

Administrative Information

Summary

File Number:

Date Filed:

Call Sign:

Not Assigned

Status:

Draft Filing

Status Date:

Last Action:

Action Date:

AFPN Date:

ATPN Date:

Begin Date:

Expiration Date:

Description

SatLite 1.4 Ku-Band Transportable Fixed Satellite Service

Applicant/Licensee

FRN:	0001563931	Attn. Phone: NNN–NNN–NNNN xNNN	406–542–4420 x
Contact Name:		Attn. Fax: NNN–NNN–NNNN xNNN	406–543–7111
Company:	KPAX Communications, Inc.	Attn. E-mail:	
Street 1:	1049 W Central Ave.	Attention:	Robert Hermes
Street 2:	PO Box 4827		
City, State, Zip:	Missoula, MT 59801– USA		
Corp. Phone:			
Corp. Fax:			
Corp. E-mail:			

Contact

FRN: 0001563931
Contact Name: Robert Hermes
Company:
Street 1: 1049 W Central Ave.
Street 2: PO Box 4827
City, State, Zip: Missoula, MT 59801– USA
Corp. Phone:
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NNN–NNN–NNNN xNNN
Contact Attn. Fax: 406–543–7111
NNN–NNN–NNNN xNNN
Contact Attn. E-mail:

Qualification Information

No.	Question	Answer
1.	Are you applying for a NEW earth station license or registration (i.e., one that has not been previously licensed or registered?)	Yes
2.	Will your proposed earth station be a fixed earth station or temporary-fixed earth station (not part of a VSAT network) that will operate only in the Fixed Satellite Service?	TFE
3.	Which band will your proposed earth station be operating in?	KUBAND
5.	Will you operate your proposed earth station ONLY with U.S.-licensed or Permitted List geostationary satellites (within the parameters specified on the Permitted List)?	Yes
6.	Does your proposed earth station and its operation conform to all technical, procedural, and operational requirements of the FCC Rules and Regulations (47 CFR) and therefore requires NO waivers or exemptions from any of the Commission's Rules?	Yes
7.	Does your proposed antenna(s) comply with the antenna gain standard specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurements?	Yes
8.	Does your proposed earth station operation conform with all routine power and power density rules contained in Sections 25.211 and 25.212?	Yes
9.	Can you certify that FAA notification is not required under 47 CFR Part 17 and 47 CFR Section 25.113(c)?	Yes
11.	Do you certify that Commission grant of any proposal in this application will NOT have a significant environmental impact as defined by 47 CFR Section 1.1307?	Yes
12.	Are you asking for a:	TO
13.	Has a Radiation Hazard Study (refer to OET bulletin 65) been completed and will this Radiation Hazard Study be attached as an exhibit to this application?	Yes
14.	Do you certify that you are not a foreign government or a representative of a foreign government?	Yes
15.	Do you certify that you are not an alien, or the representative of an alien?	Yes
16.	Do you certify that you are not a corporation organized under the laws of any foreign government?	Yes
17.	Do you certify that you are not 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?	Yes
18.	Do you certify that you are not 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?	Yes
19.	Do you certify that the applicant or any party to this application has NOT 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?	Yes

20. Do you certify that neither you nor any party to this application, nor any party directly or indirectly controlling your company, has EVER been convicted of a felony by any state or federal court? Yes
21. Do you certify that NO court has 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? Yes
22. Do you certify that neither you nor any person directly or indirectly controlling the applicant, is currently a party in any pending matter referred to in the preceding two items? Yes
23. Does the undersigned certify that neither the 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 Section 1.2002(b) for the meaning 'party to the application' for these purposes. Yes

Station Information

Call Sign	Not Assigned
Nature of Service	Fixed Satellite Service
Status	Non-Common Carrier
Satellite Orbit Type	GSO
Class of Earth Station	Temporary Fixed Earth Station
Filing Classification	Application for License of New Station
Satellite Name	PERMITTED LIST
Frequency Band(s)	KU Band
Type of Earth Station Facility	Transmit Only
PN Description	

Temporary fixed satellite services for various locations throughout the United States and it's territories.

Site Information

Site ID: 1.4

Contact Name: Doug Sebastian

Contact Phone:
NNN-NNN-NNNN xNNN

406-542-4420

Area of Operation: Various

Street 1:

State: N/A

Street 2:

City:

County:

Zip Code:

Latitude: Deg. Min. Sec. Hem. NAD Indicator:
Latitude Degree

Longitude:

N/A

Elevation (meters):

Antenna Information

Site ID	Antenna ID	ASR No	
1.4	1.4M		
Quantity	Manufacturer	Model	Antenna Size (m)
1	Sat-Lite	1411	1.4
Max Antenna Hgt AGL (m)	Max Antenna Hgt AMSL (m)	Structure Hgt AGL (m)	Max Antenna Hgt Above Roof (m)
Total Input Pwr at Antenna Flange (W)	Total EIRP – All Carriers (dBW)		
350.0	70.44		
T/R Mode	Antenna Gain	dBi at GHZ	
T	45.0	14.250	

Frequency Information

Select	Antenna ID	T/R Mode	
<input type="checkbox"/>	1.4M	T	
	Freq Lower (MHz/GHz)	Freq Upper (MHz/GHz)	Freq Unit
	14000	14500	MHz
	Emission Designator	Describe Modulation & Services	
	36M0G7W	Digital traffic, various data, modulation, FEC	
	Antenna Polarization	Max EIRP per Carrier (dBW)	Max EIRP Density per Carrier (dBW/4kHz)
	(H/V)Horizontal and Vertical	70.44	30.9
Select	Antenna ID	T/R Mode	
<input type="checkbox"/>	1.4M	T	
	Freq Lower (MHz/GHz)	Freq Upper (MHz/GHz)	Freq Unit
	14000	14500	MHz
	Emission Designator	Describe Modulation & Services	
	51K2G7W	Digital traffic, various data, modulation, FEC	
	Antenna Polarization	Max EIRP per Carrier (dBW)	Max EIRP Density per Carrier (dBW/4kHz)
	(H/V)Horizontal and Vertical	41.97	30.9

Frequency Coordination Information

Select	Antenna ID	Trans/Rec Mode	Lower Freq Limit (MHz)	Upper Freq Limit (MHz)
<input type="checkbox"/>	1.4M	Transmit		
	Satellite Arc East Limit (Deg)		Satellite Arc West Limit (Deg)	
			N/A	
	Ant Elev Angle E (Deg)	Azimuth Angle E (Deg)	Ant Elev Angle W (Deg)	Azimuth Angle W (Deg)
	Max EIRP Density to Horizon (dBW/4KHz)			

Points of Communication Information

Select	Site Id	Point of Communication
<input type="checkbox"/>	1.4	PERMITTED LIST

Certification Information

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.

Type of Applicant

Corporation

Applicant Other Text

If other, describe the type of applicant.

Signer Name

Robert Hermes

Signer Title

General Manager

Signature

Date Signed (XX/XX/XXXX)

06/17/2014

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Attachment Information

Select	Attachment Type	File Name	Date Uploaded
<input type="checkbox"/>	Radiation Hazard Study	RadHazKPAX.pdf	06/17/2014

Analysis of Non-Ionizing Radiation for a 1.4-Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 1.4-meter earth station system. The analysis and calculations performed in this report comply with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/Uncontrolled environment are shown in Table 1. The General Population/Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm ²)
30-300	0.2
300-1500	Frequency (MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm ²)
30-300	1.0
300-1500	Frequency (MHz)*(4.0/1200)
1500-100,000	5.0

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Symbol	Formula	Value	Units
Antenna Diameter	D	Input	1.4	m
Antenna Surface Area	A _{surface}	$\pi D^2 / 4$	1.54	m ²
Feed Flange Diameter	D _{fa}	Input	9.1	cm
Area of Feed Flange	A _{fa}	$\pi D_{fa}^2 / 4$	65.04	cm ²
Frequency	F	Input	14500	MHz
Wavelength	λ	300 / F	0.020690	m
Transmit Power	P	Input	350.00	W
Antenna Gain (dBi)	G _{es}	Input	45.0	dBi
Antenna Gain (factor)	G	10 ^{G_{es}/10}	31622.8	n/a
Pi	π	Constant	3.1415927	n/a
Antenna Efficiency	η	$G\lambda^2 / (\pi^2 D^2)$	0.70	n/a

1. Far Field Distance Calculation

The distance to the beginning of the far field can be determined from the following equation:

$$\begin{aligned} \text{Distance to the Far Field Region} \quad R_{ff} &= 0.60 D^2 / \lambda \\ &= 56.8 \text{ m} \end{aligned} \quad (1)$$

The maximum main beam power density in the far field can be determined from the following equation:

$$\begin{aligned} \text{On-Axis Power Density in the Far Field} \quad S_{ff} &= G P / (4 \pi R_{ff}^2) \\ &= 272.615 \text{ W/m}^2 \\ &= 27.262 \text{ mW/cm}^2 \end{aligned} \quad (2)$$

2. Near Field Calculation

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region, the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:

$$\begin{aligned} \text{Extent of the Near Field} \quad R_{nf} &= D^2 / (4 \lambda) \\ &= 23.7 \text{ m} \end{aligned} \quad (3)$$

The maximum power density in the Near Field can be determined from the following equation:

$$\begin{aligned} \text{Near Field Power Density} \quad S_{nf} &= 16.0 \eta P / (\pi D^2) \\ &= 636.404 \text{ W/m}^2 \\ &= 63.640 \text{ mW/cm}^2 \end{aligned} \quad (4)$$

3. Transition Region Calculation

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance R_t can be determined from the following equation:

$$\begin{aligned} \text{Transition Region Power Density} \quad S_t &= S_{nf} R_{nf} / R_t \\ &= 63.640 \text{ mW/cm}^2 \end{aligned} \quad (5)$$

4. Region between the Feed Assembly and the Antenna Reflector

Transmissions from the feed assembly are directed toward the antenna reflector surface, and are confined within a conical shape defined by the type of feed assembly. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the feed assembly and reflector surface can be calculated by determining the power density at the feed assembly surface. This can be determined from the following equation:

$$\begin{aligned} \text{Power Density at the Feed Flange} \quad S_{fa} &= 4000 P / A_{fa} & (6) \\ &= 21525.605 \text{ mW/cm}^2 \end{aligned}$$

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the feed assembly. The area is now the area of the reflector aperture and can be determined from the following equation:

$$\begin{aligned} \text{Power Density at the Reflector Surface} \quad S_{\text{surface}} &= 4 P / A_{\text{surface}} & (7) \\ &= 909.457 \text{ W/m}^2 \\ &= 90.946 \text{ mW/cm}^2 \end{aligned}$$

6. Region between the Reflector and the Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and the ground can be determined from the following equation:

$$\begin{aligned} \text{Power Density between Reflector and Ground} \quad S_g &= P / A_{\text{surface}} & (8) \\ &= 227.364 \text{ W/m}^2 \\ &= 22.736 \text{ mW/cm}^2 \end{aligned}$$

7. Summary of Calculations

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mW/cm ²)		Hazard Assessment
	Symbol	Value	
1. Far Field ($R_{ff} = 56.8$ m)	S_{ff}	27.262	Potential Hazard
2. Near Field ($R_{nf} = 23.7$ m)	S_{nf}	63.640	Potential Hazard
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	63.640	Potential Hazard
4. Between Feed Assembly and Antenna Reflector	S_{fa}	21525.605	Potential Hazard
5. Main Reflector	$S_{surface}$	90.946	Potential Hazard
6. Between Reflector and Ground	S_g	22.736	Potential Hazard

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mW/cm ²)		Hazard Assessment
	Symbol	Value	
1. Far Field ($R_{ff} = 56.8$ m)	S_{ff}	27.262	Potential Hazard
2. Near Field ($R_{nf} = 23.7$ m)	S_{nf}	63.640	Potential Hazard
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	63.640	Potential Hazard
4. Between Feed Assembly and Antenna Reflector	S_{fa}	21525.605	Potential Hazard
5. Main Reflector	$S_{surface}$	90.946	Potential Hazard
6. Between Reflector and Ground	S_g	22.736	Potential Hazard

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

8. Conclusions

Based on this analysis it is concluded that the FCC RF Guidelines have been exceeded in the specific regions of Tables 4 and 5. The applicant proposes to comply with the Maximum Permissible Exposure (MPE) limits of 1 mW/cm² for the Uncontrolled areas and the MPE limits of 5 mW/cm² for the Controlled areas by one or more of the following methods:

Means of Compliance Uncontrolled Areas

The antenna will be located on top of a truck. The bottom lip of the dish will be 2.7 meters above ground level. The general public will not have access to areas within $\frac{1}{2}$ diameter from the edge of the antenna.

Since one diameter removed from the main beam of the antenna or $\frac{1}{2}$ diameter removed from the edge of the antenna the RF levels are reduced by a factor of 100 or 20 dB. None of the areas exceeding the MPE levels will be accessible by the general public.

Radiation hazard signs will be posted while this earth station is in operation.

The applicant will ensure that no buildings or other obstacles will be in the areas that exceed the MPE levels.

Means of Compliance Controlled Areas

The earth station's operational personnel will not have access to the areas that exceed the MPE levels while the earth station is in operation.

The transmitters will be turned off during antenna maintenance.