Consulting Engineers
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STATEMENT OF WILLIAM J. GETZ
IN SUPPORT OF AN APPLICATION TO MODIFY
VSAT NETWORK
FIXED SATELLITE SERVICE LICENSE
CALL SIGN: E060349
FCC FILE NO. SES-LIC-20060831-01658

I am a Radio Engineer, an employee in the firm of Carl T. Jones Corporation, with offices located in Springfield, Virginia. My education and experience are a matter of record with the Federal Communications Commission.

This office has been authorized by American Broadcasting Companies, Inc. to prepare this statement in support of an Application to modify the above-referenced VSAT Network Fixed Satellite Service License. Specifically, this application proposes to: (1) add two fixed HUB locations; (2) add a second antenna for use at the remote terminal Site ID (i.e. REMOTE-1), (3) increase the number of remote terminal units; and, (4) change the Remote Control Point address for the VSAT Network. No further changes are proposed herein. **The Applicant proposed to maintain HUB-1 to HUB-5 as presently licensed and all studies and data associated with these HUBs are incorporated herein by reference.**

This Statement and the supporting Exhibits set forth the operational guidelines for the intended modification of License and submits material to demonstrate compliance with the Commission's Rules regarding human exposure to radiofrequency (RF) energy.

HUB-6 Technical Operation and RFR Exposure Study

HUB-6 Technical Operation

The proposed HUB-6 fixed satellite earth station will be located at 4100 City Avenue, Philadelphia, Pennsylvania, atop the WPVI(TV) studio building as described in the associated FCC Form 312. The proposed system will operate only through US licensed satellites and communicate between remote terminals and hub facilities all of which will be located in the United States. Exhibit 1 lists the VSAT operating parameters, the Elevation Limit and Azimuth Limit calculations, and the Input Density calculations relevant to the proposed HUB-6 operation.

The system as described, to include its component parts, meets the Commission's requirements for routine processing of earth station applications, and meets the Commission's Rules for VSAT system operation at Ku band frequencies, as outlined in Section 25.134 of the FCC Rules.

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The HUB-6 Earth Station Antenna (ESA) is an Andrew Corporation ES37 antenna which is 3.7 meters in diameter. The planned input power to the antenna system flange is 15.85 Watts, which is the input power required to produce the system carriers maximum EIRP of 63.9 dBW and 57.3 dBW as specified in the VSAT system design. The maximum EIRP from all carriers is 64.8 dBW, and the maximum EIRP density in a 4 kHz band is 30.4 dBW with any proposed combination of emissions.

The Maximum EIRP Density toward the horizon will meet the Commission's Rules for routine processing in spite of the extremely low elevation angle if operation toward the extreme western portion of the geostationary arc is necessary. The high antenna gain and the relatively low input powers act to keep the maximum density toward the horizon at a maximum of -15.95 dBW/4 kHz band. It is unlikely that operation will be conducted at this low elevation angle (10.5 degrees) because of potential attenuation of the signals at Ku frequencies when the path length through the lower portions of the atmosphere is long. Because of this, the EIRP density in a 4 kHz band is likely to be much lower than the maximum value during normal operation. The EIRP density toward the horizon will fall off rapidly when higher elevation angles are employed.

HUB-6 RFR Exposure Study

Each HUB facility requires individual RF safety practices as required by its individual operating parameters and the siting of the Earth Station Antenna. The RFR calculations performed herein were made according to the methods which are described in FCC OET Bulletin 65 (Pages 19 through 29), Edition 97-01, which is dated August 1997. Section 1.1310 of the Commission's Rules was used to obtain the limits of maximum power density for both Controlled and Uncontrolled Environments. Pursuant to Section 1.1310 of the Rules, a maximum power density of 1.0 mW/cm² is permitted in Uncontrolled Environments in the band 14000 through 14500 MHz.

The results of RFR calculations pertinent to HUB-6 are attached as Exhibit 2. As shown in Exhibit 2, the HUB-6 fixed satellite antenna system complies with the FCC limits for Uncontrolled Environments. The maximum power density at the surface of the antenna is 0.590 mW/cm², only 58.96% of the guideline value for Uncontrolled Areas.

Within the confines of the Fresnel and Transition Zones, as well as at the surface of the antenna, the level of power density is well below that for Uncontrolled Areas. The maximum power density in the near field is 0.368 mW/cm² and the maximum power density in the nearest portion of the far field is 0.157 mW/cm².

Because of the low power at the antenna feed (15.85 Watts, 12.0 dBW), very small fields are encountered in all directions from the antenna, save the locations between the antenna feed, sub-reflector and the main reflector. For this reason, it is advisable to keep persons out of the area between the antenna feed, the sub-reflector and the main reflector when the station is operating. The region between the antenna feed, sub-reflector and main reflector should be considered to be a controlled area, and all persons should be prevented from approaching this area when the antenna is

energized. When access to this area is necessary for maintenance or repair, this ESA can be shut down and control of the VSAT system can be accomplished through a secondary hub in this multi-hub VSAT network.

During normal operation, if all persons are kept out of the area between the antenna feed, the sub-reflector and the main antenna reflecting surface, the operation of the earth station as proposed herein is predicted to safely satisfy the requirements for an Uncontrolled Environment. Further, the Applicant recognizes that it is good operating practice to not activate the transmitting portion of the station's facilities before the antenna has been properly aimed skyward toward the correct satellite, and the path toward that satellite is known to be clear.

HUB-7 Technical Operation and RFR Exposure Study

HUB-7 Technical Operation

The proposed HUB-7 fixed satellite earth station is a ground level installation at 411 Liberty Street, Durham, North Carolina, as described in the associated FCC Form 312. The proposed system will operate only through US licensed satellites and communicate between remote terminals and hub facilities all of which will be located in the United States. Exhibit 3 lists the VSAT operating parameters, the Elevation Limit and Azimuth Limit calculations, and the Input Density calculations relevant to the proposed HUB-7 operation.

The system as described, to include its component parts, meets the Commission's requirements for routine processing of earth station applications, and meets the Commission's Rules for VSAT system operation at Ku band frequencies, as outlined in Section 25.134 of the FCC Rules.

The HUB-7 Earth Station Antenna (ESA) is an Andrew Corporation ES37 antenna which is 3.7 meters in diameter. The planned input power to the antenna system flange is 15.85 Watts, which is the input power required to produce the system carriers maximum EIRP of 63.9 dBW and 57.3 dBW as specified in the VSAT system design. The maximum EIRP from all carriers is 64.8 dBW, and the maximum EIRP density in a 4 kHz band is 30.4 dBW with any proposed combination of emissions.

The Maximum EIRP Density toward the horizon will meet the Commission's Rules for routine processing in spite of the extremely low elevation angle if operation toward the extreme western portion of the geostationary arc is necessary. The high antenna gain and the relatively low input powers act to keep the maximum density toward the horizon at a maximum of -19.53 dBW/4 kHz band. It is unlikely that operation will be conducted at this low elevation angle (14.6 degrees) because of potential attenuation of the signals at Ku frequencies when the path length through the lower portions of the atmosphere is long. Because of this, the EIRP density in a 4 kHz band is likely to be much lower than the maximum value during normal operation. The EIRP density toward the horizon will fall off rapidly when higher elevation angles are employed.

HUB-7 RFR Exposure Study

Each HUB facility requires individual RF safety practices as required by its individual operating parameters and the siting of the Earth Station Antenna. The RFR calculations performed herein were made according to the methods which are described in FCC OET Bulletin 65 (Pages 19 through 29), Edition 97-01, which is dated August 1997. Section 1.1310 of the Commission's Rules was used to obtain the limits of maximum power density for both Controlled and Uncontrolled Environments. Pursuant to Section 1.1310 of the Rules, a maximum power density of 1.0 mW/cm² is permitted in Uncontrolled Environments in the band 14000 through 14500 MHz.

The results of RFR calculations pertinent to HUB-7 are attached as Exhibit 4. As shown in Exhibit 4, the HUB-7 fixed satellite antenna system complies with the FCC limits for Uncontrolled Environments. The maximum power density at the surface of the antenna is 0.590 mW/cm², only 58.96% of the guideline value for Uncontrolled Areas.

Within the confines of the Fresnel and Transition Zones, as well as at the surface of the antenna, the level of power density is well below that for Uncontrolled Areas. The maximum power density in the near field is 0.368 mW/cm² and the maximum power density in the nearest portion of the far field is 0.157 mW/cm².

Because of the low power at the antenna feed (15.85 Watts, 12.0 dBW), very small fields are encountered in all directions from the antenna, save the locations between the antenna feed, sub-reflector and the main reflector. For this reason, it is advisable to keep persons out of the area between the antenna feed, the sub-reflector and the main reflector when the station is operating. The region between the antenna feed, sub-reflector and main reflector should be considered to be a controlled area, and all persons should be prevented from approaching this area when the antenna is energized. When access to this area is necessary for maintenance or repair, this ESA can be shut down and control of the VSAT system can be accomplished through a secondary hub in this multi-hub VSAT network.

During normal operation, if all persons are kept out of the area between the antenna feed, the sub-reflector and the main antenna reflecting surface, the operation of the earth station as proposed herein is predicted to safely satisfy the requirements for an Uncontrolled Environment. Further, the Applicant recognizes that it is good operating practice to not activate the transmitting portion of the station's facilities before the antenna has been properly aimed skyward toward the correct satellite, and the path toward that satellite is known to be clear.

Remote-1 Terminal - 100 Units Operating in the Continental United States
50 Units for Presently Licensed Antenna
50 Units for Proposed Antenna-2

Remote-1 (Antenna-2) Technical Operation

Presently, the E060349 Fixed Satellite Service license allows for use of 20 remote terminal units which employ ND Satcom MAS-1500 1.5 meter antennas mounted on top of the American Broadcasting Companies, Inc. Satellite News Gathering trucks. The Applicant proposes herein to increase the number of remote terminal units associated with the ND Satcom antenna to a maximum of 50 units. Further, the Applicant proposes herein to add an additional antenna (Antenna-2) and an additional 50 remote units to the Remote-1 Site ID. This additional antenna will be a Sat-Lite 1.2 meter antenna and its technical operation is described below. No change in the ND Satcom antenna technical operation is proposed herein, other than the number of licensed remote units.

For the new Sat-Lite 1.2 meter antenna (Antenna-2), the planned input power to the system flange is 144.5 Watts RMS, which is the antenna input power required to produce the system carriers maximum EIRP of 63.9 dBW and 57.3 dBW as specified in the VSAT system design. Exhibit 5 lists the VSAT operating parameters, the Elevation Limit and Azimuth Limit calculations, and the Input Density calculations relevant to the proposed Remote-1 (Antenna-2) operation.

The maximum EIRP from all carriers is 64.8 dBW, and the maximum EIRP density in a 4 kHz band is 30.4 dBW with any proposed combinations of emissions. The gain of the Sat-Lite antenna is 43.2 dBi at 14.0 GHz. The Maximum Density EIRP is 30.4 dBW/4 kHz Band in the main beam of the antenna. The maximum Input Density for the Remote-1 Terminal (Antenna-2) as proposed is -12.82 dBW/4 kHz Band, which meets the requirements of Section 25.134 of the Commission's Rules for routine processing of VSAT applications.

By limiting Remote-1 Terminals to transmit only to spacecraft between 69 and 125 degrees west, no geographic restriction to operation is needed for operation near major population centers in the Continental United States. Elevation and Azimuth angle calculation results are shown on Exhibit 5 for typical east coast and west coast locations. Those calculations show an elevation angle of 20 degrees or greater for all combinations of geographic location opposite that of the geostationary arc location. At this elevation angle, the maximum EIRP Density toward the horizon is -13.35 dBW/4 kHz Band for a spacecraft at the eastern limit of the arc and an earth station location in the extreme western United States. The calculations in Exhibit 5 also show the EIRP density for a typical Space Segment Provider, which is -14.23 dBW/4 kHz Band or lower.

Remote-1 (Antenna-2) Power Density Calculations

The RFR calculations performed herein were made according to the methods which are described in FCC OET Bulletin 65 (Pages 19 through 29), Edition 97-01, which is dated August 1997. Section 1.1310 of the Commission's Rules was used to obtain the limits of maximum power density for both Controlled and Uncontrolled Environments. Pursuant to Section 1.1310 of the Rules, a maximum power density of 1.0 mW/cm^2 is permitted in Uncontrolled Environments in the band 14000 through 14500 MHz.

The results of RFR calculations pertinent to Antenna-2 are attached as Exhibit 6. As shown in Exhibit 6, the predicted power density in the main beam of the truck-mounted antennas exceeds the FCC limits for Uncontrolled Environments in almost every instance. The maximum power density at the surface of the antenna is 51.12 mW/cm^2, well above the limit of 1.0 mW/cm^2 is found in Section 1.1310 of the Commission's Rules for Uncontrolled Areas.

However, because the Remote-1 (Antenna-2) terminals will be limited to transmit only to satellites between 69 and 125 degrees west in the geostationary arc, elevation angles less than 20 degrees will not be used. Because elevation angles of less than 20 degrees are not needed, areas at ground level to two meters above the ground are expected to meet the exposure requirements if a one meter safe distance is observed from any portion of the antenna.

In light of the above, the Applicant commits to procedures whereby the antenna will not be energized while the antenna is aimed toward buildings or other areas where persons could be present, as an exceptionally high level of radio frequency energy is present in the direction of the main beam. These high levels of power density can exceed the limits for Uncontrolled Environments for a substantial distance.

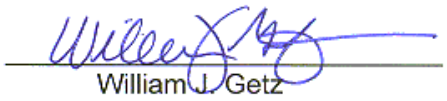
Furhter, in no case shall the station be operated before the antenna has been properly aimed skyward toward the correct satellite, and the path toward that satellite is known to be clear. In all cases, the roof of the truck where the antenna is mounted should be treated as a restricted area when the station is in operation. Although there are areas on the truck's roof where the predicted power density is within applicable limits, the Applicant nonetheless commits to prohibit access to the roof of the truck during operation of the station.

Conclusion

The operation of each HUB and Remote Terminal as described herein meets the Commission's requirements for safety of workers and the general public from excessive exposure to radiofrequency energy when operated within the guidelines outlined above. The proposed facilities also meet the Commission's requirements for Satellite Earth Stations and the Commission's VSAT Rules regarding routine processing and operation, and a grant of this application would be in the public interest.

This Engineering Statement, various entries in FCC Form 312 Main Form and Schedule B, and the calculations to predict expected power density per OET Bulletin 65 were prepared by me or under my supervision and are believed to be true and correct.

DATED: December 9, 2011



William J. Getz

Consulting Engineers
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Exhibit 1

Proposed HUB-6, Philadelphia, PA
VSAT Network Operating Parameters
Call Sign E060349

VSAT System Design Parameters

Maximum EIRP, All Carriers, All HUBs & Remote-1	64.8	dBW
Carrier 1: Program Video, Audio, Voice, Data		
Maximum EIRP	63.9	dBw
Maximum Bandwidth for Emission 9M00G7W	9000	kHz
Maximum EIRP Density per 4 kHz Segment	30.38	dBw/4kHz
Carrier 2: Video, Audio, Voice, Data and Other		
Maximum EIRP	57.3	dBw
Maximum Bandwidth for Emission 6M98G7W	6980	kHz
Maximum EIRP Density per 4 kHz Segment	24.88	dBw/4kHz

Input Density Values

Antenna Diameter	3.7	meters
Antenna Gain at Mid-Band	52.8	dBi
Carrier 1 Input Density	-22.42	dBw
Carrier 2 Imput Density	-27.92	dBw
Maximum Input Density (All Carriers)	**-22.42**	**dBw**

Azimuth and Elevation Sample Calculations

Earth Satellite Antenna Location: 4100 City Avenue, Philadelphia, PA
Coordinates (NAD-83): 40-00-20.6 N.L. and 75-12-51.8 W.L.

Location	Description	Azimuth	Elevation
060° West	Eastern Limit	157.1	41.1
140° West	Western Limit	253.2	10.5

Section 25.209 Off-Axis Maximum Antenna Gain to Eastern Limit	-8.35	dBi
Section 25.209 Off-Axis Maximum Antenna Gain to Western Limit	6.47	dBi
Carrier 1 Maximum EIRP to Eastern Limit	2.75	dBw
Carrier 1 Maximum EIRP Density to Eastern Limit per 4 kHz segment	-30.77	dBw/4kHz
Carrier 2 Maximum EIRP to Eastern Limit	-3.85	dBw
Carrier 2 Maximum EIRP Density to Eastern Limit per 4 kHz segment	-36.26	dBw/4kHz
Carrier 1 Maximum EIRP to Western Limit	17.57	dBw
Carrier 1 Maximum EIRP Density to Western Limit per 4 kHz segment	-15.95	dBw/4kHz
Carrier 2 Maximum EIRP to Western Limit	10.97	dBw
Carrier 2 Maximum EIRP Density to Western Limit per 4 kHz segment	-21.45	dBw/4kHz
Maximum EIRP toward the Horizon	17.57	dBw
Maximum EIRP Density toward the Horizon	**-15.95**	**dBw/4kHz**

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Proposed HUB-6, Philadelphia, PA
VSAT Network RFR Power Density Calculations
Call Sign E060349

Pursuant to Section 1.1310 of the FCC Rules the FCC Guidline values for frequencies used by the satellite Ku uplink system are as follows:

Uncontrolled RFR Environment Guideline Value	1.0	mW/cm²
Controlled RFR Environment Guideline Value	5.0	mW/cm²

VSAT System Operating Constants

Antenna Actual Diameter	3.7	meters
Antenna Isotropic Gain	52.8	dBi
Nominal Frequency	14250	MHz
Maximum EIRP (All Carriers)	64.8	dBw
Lowest Antenna Elevation Angle	10.5	deg

System Calculations

Antenna On-Axis Isotropic Power Gain	190546.1	
Antenna 1 Degree Off-Axis Isotropic Power Gain	1584.9	
Antenna Off-Axis Isotropic Power Gain at Lowest Elev. Angle	4.436	
Aperature Efficiency (η)	0.624	
Maximum Input Power (All Carriers)	15.85	watts
Antenna Surface Area	10.7521	sq. meters
Nominal Wavelength	0.02104	meters
Near Field Limit (R_{nf})	162.7	meters
Far Field Limit (R_{ff})	390.4	meters

note: The Transition Region extends from R_{nf} to R_{ff}

RFR Power Density Calculations

Power Density at the Surface of the Antenna	0.5896	mW/cm²
OET Bulletin 65, Edition 97-01, Equation 11		
Percent Uncontrolled Limit	58.96%	
Percent Controlled Limit	11.79%	
Maximum Power Density On-Axis Near Field Region	0.3680	mW/cm²
OET Bulletin 65, Edition 97-01, Equation 13		
Percent Uncontrolled Limit	36.80%	
Percent Controlled Limit	7.36%	

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Maximum Power Density On-Axis in The Transition Region 0.3680 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 17

Percent Uncontrolled Limit	36.80%
Percent Controlled Limit	7.36%

Maximum Power Density On-Axis in The Far-Field Region (S_{ff}) 0.1576 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 18

Percent Uncontrolled Limit	15.76%
Percent Controlled Limit	3.15%

Maximum Power Density 1° Off-Axis in The Far-Field Region 0.0013 mW/cm²

Off-Axis Power Gain/On-Axis Power Gain = 0.008317638

Off-Axis Power Density in Far Field and Beyond = Ratio x S_{ff}

Percent Uncontrolled Limit	0.13%
Percent Controlled Limit	0.03%

Evaluation of Safe Occupancy Area in Front of Antenna at Lowest Elevation Angle

Power Density One Meter from Antenna 1.4324 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 7

Percent Uncontrolled Limit	143.24%
Percent Controlled Limit	28.65%

Power Density Two Meters from Antenna 0.3581 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 7

Percent Uncontrolled Limit	35.81%
Percent Controlled Limit	7.16%

Power Density Three Meters from Antenna 0.1592 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 7

Percent Uncontrolled Limit	15.92%
Percent Controlled Limit	3.18%

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Exhibit 3

Proposed HUB-7, Durham, NC
VSAT Network Operating Parameters
Call Sign E060349

VSAT System Design Parameters

Maximum EIRP, All Carriers, All HUBs & Remote-1	64.8	dBW
Carrier 1: Program Video, Audio, Voice, Data		
Maximum EIRP	63.9	dBw
Maximum Bandwidth for Emission 9M00G7W	9000	kHz
Maximum EIRP Density per 4 kHz Segment	30.38	dBw/4kHz
Carrier 2: Video, Audio, Voice, Data and Other		
Maximum EIRP	57.3	dBw
Maximum Bandwidth for Emission 6M98G7W	6980	kHz
Maximum EIRP Density per 4 kHz Segment	24.88	dBw/4kHz

Input Density Values

Antenna Diameter	3.7	meters
Antenna Gain at Mid-Band	52.8	dBi
Carrier 1 Input Density	-22.42	dBw/4kHz
Carrier 2 Input Density	-27.92	dBw/4kHz
Maximum Input Density (All Carriers)	**-22.42**	dBw/4kHz

Azimuth and Elevation Sample Calculations

Earth Satellite Antenna Location: 411 Liberty Street, Durham, NC
Coordinates (NAD-83): 39-59-37.0 N.L. and 78-53-42.0 W.L.

Location	Description	Azimuth	Elevation
060° West	Eastern Limit	149.8	43.7
140° West	Western Limit	252.0	14.6

Section 25.209 Off-Axis Maximum Antenna Gain to Eastern Limit	-9.01	dBi
Section 25.209 Off-Axis Maximum Antenna Gain to Western Limit	2.89	dBi
Carrier 1 Maximum EIRP to Eastern Limit	2.09	dBw
Carrier 1 Maximum EIRP Density to Eastern Limit per 4 kHz segment	-31.43	dBw/4kHz
Carrier 2 Maximum EIRP to Eastern Limit	-4.51	dBw
Carrier 2 Maximum EIRP Density to Eastern Limit per 4 kHz segment	-36.93	dBw/4kHz
Carrier 1 Maximum EIRP to Western Limit	13.99	dBw
Carrier 1 Maximum EIRP Density to Western Limit per 4 kHz segment	-19.53	dBw/4kHz
Carrier 2 Maximum EIRP to Western Limit	7.39	dBw
Carrier 2 Maximum EIRP Density to Western Limit per 4 kHz segment	-25.03	dBw/4kHz
Maximum EIRP toward the Horizon	13.99	dBw
Maximum EIRP Density toward the Horizon	**-19.53**	**dBw/4kHz**

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Proposed HUB-7, Durham, NC
VSAT Network RFR Power Density Calculations
Call Sign E060349

Pursuant to Section 1.1310 of the FCC Rules the FCC Guidline values for frequencies used by the satellite Ku uplink system are as follows:

Uncontrolled RFR Environment Guideline Value	1.0	mW/cm²
Controlled RFR Environment Guideline Value	5.0	mW/cm²

VSAT System Operating Constants

Antenna Actual Diameter	3.7	meters
Antenna Isotropic Gain	52.8	dBi
Nominal Frequency	14250	MHz
Maximum EIRP (All Carriers)	64.8	dBw
Lowest Antenna Elevation Angle	14.6	deg

System Calculations

Antenna On-Axis Isotropic Power Gain	190546.1	
Antenna 1 Degree Off-Axis Isotropic Power Gain	1584.9	
Antenna Off-Axis Isotropic Power Gain at Lowest Elev. Angle	1.946	
Aperature Efficiency (η)	0.624	
Maximum Input Power (All Carriers)	15.85	watts
Antenna Surface Area	10.7521	sq. meters
Nominal Wavelength	0.02104	meters
Near Field Limit (R_{nf})	162.7	meters
Far Field Limit (R_{ff})	390.4	meters

note: The Transition Region extends from R_{nf} to R_{ff}

RFR Power Density Calculations

Power Density at the Surface of the Antenna	0.5896	mW/cm²
OET Bulletin 65, Edition 97-01, Equation 11		
Percent Uncontrolled Limit	58.96%	
Percent Controlled Limit	11.79%	
Maximum Power Density On-Axis Near Field Region	0.3680	mW/cm²
OET Bulletin 65, Edition 97-01, Equation 13		
Percent Uncontrolled Limit	36.80%	
Percent Controlled Limit	7.36%	

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Maximum Power Density On-Axis in The Transition Region 0.3680 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 17

Percent Uncontrolled Limit	36.80%
Percent Controlled Limit	7.36%

Maximum Power Density On-Axis in The Far-Field Region (S_{ff}) 0.1576 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 18

Percent Uncontrolled Limit	15.76%
Percent Controlled Limit	3.15%

Maximum Power Density 1° Off-Axis in The Far-Field Region 0.0013 mW/cm²

Off-Axis Power Gain/On-Axis Power Gain = 0.008317638

Off-Axis Power Density in Far Field and Beyond = Ratio x S_{ff}

Percent Uncontrolled Limit	0.13%
Percent Controlled Limit	0.03%

Evaluation of Safe Occupancy Area in Front of Antenna at Lowest Elevation Angle

Power Density One Meter from Antenna 0.6283 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 7

Percent Uncontrolled Limit	62.83%
Percent Controlled Limit	12.57%

Power Density Two Meters from Antenna 0.1571 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 7

Percent Uncontrolled Limit	15.71%
Percent Controlled Limit	3.14%

Power Density Three Meters from Antenna 0.0698 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 7

Percent Uncontrolled Limit	6.98%
Percent Controlled Limit	1.40%

Proposed Remote-1, Antenna-2
VSAT Network Operating Parameters
Call Sign E060349

VSAT System Design Parameters

Maximum EIRP, All Carriers, All HUBs & Remote-1	64.8 dBW
Carrier 1: Program Video, Audio, Voice, Data	
Maximum EIRP	63.9 dBw
Maximum Bandwidth for Emission 9M00G7W	9000 kHz
Maximum EIRP Density per 4 kHz Segment	30.38 dBw/4kHz
Carrier 2: Video, Audio, Voice, Data and Other	
Maximum EIRP	57.3 dBw
Maximum Bandwidth for Emission 6M98G7W	6980 kHz
Maximum EIRP Density per 4 kHz Segment	24.88 dBw/4kHz

Input Density Values

Antenna Diameter	1.2 meters
Antenna Gain at Mid-Band	43.2 dBi
Carrier 1 Input Density	-12.82 dBw/4kHz
Carrier 2 Input Density	-18.32 dBw/4kHz
Maximum Input Density (All Carriers)	**-12.82** dBw/4kHz

Azimuth and Elevation Sample Calculations

Vehicle-Mount Mobile Satellite Antenna

				Sec. 25.209	Carrier 1		Carrier 2	
From New York (Eastern) Coordinates: 40-46-24 N.L. & 73-58-49 W.L. (NAD-83)				Off-Axis	Maximum EIRP		Maximum EIRP	
Location	Description	Azimuth	Elevation	Gain	dBw	dBw/4kHz	dBw	dBw/4kHz
060° West	Full Arc Eastern Limit	159.1	40.9	-8.29	12.41	-21.11	5.81	-26.61
069° West	Limited Arc Eastern Limit	172.4	42.8	-8.79	11.91	-21.61	5.31	-27.10
125° West	Limited Arc Western Limit	242.2	20.4	-0.74	19.96	-13.56	13.36	-19.06
140° West	Full Arc Western Limit	253.9	9.4	7.67	28.37	-5.15	21.77	-10.65

From San Francisco (Western) Coordinates: 37-48-00 N.L. & 122-23-58 W.L. (NAD-83)

Location	Description	Azimuth	Elevation	Gain	dBw	dBw/4kHz	dBw	dBw/4kHz
060° West	Full Arc Eastern Limit	107.7	13.1	4.07	24.77	-8.75	18.17	-14.25
069° West	Limited Arc Eastern Limit	114.4	20.0	-0.53	20.17	-13.35	13.57	-18.84
125° West	Limited Arc Western Limit	184.3	46.3	-9.64	11.06	-22.46	4.46	-27.96
140° West	Full Arc Western Limit	207.5	42.7	-8.76	11.94	-21.58	5.34	-27.08

Typical Space Segment Provider

Location	Description	Azimuth	Elevation	Gain	dBw	dBw/4kHz	dBw	dBw/4kHz
091° West	Eastern Limit (Galaxy17); From San Francisco	135.1	35.3	-6.69	14.01	-19.52	7.41	-25.01
123° West	Western Limit (Galaxy18); From New York	240.4	21.7	-1.41	19.29	-14.23	12.69	-19.73

Limited Arc
Maximum EIRP Density toward the Horizon **-13.35 dBw/4kHz**

Typical Space Segment
Maximum EIRP Density toward the Horizon **-14.23 dBw/4kHz**

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Proposed Remote-1, Antenna-2
VSAT Network RFR Power Density Calculations
Call Sign E060349

Pursuant to Section 1.1310 of the FCC Rules the FCC Guidline values for frequencies used by the satellite Ku uplink system are as follows:

Uncontrolled RFR Environment Guideline Value	1.0	mW/cm²
Controlled RFR Environment Guideline Value	5.0	mW/cm²

VSAT System Operating Constants

Antenna Actual Diameter	1.2	meters
Antenna Isotropic Gain	43.2	dBi
Nominal Frequency	14250	MHz
Maximum EIRP (All Carriers)	64.8	dBw
Lowest Antenna Elevation Angle	20.4	deg

System Calculations

Antenna On-Axis Isotropic Power Gain	20893.0	
Antenna 1 Degree Off-Axis Isotropic Power Gain	1584.9	
Antenna Off-Axis Isotropic Power Gain at Lowest Elev. Angle	0.843	
Aperature Efficiency (η)	0.651	
Maximum Input Power (All Carriers)	144.54	watts
Antenna Surface Area	1.1310	sq. meters
Nominal Wavelength	0.02104	meters
Near Field Limit (R_{nf})	17.1	meters
Far Field Limit (R_{ff})	41.1	meters

note: The Transition Region extends from R_{nf} to R_{ff}

RFR Power Density Calculations

Power Density at the Surface of the Antenna 51.1220 mW/cm²
OET Bulletin 65, Edition 97-01, Equation 11

Percent Uncontrolled Limit	5112.20%
Percent Controlled Limit	1022.44%

Maximum Power Density On-Axis Near Field Region 33.2627 mW/cm²
OET Bulletin 65, Edition 97-01, Equation 13

Percent Uncontrolled Limit	3326.27%
Percent Controlled Limit	665.25%

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Maximum Power Density On-Axis in The Transition Region 33.2627 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 17

Percent Uncontrolled Limit	3326.27%
Percent Controlled Limit	665.25%

Maximum Power Density On-Axis in The Far-Field Region (S_{ff}) 14.2487 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 18

Percent Uncontrolled Limit	1424.87%
Percent Controlled Limit	284.97%

Maximum Power Density 1° Off-Axis in The Far-Field Region 1.0809 mW/cm²

Off-Axis Power Gain/On-Axis Power Gain = 0.075857758

Off-Axis Power Density in Far Field and Beyond = Ratio x S_{ff}

Percent Uncontrolled Limit	108.09%
Percent Controlled Limit	21.62%

Evaluation of Safe Occupancy Area in Front of Antenna at Lowest Elevation Angle

Power Density One Meter from Antenna 2.4829 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 7

Percent Uncontrolled Limit	248.29%
Percent Controlled Limit	49.66%

Power Density Two Meters from Antenna 0.6207 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 7

Percent Uncontrolled Limit	62.07%
Percent Controlled Limit	12.41%

Power Density Three Meters from Antenna 0.2759 mW/cm²

OET Bulletin 65, Edition 97-01, Equation 7

Percent Uncontrolled Limit	27.59%
Percent Controlled Limit	5.52%