.[10] The terminals use varying degrees of signal spreading and EIRP power reduction to meet the VMES emissions mask and comply with the Commission's two-degree spacing policies.

a. The StealthRay 3000 Terminal

The StealthRay 3000 will operate in accordance with the off-axis EIRP spectral density limits for Ku-band VMES terminals in the Commission's rules. The transmitted EIRP density levels of the StealthRay 3000 comply with the limits specified for Ku-band VMESs in Section25.226 of the Commission's rules by limiting the PSD at the panel input flange to -18.1 dBW/4Khz.[11] The co-polarized off-axis EIRP spectral density levels along the geostationary plane for the StealthRay 3000 terminal are shown in Figures 8-9, below, with a maximum input flange PSD level of -18.1 dBW/4kHz at a maximum skew angle of 50˚ and with up to 0.5˚ pointing offset.

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[9] RAS has previously demonstrated that the original StealthRay antenna, which is the subject of the existing LMSS licenses, complies with the VMES off-axis EIRP spectrum density limits for Ku-band terminals and two-degree spacing requirements. *SeeRaysat Authorization Order*, ¶¶ 15-23.

[10] *See* 47 C.F.R. § 25.226(a)(1)(i). Raysat's VMES terminals comply with off-axis EIRP spectral density limits in the azimuth plane. However, all terminals will require a waiver of the power limits in the elevation plane. *See* Section III.B, *infra*.

[11] *See* 47 C.F.R. § 25.226(a)(1)(i).

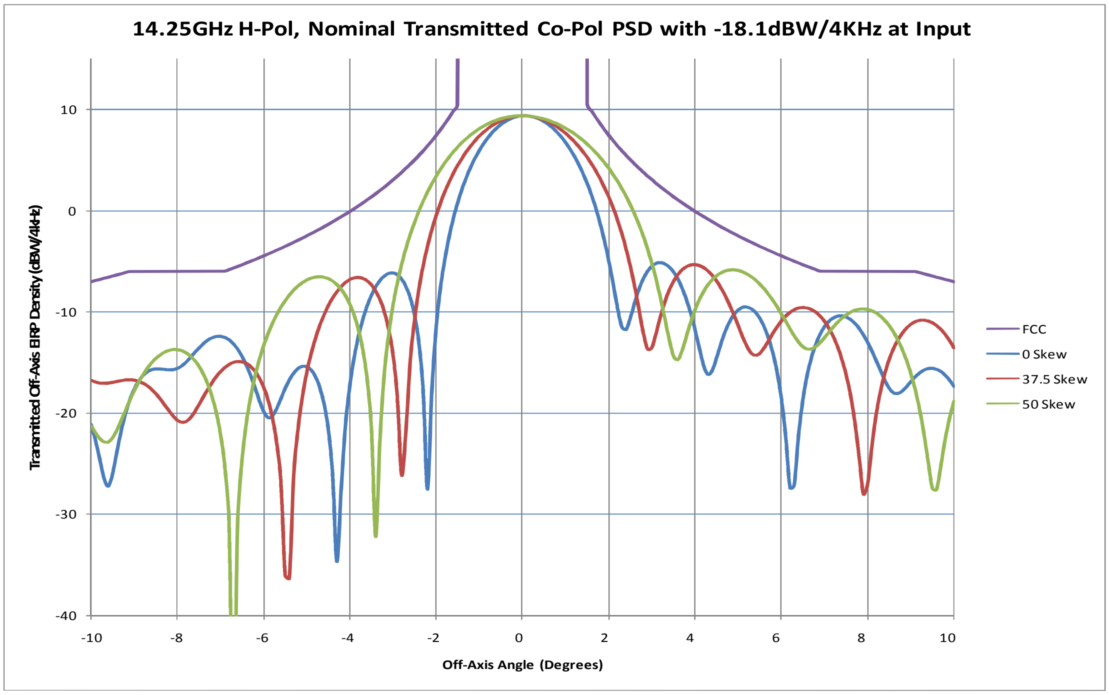

Figure 8. StealthRay 3000 14.25 GHz H-Pol

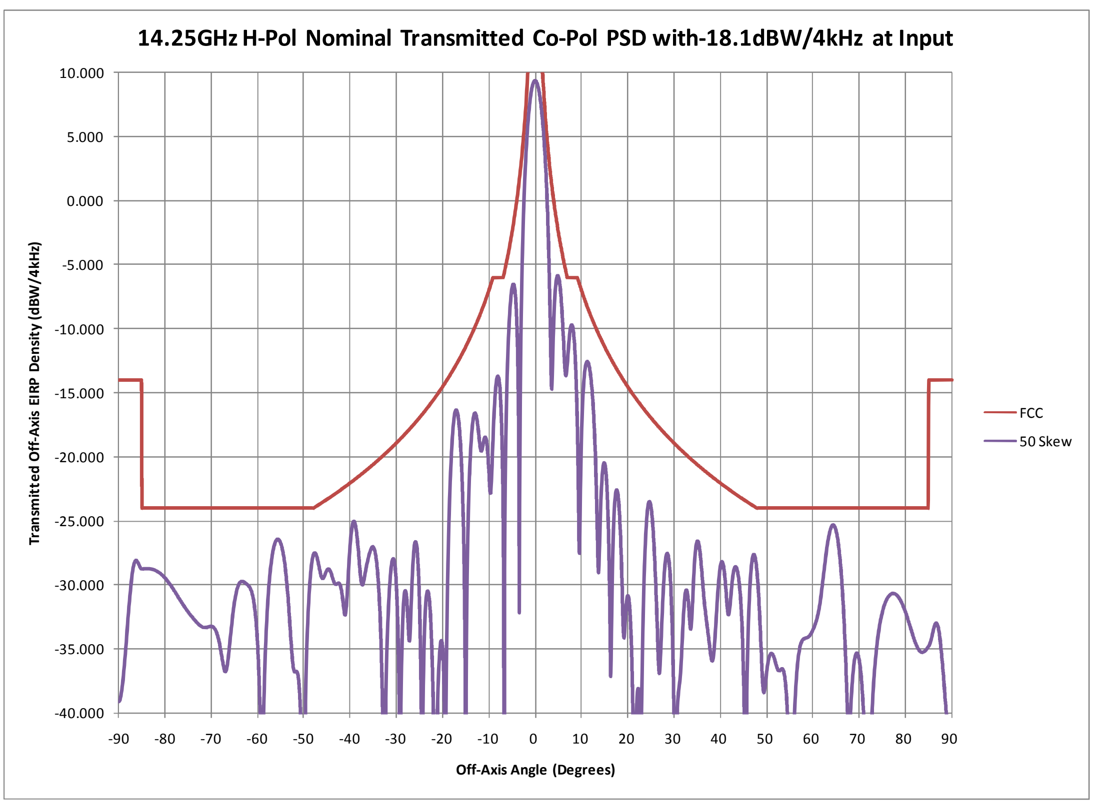

Figure 9. StealthRay 3000 14.25 GHz H-Pol

RAS has provided in the attached Technical Exhibit measured antenna gain data required by Section 25.132 of the Commission's rules and, pursuant to Section 25.226(a)(1)(i) and (b)(1), the required tables.[12] In addition, the off-axis EIRP spectral density plots, and the antenna gain plots and tables also provided in the Technical Exhibit, demonstrate that the StealthRay 3000 terminal complies with the off-axis EIRP spectral density levels set forth in Section 25.226 of the rules and the Commission's two-degree spacing policies, even at the maximum pointing offset of 0.5˚ (at which point the terminal automatically ceases transmissions).

b. The StealthRay 5000

The StealthRay 5000 will operate in accordance with the off-axis EIRP spectral density limits for Ku-band VMES terminals in the Commission's rules.[13] The transmitted EIRP density levels of the StealthRay 5000 antenna comply with the limits specified for Ku-band VMESs in Section25.226 of the Commission's rules[14] by limiting the PSD level to -20.8 dBW/4kHz at the panel input flange. The co-polarized off-axis EIRP spectral density levels along the geostationary plane for the StealthRay 5000 terminal are shown in Figures 10-11, below, with a maximum input PSD level of -20.8 dBW/4kHz at a maximum skew angle of 50˚ and with up to 0.5˚ pointing offset.[15]

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[12] *See* Technical Exhibit, Appendix A1.

[13] *See* 47 C.F.R. § 25.226(a)(1)(i).

[14] *See* 47 C.F.R. § 25.226(a)(1)(i).

[15] *See* 47 C.F.R. § 25.226(b)(1)(iv)(A).

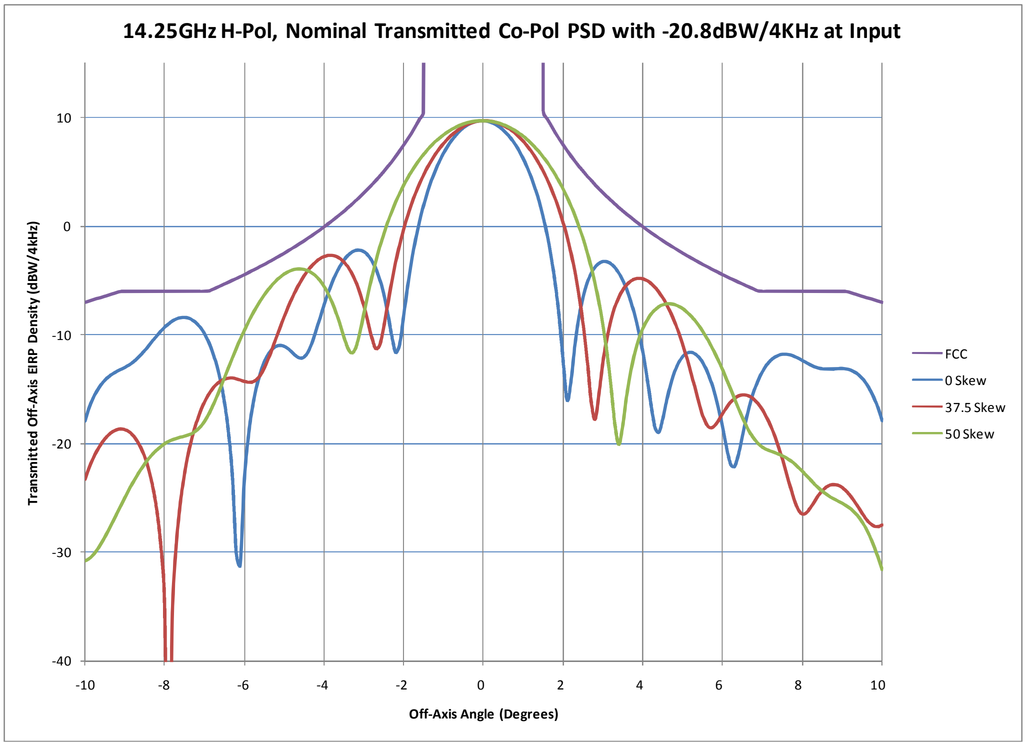

Figure 10. StealthRay 5000 14.25 GHz H-Pol

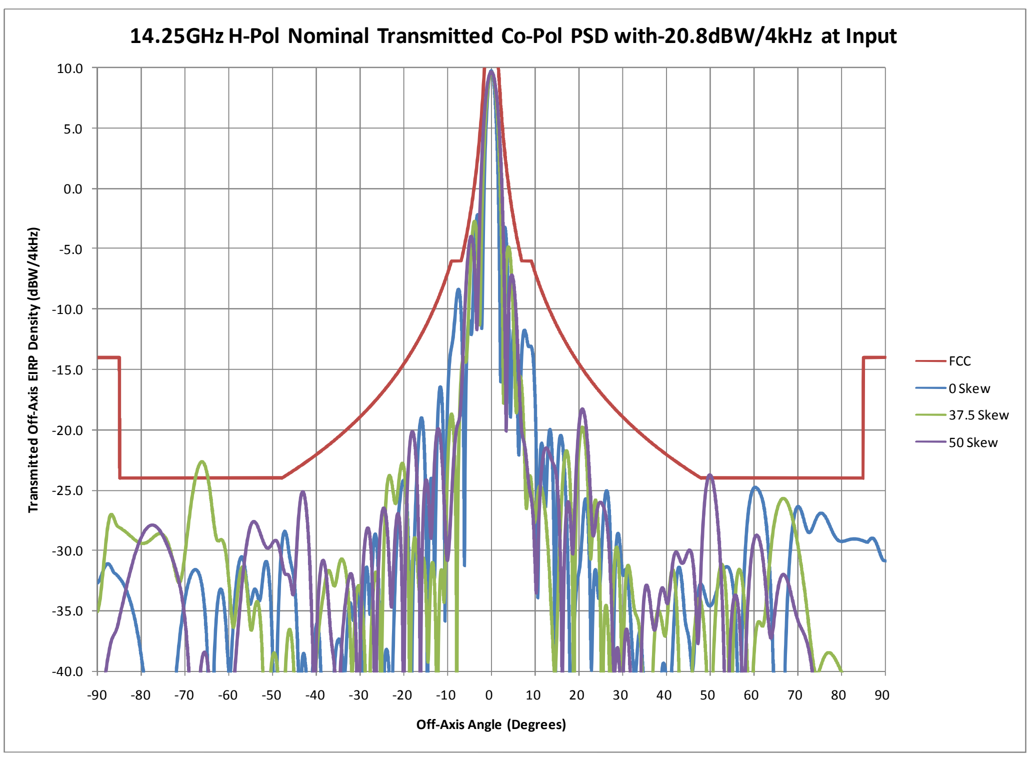

Figure 11. StealthRay 5000 14.25 GHz H-Pol

RAS has provided in the attached Technical Exhibit measured antenna gain data required by Section 25.132 of the Commission's rules and, pursuant to Section 25.226(a)(1)(i) and (b)(1), the required tables.[16] The off-axis EIRP spectral density plots, and the antenna gain plots and tables provided in the Technical Exhibit, demonstrate that the StealthRay 5000 terminal complies with the spectral density levels set forth in Section 25.226 of the rules and the Commission's two-degree spacing policies, even at the maximum pointing offset of 0.5˚ (at which point it automatically ceases transmissions).

c. The E-7000 Antenna

The E-7000 will also operate in accordance with the off-axis EIRP spectral density limits for Ku-band VMES terminals in the Commission's rules.[17] The transmitted EIRP density levels of the E-7000 antenna comply with the limits specified for Ku-band VMES in Section25.226 of the Commission's rules[18] when the PSD level at the input to the antenna is limited to a maximum of -20.15 dBW/4kHz. The co-polarized off-axis EIRP spectral density levels of the E-7000 terminal are shown in Figures 12-13 below.

[16] *See* Technical Exhibit, Appendix A2.

[17] *See* 47 C.F.R. § 25.226(a)(1)(i).

[18] *See* 47 C.F.R. § 25.226(a)(1)(i).

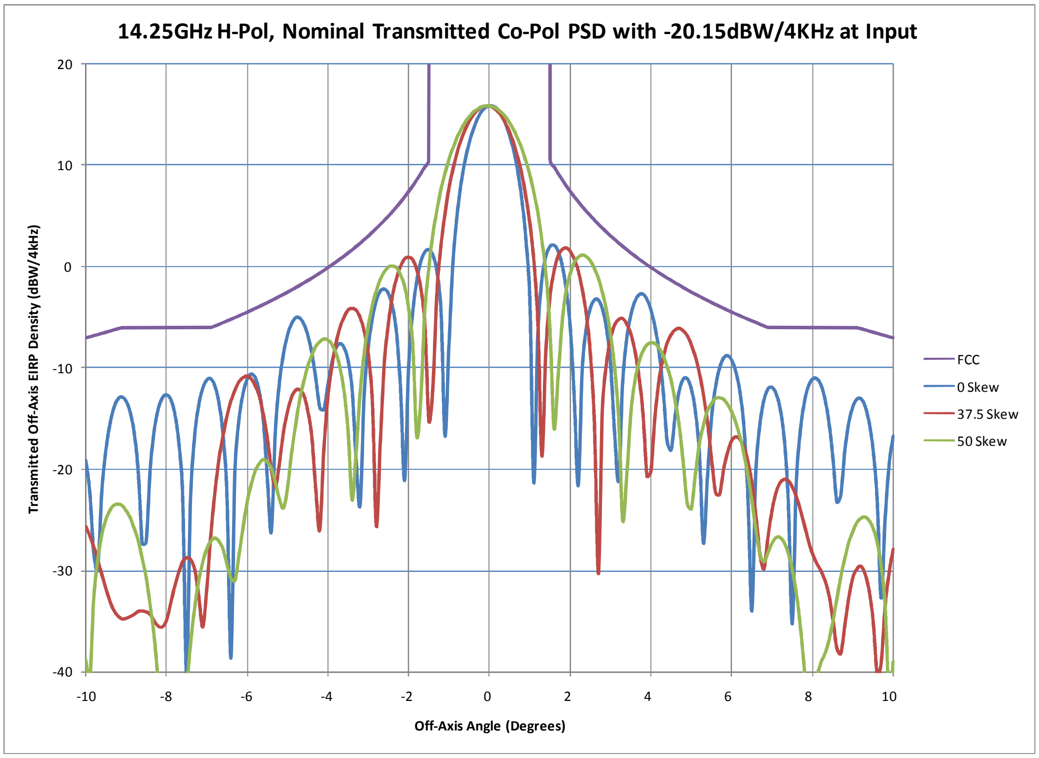

Figure 12. E-7000 14.25 GHz H-Pol

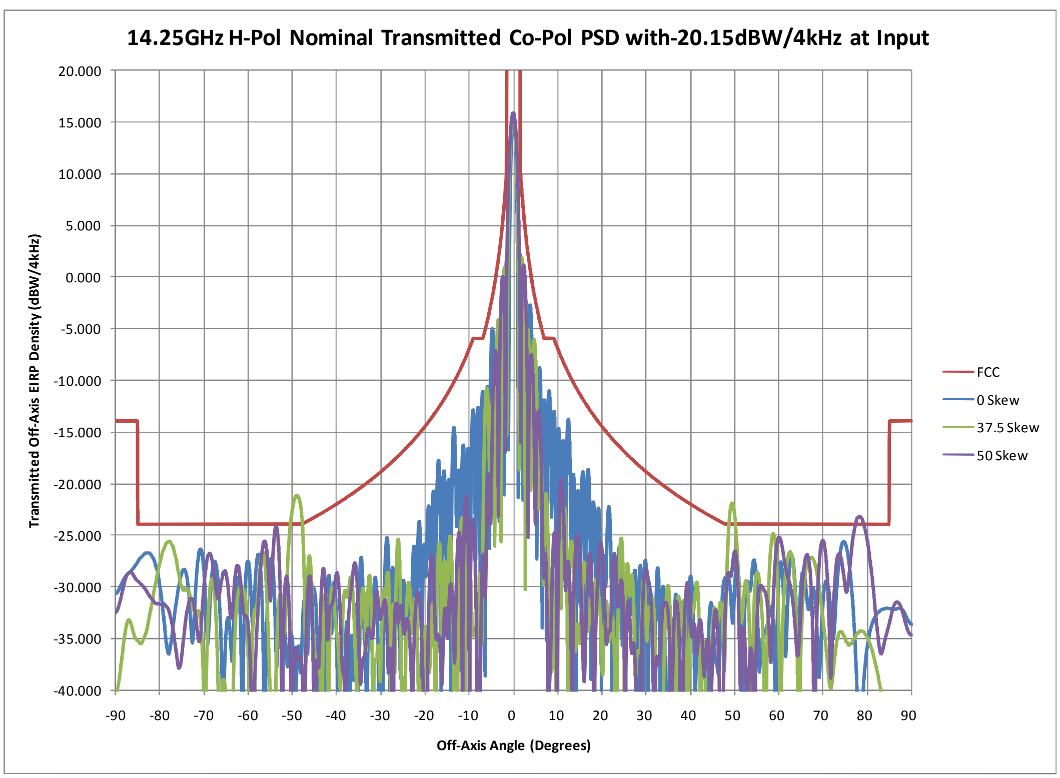

Figure 13. E-7000 14.25 GHz H-Pol

RAS has provided in the attached Technical Exhibit measured antenna gain data required by Section 25.132 of the Commission's rules and, pursuant to Section 25.226(a)(1)(i) and (b)(1), the required tables.[19] The off-axis EIRP spectral density plots, and the antenna gain plots and tables provided in the Technical Exhibit, demonstrate that the E-7000 terminal complies with the spectral density levels set forth in Section 25.226 of the rules and the Commission's two-degree spacing policies, even at the maximum pointing offset of 0.5˚ in the azimuth plane (at which point it automatically ceases transmissions).

2. Antenna Pointing Control

As demonstrated below, the RAS terminals comply with the Commission's VMES pointing accuracy requirements consistent with the Commission's two-degree spacing policies. Each of the RAS terminals – the StealthRay 3000, StealthRay 5000 and E-7000 – will maintain a declared pointing accuracy, including both deliberate mispointing (*i.e.* conscan) and dynamic pointing error, of 0.5°. If the antenna pointing error exceeds the specified limit , the terminal will cease transmission within 100 milliseconds and will not resume transmission until the pointing offset is within the limit.[20]

As with the original StealthRay, once the satellite is acquired, the terminals dither in azimuth to peak the signal and maintain accurate pointing to the satellite. The terminals have internal 3-axis gyroscopes and 2-axis inclinometers to assist with tracking while in motion. The terminals will also use the information from the gyros to determine when the pointing offset has

[19]*See* Technical Exhibit, Appendix A3.

[20]*Id*.

been reached and will cease transmissions within 100 milliseconds when that occurs.[21] The RAS terminals will not resume transmission until the pointing offset is within 0.5°.[22]

3. Compliance With Additional VMES Requirements

RAS will comply with the Commission's requirements for VMES applicants. Although RAS has formally operated under its LMSS licenses, it has upgraded its network equipment to comply with the VMES rules.

Section 25.226(a)(5), (b)(6) Points of Contact. The RAS point of contact ("stop buzzer" contact) for the proposed VMES operations, available 24 hours, 7 days a week, with authority to cease all emissions from the VMES is:

Kevin Bruestle
Raysat Antenna Systems, LLC
Office: 1-703-463-9884
Mobile: 1-517-262-1601

For filing issues involving this authorization request please contact:

Carlos Nalda
Squire Sanders (US) LLP
1200 19th Ave, NW
Suite 300
Washington, DC 20004
Office: (202) 626-6659
Fax: (202) 626-6780
Cell: (571) 332-5626
Email: carlos.nalda@squiresanders.com

[21] *See* 25.226(b)(1)(iv)(B). Although the terminal dithers in azimuth by ±0.35° and Raysat expects pointing accuracy to typically remain at that value, Raysat is implementing a declared pointing accuracy of 0.5° – the offset at which antenna transmissions automatically terminate – to set maximum transmit power levels. *See* 47 C.F.R. §§ 25.226(a)(1)(ii)(B), (b)(1).

[22] *Id*. Although the VMES rules permit the resumption of transmissions at the declared pointing maximum pointing error (*i.e.*, 0.5°), Raysat will not resume transmissions until pointing accuracy is within 0.35°.

Section 25.226(a)(6), (b)(7) Recordkeeping. RAS will maintain, for each VMES transmitter, a time-annotated record of the vehicle location, transmit frequency, channel bandwidth and satellite used for at least one year. The location and time of all transmissions will be recorded at time intervals no greater than every five (5) minutes while the VMES is transmitting. This information will be available, as required by the Commission rules, to a coordinator, fixed system operator, FSS operator, the NTIA or the Commission within 24 hours of the request.

Section 25.226(a)(7), (8) Protection Claims. RAS recognizes that its terminals receiving in the 11.7-12.2 GHz bands will receive protection from interference caused by space stations other than the target space station only to the degree to which harmful interference would not be expected to be caused to an earth station employing an antenna conforming to the referenced patterns defined in Section 25.209(a) and (b) and stationary at the location at which any interference occurred.

Section 25.226(a)(9) Loss of Reception. The RAS VMES terminals will automatically cease transmitting within 100 milliseconds upon loss of reception of the satellite downlink signal.

Section 25.226(b)(4) Geographic Area of Service. RAS is seeking authorization to operate within the continental United States (CONUS).

Section 25.222(b)(8) Radiation Hazard. RAS has included a radiation hazard analysis for each antenna with this application in the attached Technical Exhibit (Appendices A1-A3).

4. Protection of Other Users in the 14.0-14.5 GHz Band

RAS's operation of the antennas will protect other users in the 14.0-14.5 GHz band consistent with the requirements of the Commission's VMES rules.

Protection of Fixed-Satellite Service. As discussed above, RAS's terminals will operate in compliance with the VMES off-axis EIRP spectral density limits, even taking the declared pointing accuracy value into consideration. The VMES limits are consistent with those for routinely licensed VSAT earth stations.

Protection of Potential NGSO FSS Systems. RAS acknowledges that non-geostationary orbit ("NGSO") systems are also permitted to operate in the Ku-band. However, no such systems are currently authorized. RAS will undertake adequate protection measures if such systems are authorized in the future. In any event, RAS requests a waiver to the extent that its terminals do not meet the off-axis EIRP spectral density mask in directions other than the GSO arc. *See* Waiver Request, Section III.A*infra*.

Protection of Terrestrial Radio Services. RAS has examined current spectrum use in the 14.0-14.5 GHz band and has determined that there are no active FCC-licensed terrestrial services in this band with which its proposed operations would potentially conflict.

Protection of the Radio Astronomy Service. RAS will comply with its prior coordination agreement with the National Science Foundation to protect radio astronomy service sites listed in Section 25.226(d) of the rules.[23]

Protection of Space Research Service. RAS recognizes the utilization of the frequency band from 14.0-14.05 GHz and the possible use of the band from 14.05-14.2 GHz allocated to the National Aeronautics and Space Administration ("NASA") Tracking and Data Relay Satellite System ("TDRSS") for space research conducted at White Sands, New Mexico and Blossom Point, Maryland. RAS will comply with its prior coordination agreement with the NASA to protect TDRSS facilities.[24]

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[23] *Raysat Authorization Order*, ¶ 30 n. 82.

[24] *Raysat Authorization Order*, ¶ 27 n. 73.

III. WAIVER

A. Off-axis EIRP Spectral Density for Regions Outside the GSO Arc

As a result of their low-profile configuration, the RAS terminals do not meet the Section 25.226(a)(1)(i)(B) off-axis EIRP levels for regions beyond +/- 3º from the GSO arc.[25] These limits are principally designed to facilitate potential NGSO use of the Ku-band.

No NGSO systems have yet been constructed or are even under serious consideration. If and when such a system is licensed by the Commission, RAS will take all necessary steps prior to the launch of any new NGSO system to ensure that the RAS system does not cause harmful interference to the new system, up to and including operating at reduced power levels sufficient to mitigate harmful interference into compliant NGSO satellite systems. RAS acknowledges that the Commission may condition the grant of this license application upon a requirement that RAS take such necessary coordination measures.

B. ALSAT Authority

RAS understands that the availability of ALSAT authority for its VMES terminals is in question.[26] As demonstrated herein, RAS's VMES terminals operate in accordance with off-axis EIRP spectral density levels even at maximum pointing offset, at which point they automatically cease transmission. RAS therefore requests a waiver to the extent necessary to permit RAS's VMES terminals to operate with ALSAT.

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[25] Included in the attached Appendixes A1, A2, and A3, as Tables A1-B6 in each respective appendix, are the mid-band elevation off-axis EIRP spectral density plots for vertical and horizontal polarizations.

[26] Petition for Reconsideration of ViaSat, Inc., *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 (Dec. 4, 2009).

This waiver request arises out of the uncertainty in the VMES Order regarding the availability of ALSAT to VMES terminals that comply at all times with applicable off-axis EIRP spectral density requirements.[27] ALSAT is clearly available for VMESs that comply with off-axis EIRP levels but not for VMESs that seek to operate at higher power levels or use dynamic power density systems.[28] Without explanation, however, the Commission suggested that ALSAT authority also would be unavailable to any VMES that did not meet a 0.2° pointing accuracy even if off-axis EIRP spectral density limits are satisfied.[29] RAS ensures that its terminals meet the mask at all times by spreading and operating at reduced transmit power. In other words, RAS's terminals take maximum pointing offset into account in establishing maximum transmit power and thus always comply with the Commission's permissible off-axis EIRP spectral density levels. Because they operate like a 0.2°-compliant VMES terminal, ALSAT authority is appropriate.

To the extent necessary to permit grant of ALSAT authority, RAS seeks a waiver of § 25.226(a)(1)(iii)(A). Waiver is in the public interest because RAS complies with the off-axis mask at all times by operating with spreading and at lower power levels that take mispointing into account. A waiver in this case would not undermine the policies underlying the rule because the off-axis EIRP spectral density mask designed to protect adjacent satellites is met at all times. Indeed, RAS's approach is more conservative than the policy adopted by the Commission

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[27] *Compare VMES Order* at ¶¶ 98 and 117 with ¶ 168.

[28] *Id.*

[29] *Id*. at ¶ 168.

because it ensures compliance with permissible levels even at maximum mispointing.[30]

IV. CONCLUSION

For all of the foregoing reasons, RAS respectfully requests that the Commission convert RAS's existing LMSS licenses to VMES licenses, permit RAS to operate up to 400 units of three additional terminal types, and make other changes as requested herein. Grant of the requested VMES authority would serve the public interest by permitting RAS to expand the range of mobile satellite voice and data communications to government, military and commercial customers.

[30] VMESs that meet 0.2° pointing accuracy are permitted to exceed the off-axis EIRP spectral density mask between 0.2° and 0.5°. In contrast, RAS's terminals never exceed the mask regardless of pointing offset.

Technical Certificate

I, David Gross, hereby certify that I am the technically qualified person responsible for the preparation of the technical discussion contained in Raysat Antenna Systems, LLC's Application for License Modification, that I am familiar with Part 25 of the Commission's Rules (47 C.F.R. Part 25), and that I have either prepared or reviewed the technical information submitted in this Application and found it to be complete and accurate to the best of my knowledge and belief.

By: ________________________________

David Gross
Raysat Antenna Systems, LLC

May 17, 2012