NARRATIVE DESCRIPTION AND PUBLIC INTEREST STATEMENT

Intelsat License LLC ("Intelsat") seeks experimental special temporary authority ("STA") for in-flight demonstration and operation of two Ku-band satellite earth station terminal types in connection with development and implementation of service to a U.S. Government customer. Intelsat seeks to commence operations in U.S. and international airspace no later than June 1, 2012 for a period of 180 days. Authority is sought to test and operate up to 50 of each terminal type.

This STA request is similar to one recently granted to Intelsat (File No. 0196-EX-ST-2012) but adds a second antenna type. Thus, it is intended to replace the prior STA upon grant. For the reasons set forth herein, grant of the requested STA would serve the public interest.

I. INTRODUCTION

Intelsat, a leading satellite service provider, is developing a Ku-band aeronautical mobile VSAT connectivity offering for a U.S. government customer using its Fixed-Satellite Service ("FSS") network. The operations involve aircraft-mounted satellite earth station terminals transmitting in the 14.0-14.5 GHz band. The terminals – the TECOM KuStream 1500 and Rantec Airborne SATCOM terminal – are both designed for aeronautical applications and have been previously authorized by the Commission.

Adjacent FSS satellites will be protected from harmful interference by limiting the off-axis EIRP spectral density along the GSO arc to no more than the levels permitted for routinely licensed Ku-band VSAT terminals. Intelsat's experimental operations also will not impact other users of the Ku-band (including U.S. Government radio astronomy and space services).

There is ample precedent for granting Intelsat an experimental STA to conduct these operations based on prior authority for experimental operations granted to Boeing (Call Sign WC2XVE), ARINC (Call Sign WC2XPE), Hughes Network Systems (Call Sign WE2XEW), Panasonic Avionics (Call Sign WD9XQT) and others, including Intelsat itself (File Nos. 0158-EX-ST-2012 and 0196-EX-ST-2012).

A. KuStream Aeronautical Terminal

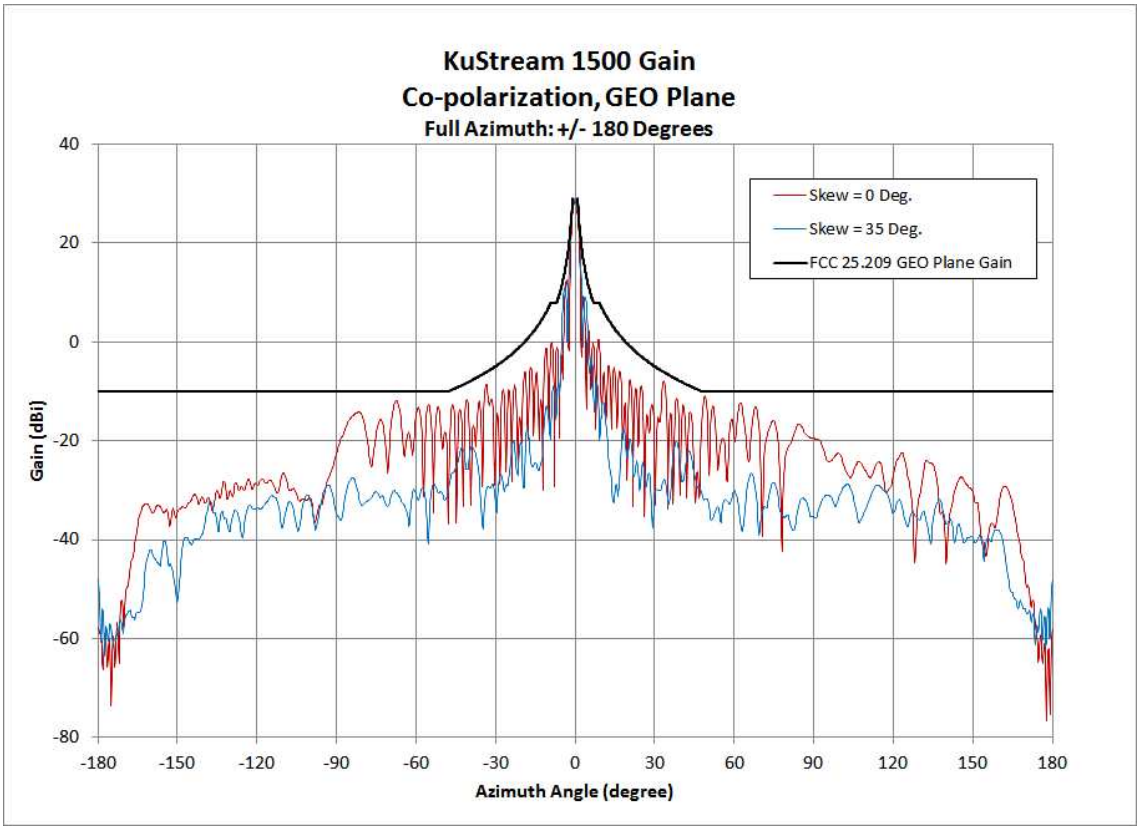
The KuStream 1500 terminal, manufactured by TECOM/Qest, is a government version of the KuStream terminal that has been previously authorized by the Commission for both experimental and commercial operations. For example, the TECOM terminal was authorized for aeronautical experimental operations by Row 44, Inc. in 2009 (File No. 0236-EX-PL-2009, Call Sign WF2XBY), and for commercial operations in 2010 (File No. SES-MOD-20091021-01342, Call Sign E080100). Intelsat is presently operating this antenna pursuant to a separate experimental STA (File No. 0196-EX-ST-2012).

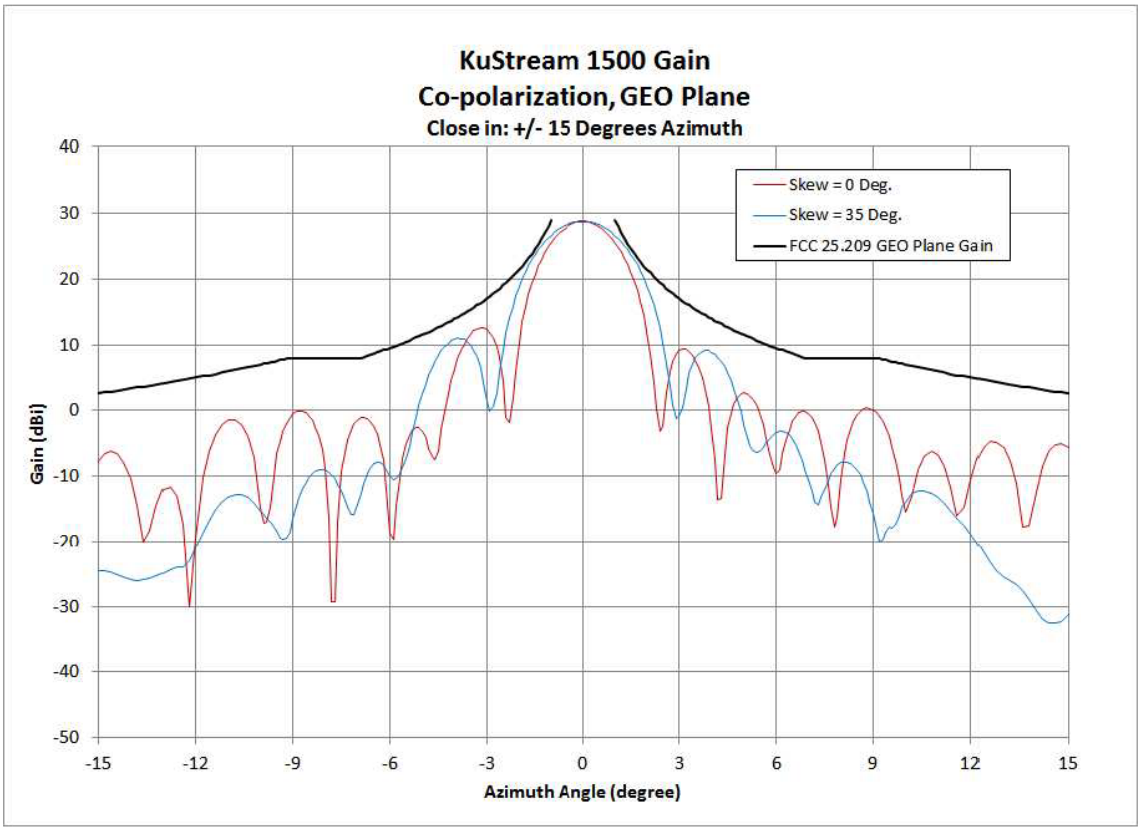
The material operating parameters of the KuStream antenna are well-known to the Commission, including:

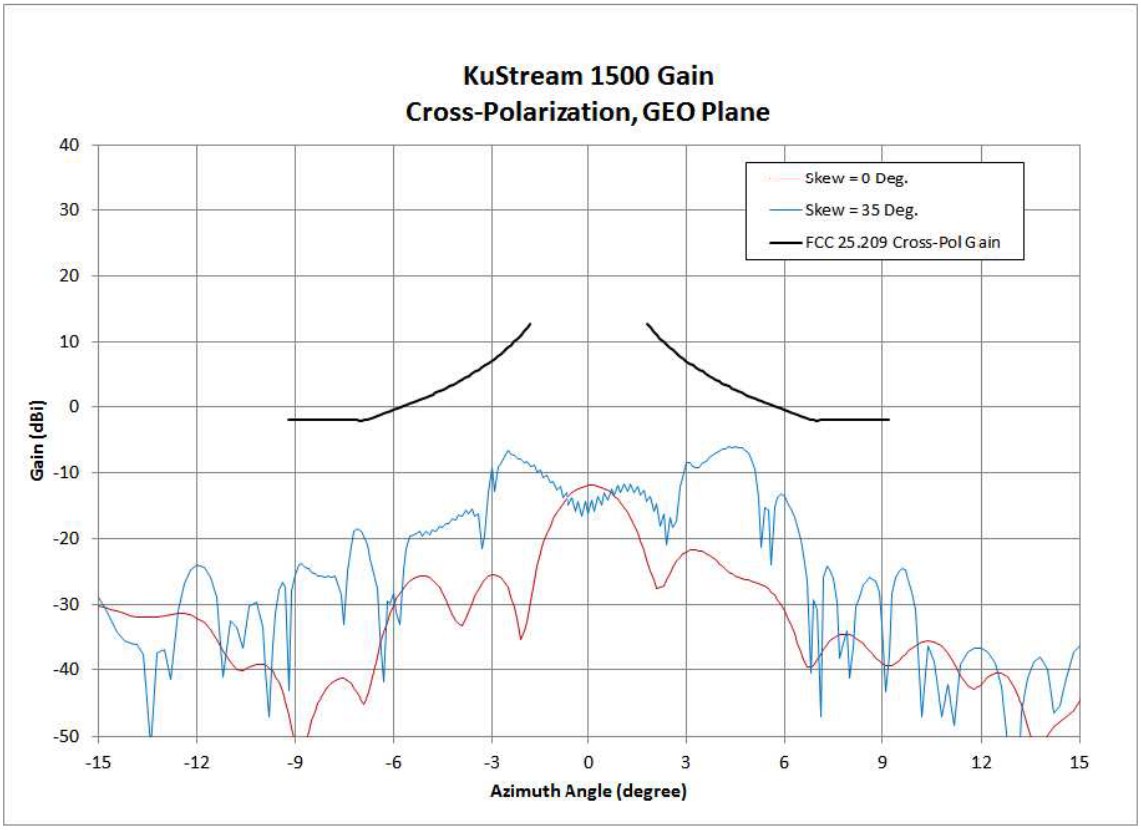
- 0.2º pointing accuracy; automatic muting within 100ms if pointing offset exceeds 0.5º and transmissions do not resume until pointing accuracy is within 0.2º;
- Compliance with Section 25.209 antenna gain pattern through 35º skew angle (the terminal automatically mutes transmissions at skew angles greater than 35º);
- Compliance with Section 25.222 and 25.226 off-axis EIRP levels (i.e., VSAT routine licensing levels applicable to Ku-band ESV and VMES operations), which have been applied in the aeronautical context.

Thus, the KuStream antenna complies fully with the Commission's two-degree spacing policies and rules designed to protect co-frequency operations from harmful interference. Charts are provided below showing the gain of the KuStream 1500. Section 25.209 gain patterns and off-

axis EIRP levels are provided below and confirm applicable limits are met for co-polarization and cross-polarization for all operating scenarios.

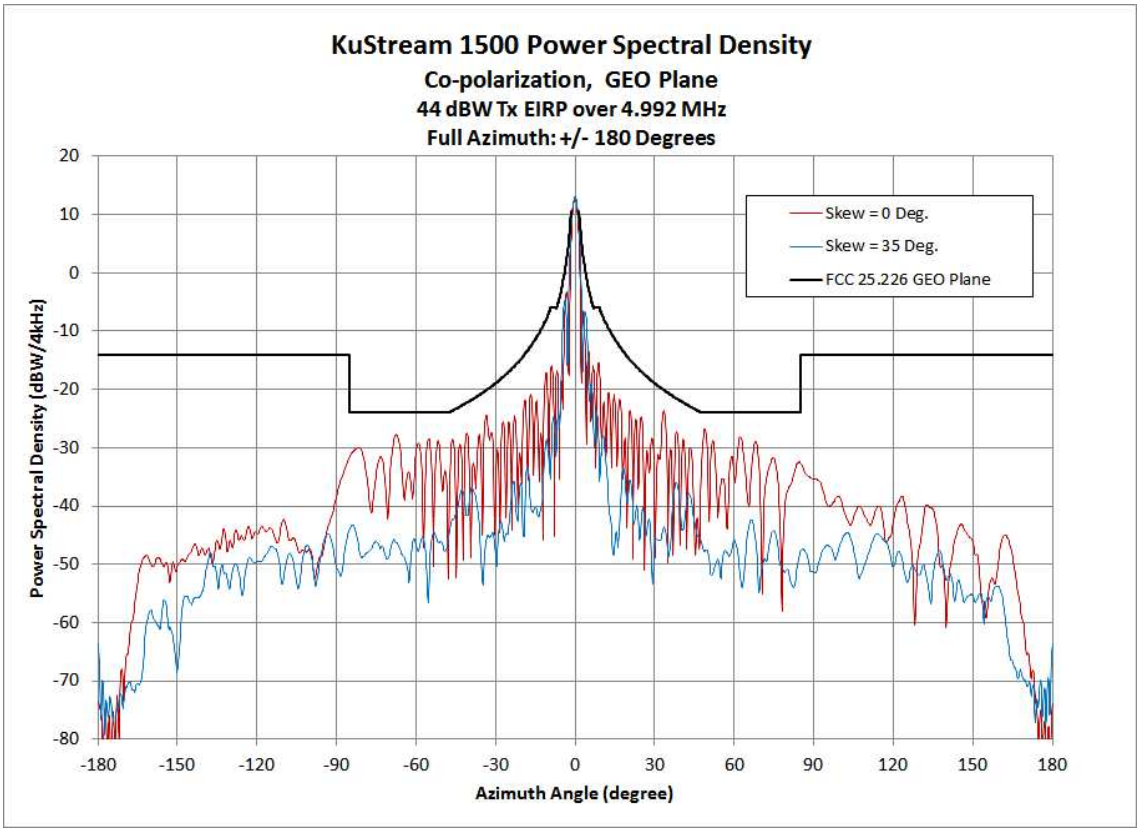



KuStream 1500 Gain
Co-polarization, GEO Plane
Close in: +/- 15 Degrees Azimuth
Skew = 0 Deg.
Skew = 35 Deg.
FCC 25.209 GEO Plane Gain
Gain (dBi)
Azimuth Angle (degree)
40
30
20
10
0
-10
-20
-30
-40
-50
-15
-12
-9
-6
-3
0
3
6
9
12
15

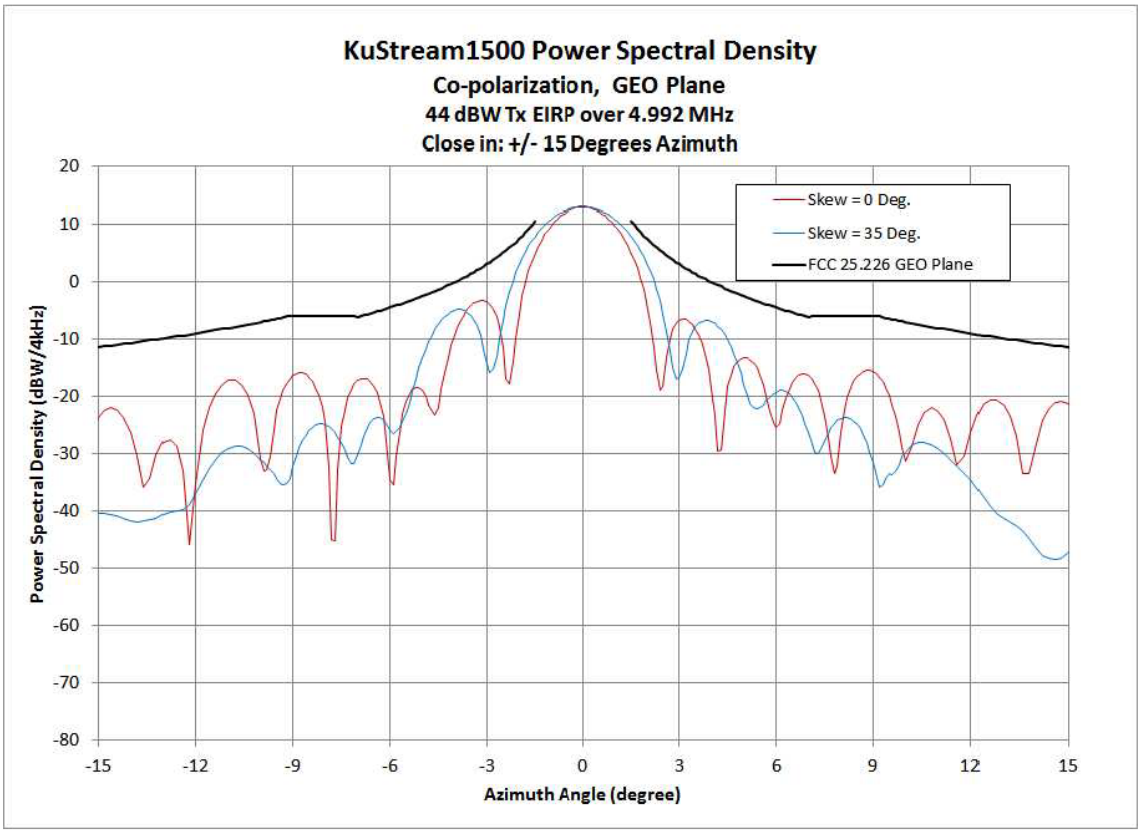

KuStream 1500 Gain
Cross-Polarization, GEO Plane
Skew = 0 Deg.
Skew = 35 Deg.
FCC 25.209 Cross-Pol Gain
Gain (dBi)
Azimuth Angle (degree)
40
30
20
10
0
-10
-20
-30
-40
-50
-15
-12
-9
-6
-3
0
3
6
9
12
15

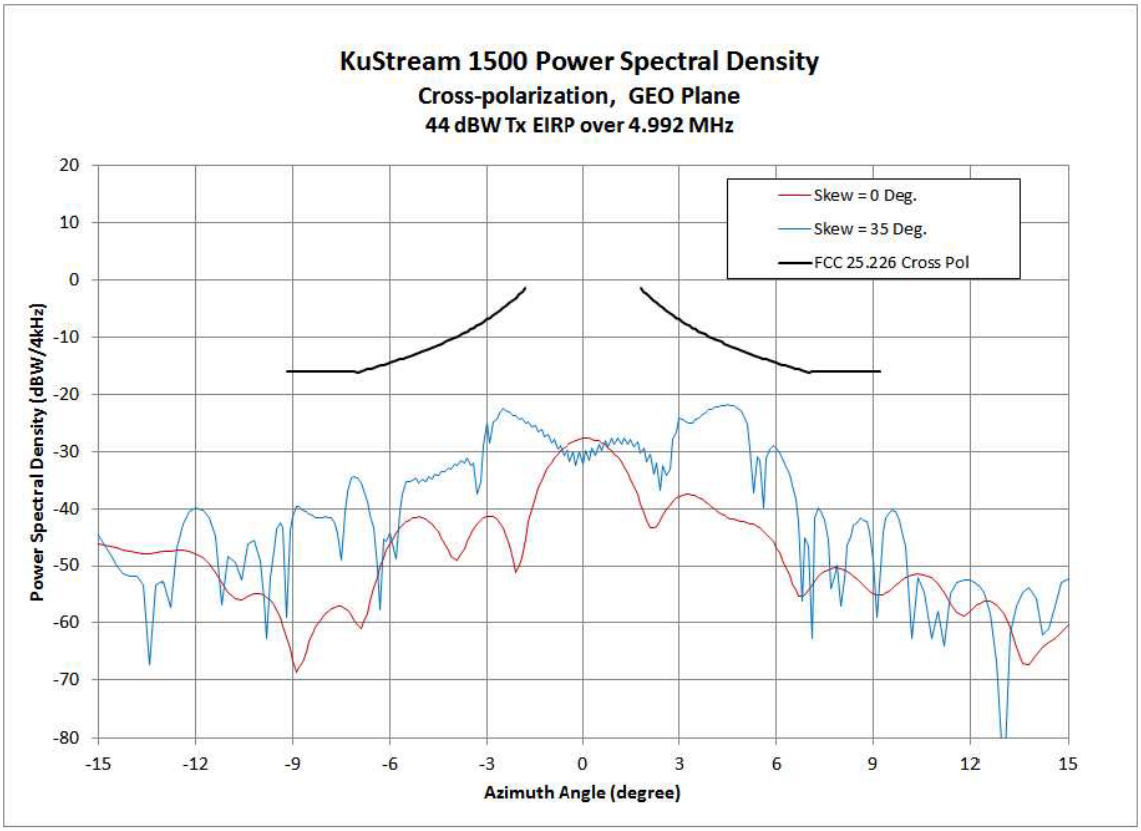
The terminal will be configured to not transmit more than 44 dBW EIRP. (This translates into an ERP of 15,310 W and a transmit power of 13.05 W). This power limitation is implemented as part of the commissioning procedure of the terminal.[1]

The terminal includes an iDirect modem which will be set with an appropriate maximum transmit power level to insure that 44 dBW EIRP is not exceeded. In addition, because iDirect-based networks employ TDMA, only one terminal will transmit at a given time slot (i.e., there is no aggregation of transmissions from multiple terminals). Below are charts showing the off-axis power spectral density of the carrier transmitted from the KuStream 1500 terminal.



[1] In File No. 0196-EX-ST-2012, transmit ERP was inadvertently calculated at 17.35 W rather than 13.05 W. However, Intelsat has operated the terminal at the correct, lower value since grant of the STA.


KuStream1500 Power Spectral Density
Co-polarization, GEO Plane
44 dBW Tx EIRP over 4.992 MHz
Close in: +/- 15 Degrees Azimuth
Skew = 0 Deg.
Skew = 35 Deg.
FCC 25.226 GEO Plane
Power Spectral Density (dBW/4kHz)
Azimuth Angle (degree)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-15
-12
-9
-6
-3
0
3
6
9
12
15


KuStream 1500 Power Spectral Density
Cross-polarization, GEO Plane
44 dBW Tx EIRP over 4.992 MHz
Skew = 0 Deg.
Skew = 35 Deg.
FCC 25.226 Cross Pol
Power Spectral Density (dBW/4kHz)
Azimuth Angle (degree)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-15
-12
-9
-6
-3
0
3
6
9
12
15

B. Rantec Aeronautical Terminal

The Rantec 18in Ku-band Airborne SATCOM terminal, manufactured by Rantec Microwave Antennas, has been previously authorized by the Commission for on-ground and inflight operations. For example, the Rantec antenna was authorized for temporary operations by Tachyon in 2011.[2]

The material operating parameters of the Rantec antenna are consistent with the requirements imposed by the Commission on other Ku-band aeronautical systems, including:

- Better that 0.2º pointing accuracy; automatic muting of transmission within 100ms if pointing offset exceeds 0.2º;
- An 18in circular reflector antenna that has no skew angle limitations (i.e., circular aperture has equivalent off-axis performance at all skew angles);
- Compliance with Section 25.222 and 25.226 off-axis EIRP levels (i.e., VSAT routine licensing levels applicable to Ku-band ESV and VMES operations), which have been applied in the aeronautical context.

The pointing methodology of the Rantec terminal was thoroughly detailed in the application submitted in File No. 0504-EX-PL-2011, Call Sign WF2XZO, where is summarized below. Accurate pointing of the Rantec terminals antenna is achieved under direction of the antenna control unit ("ACU"), which is also used in over 150 units operating with 11.5" antennas. The ACU receives aircraft position, heading, orientation and rate of change information from a dedicated inertial reference unit ("IRU"), which is also widely deployed. The ACU determines the desired antenna azimuth and elevation by executing an open loop pointing algorithm using: (i) ephemeris data stored in the modem to determine the satellite location and polarization; (ii) stored constants to determine the antenna orientation relative to the airframe;

---

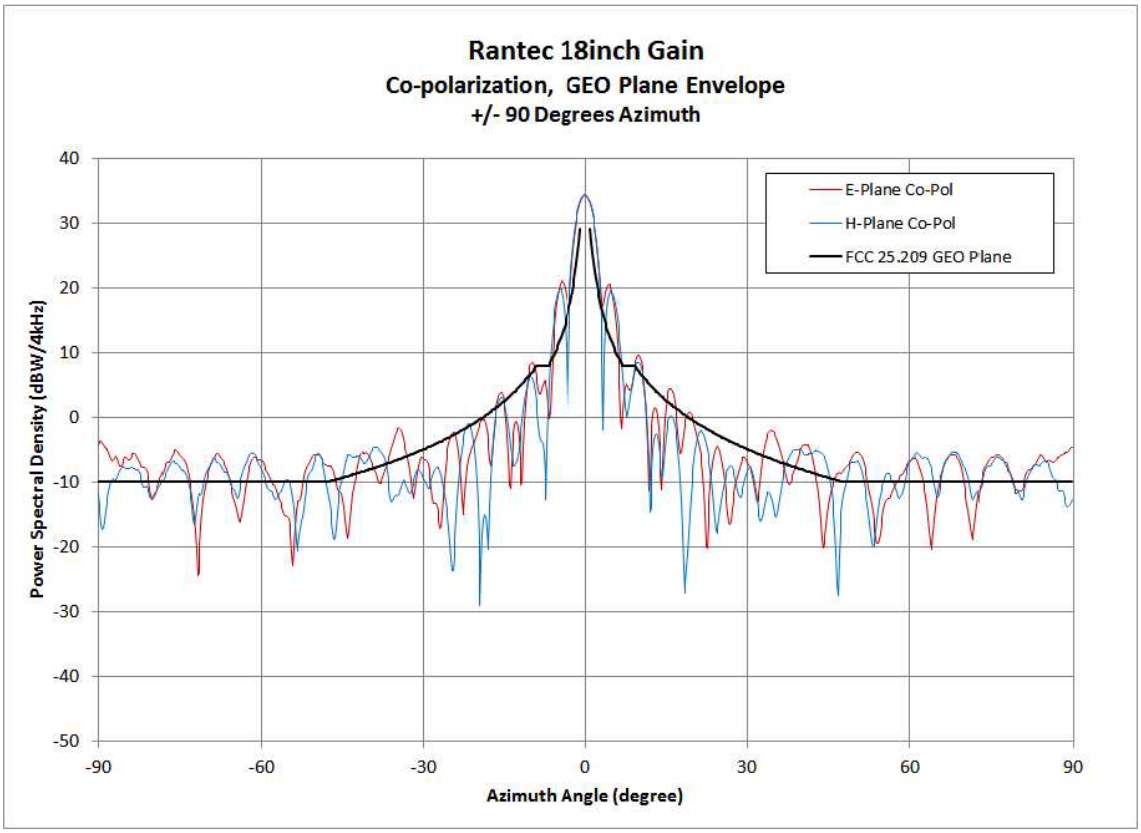
[2] *See* Call Sign E070139, File Nos. SES-STA-20110901-01019 and SES-STA-20110926-01142; *see also* Call Sign WF2XZO, File No. 0504-EX-PL-2011.

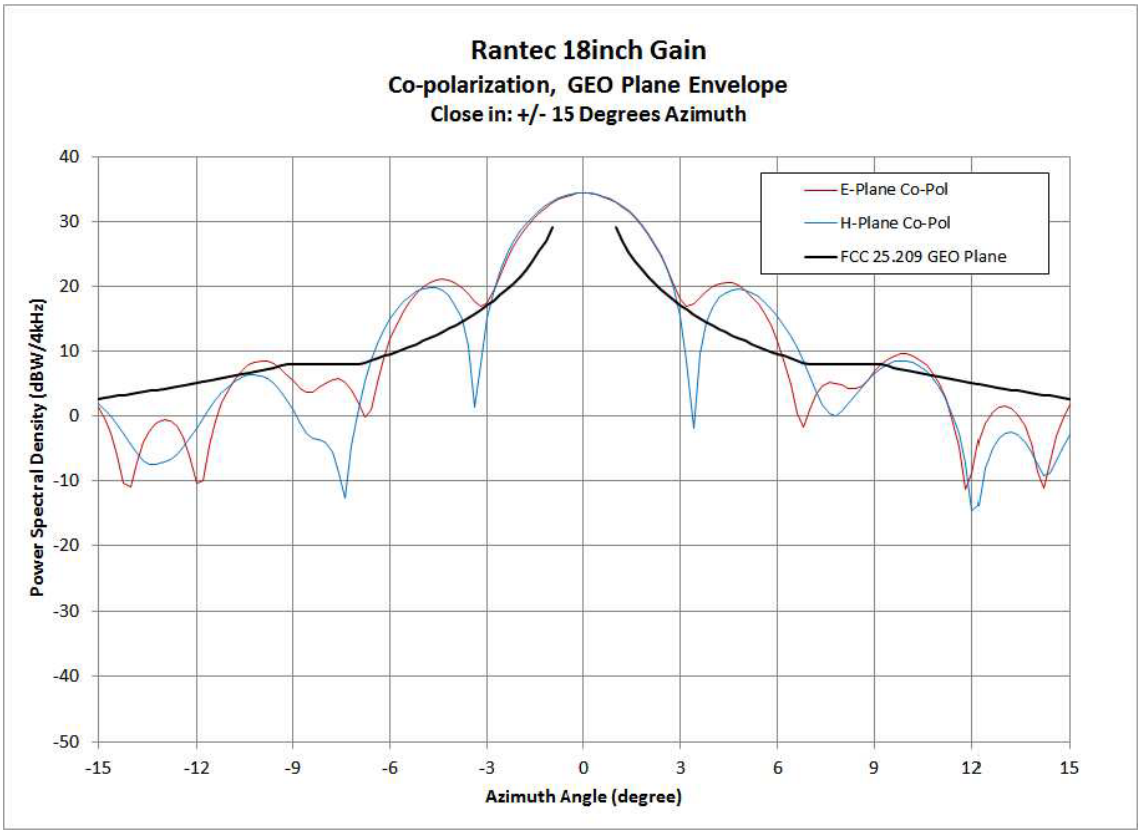
(iii) latitude, longitude and altitude data; (iv) heading, yaw, pitch, and roll data; and (v) speed, yaw rate, pitch rate, and roll rate data.

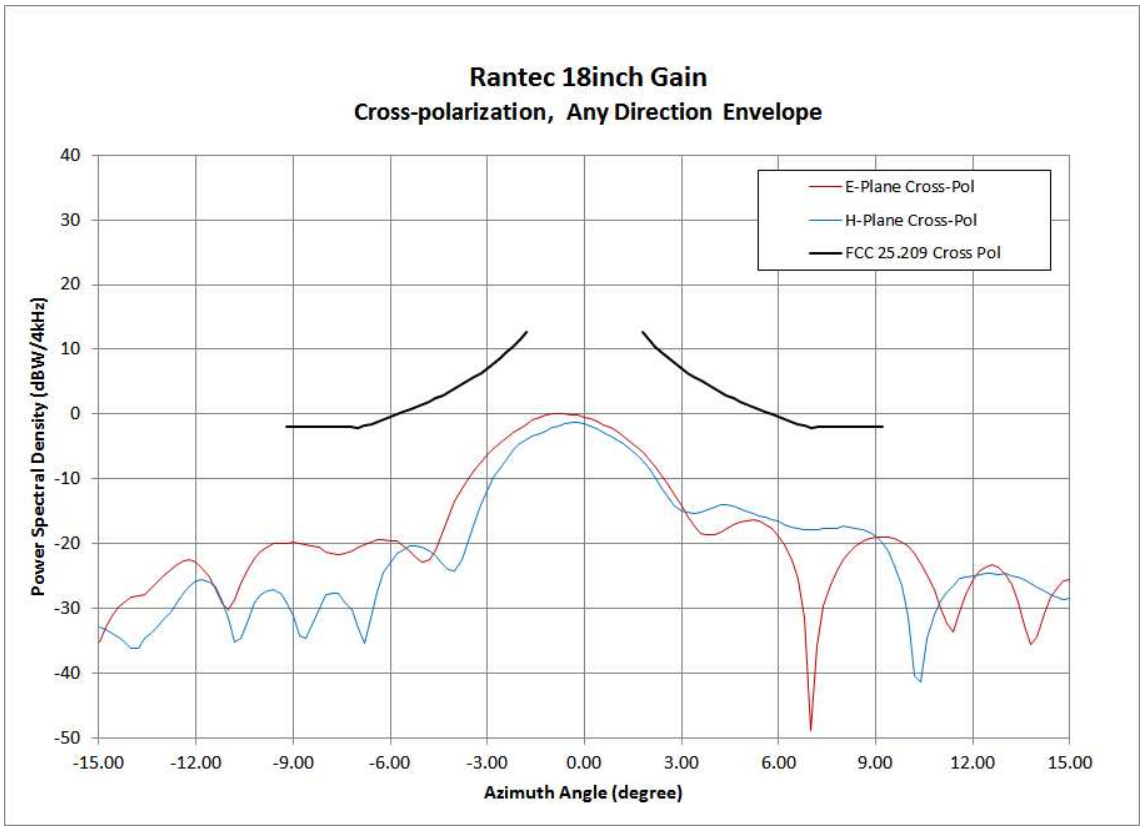
Once the satellite is acquired, the ACU corrects for aircraft attitude changes based upon the IRU data, without waiting for degradation of the received signal strength. The IRU data is provided every 0.02 seconds, with a data resolution (least significant bit) of 0.05°. The ACU computes the desired antenna azimuth, elevation and polarization 1024 times every second (approximately once every millisecond). The antenna can move in azimuth and elevation at more than 15° per second, which is sufficient to track aircraft motion within a normal flight envelope. The total RMS pointing error for the antenna is calculated to be less than 0.1°.

The Rantec antenna has configurable azimuth, elevation, and polarization error limits. If any of these limits are exceeded, or if there is a hardware fault reported in the pointing hardware, the antenna will automatically inhibit transmit. This is done independent of, and takes precedence over, any modem transmit inhibit/enable. The transmission will remain inhibited until the pointing error limit or hardware fault is removed. As such, transmit will be inhibited in less than 100 ms anytime pointing error exceeds 0.2 degrees

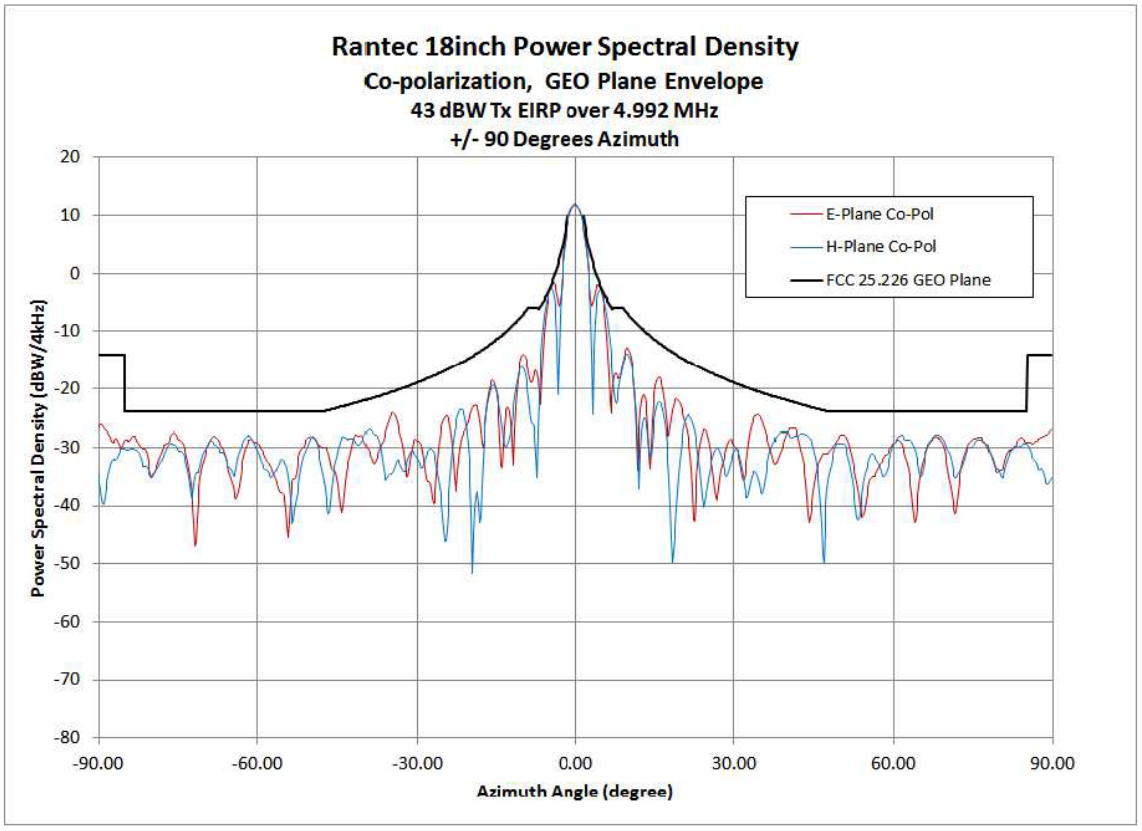
Although the Rantec antenna does not comply with Section 25.209 gain patterns, appropriate selection of operating parameters (modulation, spreading, maximum transmit EIRP levels) allows the antenna to comply with the Commission's two-degree spacing policies and rules designed to protect co-frequency operations from harmful interference.

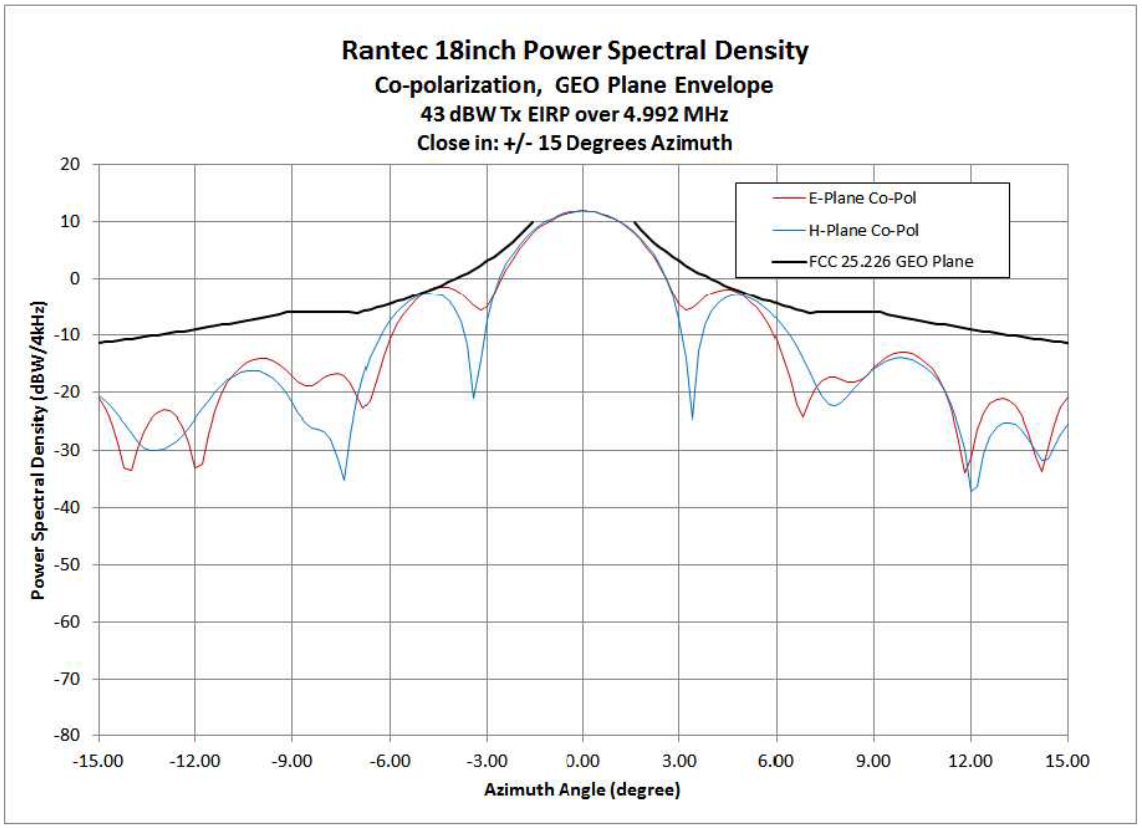

Rantec 18inch Gain
Co-polarization, GEO Plane Envelope
+/- 90 Degrees Azimuth
E-Plane Co-Pol
H-Plane Co-Pol
FCC 25.209 GEO Plane
Power Spectral Density (dBW/4kHz)
Azimuth Angle (degree)
40
30
20
10
0
-10
-20
-30
-40
-50
-90
-60
-30
0
30
60
90

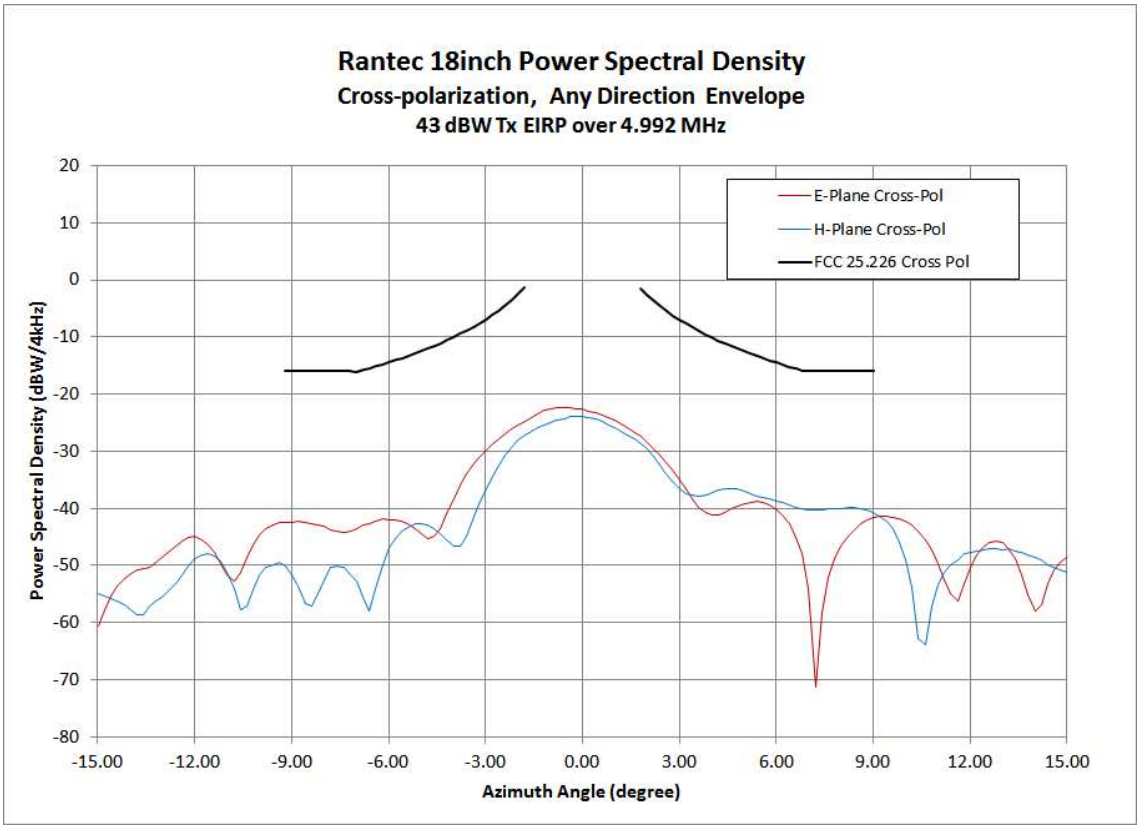

Rantec 18inch Gain
Co-polarization, GEO Plane Envelope
Close in: +/- 15 Degrees Azimuth
E-Plane Co-Pol
H-Plane Co-Pol
FCC 25.209 GEO Plane
Power Spectral Density (dBW/4kHz)
Azimuth Angle (degree)
40
30
20
10
0
-10
-20
-30
-40
-50
-15
-12
-9
-6
-3
0
3
6
9
12
15



The terminal will be configured to not transmit more than 43 dBW EIRP. (This translates into an ERP of 12,162 W and a transmit power of 7.13 W. This power limitation is implemented as part of the commissioning procedure of the terminal. The terminal includes an iDirect modem which will be set with an appropriate maximum transmit power level to insure that 43 dBW EIRP is not exceeded. In addition, because iDirect-based networks employ TDMA, only one terminal will transmit at a given time slot (i.e., there is no aggregation of transmissions from multiple terminals). Below are charts showing the off-axis power spectral density of the carrier transmitted from the Rantec terminal.


Rantec 18inch Power Spectral Density
Co-polarization, GEO Plane Envelope
43 dBW Tx EIRP over 4.992 MHz
+/- 90 Degrees Azimuth
E-Plane Co-Pol
H-Plane Co-Pol
FCC 25.226 GEO Plane
Power Spectral Density (dBW/4kHz)
Azimuth Angle (degree)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90.00
-60.00
-30.00
0.00
30.00
60.00
90.00


Rantec 18inch Power Spectral Density
Co-polarization, GEO Plane Envelope
43 dBW Tx EIRP over 4.992 MHz
Close in: +/- 15 Degrees Azimuth
E-Plane Co-Pol
H-Plane Co-Pol
FCC 25.226 GEO Plane
Power Spectral Density (dBW/4kHz)
Azimuth Angle (degree)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-15.00
-12.00
-9.00
-6.00
-3.00
0.00
3.00
6.00
9.00
12.00
15.00



A Radiation Hazard study for the Rantec antenna is included as Attachment B.

B. Satellite Points of Communications

Intelsat will utilize commercial FSS satellite capacity to conduct its experimental operations. Specifically, the antennas will communicate with G-25 at 93.1ºW.L., G-19 at 97.0º W.L., IS 801 at 29.5ºW.L., IS-14 at 45ºW.L., IS-23 at 53ºW.L. (planned satellite), IS-19 at 166ºE.L. (planned satellite), T-11N at 37.6ºW.L., SES-4 at 22ºW.L. and NSS-7 at 20ºW.L. The operations proposed herein will be in compliance with the off-axis EIRP limits applicable to these satellites as set forth in the Commission's analogous VMES and ESV rules. *See* 47 C.F.R. §§ 25.222 and 25.226.

Commercial Ku-band satellites have been used by Intelsat for mobile VSAT operations without reported interference incidents. Given that the KuStream 1500 and Rantec antennas are specifically designed for Ku-band aeronautical operations, similar non-interfering operations can

be expected. The terminals also have similar performance characteristics, including antenna gain, such that there transmit power levels and link performance are essentially identical. Representative link budget analyses for the KuStream 1500 operations are included below (the Rantec terminal and operations with other proposed satellites would have essentially identical link budgets).

Galaxy 25 – Forward and Return Carriers

Customer Support Engineering & Capacity Management

Link Budget Report for: TECOM Demo

Opportunity-ID / SSR-ID
Done by: bauerf Date: 21 Jan 2012

Application: STRIP7 v3.9 Operational

Satellite and Role: G-25 @ 93.10°W
Transponder: KH07/KV07 (NAKH/NAKV)
Platform bias: -0.52°E; 0.00°N
Sat. TWT Power [Watts]: 100.0
Sat. D/L EIRP at be/bp [dBW]: 39.9 / 50.9
SFD at be/bp [dBW/m²]: -80.5 / -87.4
Band Up/Dw [MHz]: (14154 - 14181) / (11854 - 11881)
Polarization Up/Dw: H / V

Total lease resource [MHz]: 27.0
Total D/L EIRP Avail. at be/bp [dBW]: 36.1 / 47.1
Total D/L EIRP Used at be/bp [dBW]: 34.4 / 45.4
Total BW Used [MHz]: 23.5
Xp Operational Mode: Multi-Carrier OBO= -3.8 dB

Antennas	Diameter [m]	Gtx [dBi]	G/T [dB/K]	Latitude [°N]	Longitude [°E]	Xpol [dB]	Location (Nearest City and Country)	Notes	TOTAL HPA Power [W]
MTN-K11	11.0	62.0	38.7	39.70	282.27	30.0	MTN-K11 - United States		1.8
TECOM	0.44	33.0	11.8	35.16	280.75	26.0	Fayetteville - UNITED STATES		16.3

Tx E/S	Rx E/S	Carrier Type	Per Carrier Link Parameters and Results															
		#, Type, [I.R, OH, FEC, RS, modulation]	Noise BW [MHz]	Space Factor (Roll-off)	Alloc. BW [MHz]	PEB [MHz]	b.e. D/L EIRP [dBW]	C/N thresh. [dB]	Clear Sky C/N [dB]	Eb/No thresh. [dB]	Clear Sky Eb/No [dB]	Link Availab. [%/yr]	U/L EIRP [dBW]	HPA size (Watt)	HPA OBO [dB]	WGL [dB]	UPC [dB]	Gx apprvl
MTN-K11	TECOM	DIG (6.221 Mbps, OH=0.0%, 0.3059 FEC, QPSK)	10.168	1.20	12.203	18.075	34.4	0.2	6.3	2.3	8.4	99.93	64.6	1.8	0.0	0.0	0.0	n/a
TECOM	MTN-K11	Spread (1.040 Mbps, OH=0.0%, 1/2 FEC, BPSK)	4.160	1.20	4.992	0.136	13.1	-3.2	-0.6	2.8	5.4	99.95	44.0	12.6	0.0	0.0	0.0	No
		TOTAL: 2 Carriers			**17.195**	**18.211**	**34.4**											

ISCO comments:

Antenna pattern comments:

Notes:
Clear Sky C/N includes 1.5 dB additional margin for terrestrial interference, antenna mis-pointing
Eb/No includes 0.4 dB IF-RF degradation.
* Analysis results based on today's operational levels of interference. Results are not guaranteed due to possible fluctuations in operational interferences over time.

Galaxy 19 – Forward and Return carriers

Customer Support Engineering & Capacity Management

Link Budget Report for:

Opportunity-ID / SSR-ID

Done by: bauerf Date: 29 Sep 2011

Application: STRIP7 v3.9 Operational

Satellite and Role: G-19 @ 97.00°W
Transponder: 13K/13K (NAKH/NAKV)
Platform bias: -1.00°E; 0.00°N
Sat. TWT Power [Watts]: 130.0
Sat. D/L EIRP at be/bp [dBW]: 40.5 / 49.3
SFD at be/bp [dBW/m²]: -84.3 / -92.7
Band Up/Dw [MHz]: (14247 - 14274) / (11947 - 11974)
Polarization Up/Dw: H / V

Total lease resource [MHz]: 27.0
Total D/L EIRP Avail. at be/bp [dBW]: 36.7 / 45.5
Total D/L EIRP Used at be/bp [dBW]: 36.4 / 45.2
Total BW Used [MHz]: 27.2
Xp Operational Mode: Multi-Carrier OBO= -3.8 dB

Antennas	Diameter [m]	Gtx [dBi]	G/T [dB/K]	Latitude [°N]	Longitude [°E]	Xpol [dB]	Location (Nearest City and Country)	Notes	TOTAL HPA Power [W]
HUB									
IMT-33E2	4.8	55.2	31.5	39.60	282.24	35.7	MTN-K33 - United States		371.5
Remotes								Grid for Remotes = 0.50°	
Rem-1	0.46	34.8	11.0			26.0	According to attached plot	G/T @ 20.0°EL angle; Tlna = 65.0°K; VSWRlna = 2.2; Feed losses = 0.3 dB	10.0

Tx E/S	Rx E/S	Carrier Type #, Type, [I.R, OH, FEC, RS, modulation]	Per Carrier Link Parameters and Results Noise BW [MHz]	Space Factor (Roll-off)	Alloc. BW [MHz]	PEB [MHz]	b.e. D/L EIRP [dBW]	C/N thresh. [dB]	CS C/N after ASI [dB]	Eb/No thresh. [dB]	CS Eb/No after ASI [dB]	Link Availab. [%/yr]	U/L EIRP [dBW]	HPA size (Watt)	HPA OBO [dB]	WGL [dB]	UPC [dB]	Gx apprvl
IMT-33E2	Remotes	DIG (6.221 Mbps, OH=0.0%, 0.3059 FEC, QPSK)	10.168	1.20	12.203	24.182	36.2	0.2	0.2-4.7	2.3	2.3-6.8	0.00-99.90	64.9	371.5	3.0	8.0	5.0	n/a
Rem-1	IMT-33E2	3 x Spread (1.040 Mbps, OH=0.0%, 1/2 FEC, BPSK)	4.160	1.20	4.992	0.303	17.2	-3.2	-19.7-1.1	2.8	-13.7-7.1	0.00-99.97	44.0	10.0	0.0	0.8	n/a	No
		TOTAL: 4 Carriers			27.179	25.092	36.4											

ISCO comments:

Antenna pattern comments:

Notes:
Clear Sky C/N includes 1.5 dB additional margin for terrestrial interference, antenna mis-pointing
Eb/No includes 0.4 dB IF-RF degradation.
The total Dw-link Availability is calculated for Up-link Availability better than or equal to 99.90%/yr. Using Parc-3 rain model (Rice-Holmberg), the UPC attenuator value is calculated to provide this Up-link Availability.
* Analysis results based on today's operational levels of interference. Results are not guaranteed due to possible fluctuations in operational interferences over time.

III. PROTECTION OF OTHER USERS IN THE 14.0–14.5 GHZ BAND

Protection of Fixed-Satellite Service. Intelsat will comply with the Commission's off-axis EIRP limits set forth in analogous ESV and VMES rules. *See* 47 C.F.R. §§ 25.222 and 25.226. Thus, the terminal will operate in such a manner that the off-axis EIRP levels are no greater than the levels produced by a routinely licensed VSAT earth station. To the extent that any adjacent satellite operator experiences unacceptable interference from Intelsat's experimental operations, Intelsat will cease terminal transmissions immediately.

Protection of Potential NGSO FSS Systems. Intelsat acknowledges that non-geostationary orbit ("NGSO") systems are also permitted to operate in the Ku-band. However, no such systems are currently authorized or plan to operate within the period contemplated for the proposed experimental operations.

Protection of Terrestrial Radio Services. Intelsat 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 could conflict.

Protection of the Radio Astronomy Service. Intelsat agrees to comply with exclusion zones designed to protect such radio astronomy sites set forth in Section 25.226(d).

Protection of Space Research Service. Intelsat 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. For purposes of this experimental STA application and consistent with Section 25.226(c), Intelsat will avoid AES operation within line-of-sight vicinity of these earth stations.

IV. SUPERVISION AND CONTROL

For purposes of these experiments, the Intelsat terminals will be operated under Intelsat's full supervision and control. The point of contact for the planned experimental operations is:

Christopher M. Hudson	(cell) +1-202-352-1272 chris.hudson@intelsatgeneral.com
ISOC – Intelsat Secure Operating Center	+1 (404) 381-2727 ISOC@intelsatgeneral.com

This contact will have access to all network functions, and will have the ability and authority to cease all transmissions from the terminals wherever they are located.

VIII. CONCLUSION

Grant of this experimental STA will allow Intelsat to further develop and demonstrate the mobile VSAT technologies to support U.S. Government customers. The subject terminal has been designed to protect other uses in the Ku-band from interference and will comply with FCC rules and policies governing Ku-band aeronautical operations and analogous services. Because grant of this request would serve the public interest, Intelsat respectfully requests approval at the earliest practicable time.