



beyond frontiers

February 27, 2017

By Electronic Filing

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: SES Americom, Inc., Application for Temporary Fixed Ku-Band Earth Station Operating Authority, File Nos. SES-LIC-20170213-00151, SES-STA-20170213-00159

Dear Ms. Dortch,

SES Americom, Inc., pursuant to Section 1.65 of the Commission's rules, 47 C.F.R. § 1.65, hereby updates the record with respect to the above-captioned requests for earth station operating authority to provide a radiation hazard report.

Please address any questions regarding this matter to the undersigned.

Yours Sincerely,

/s/ Petra A. Vorwig

Petra A. Vorwig
Senior Legal & Regulatory Counsel
SES Americom, Inc.

Radiation Hazard Analysis

1 Meter Various, Various

Introduction

A radiation hazard analysis is presented for a 1 meter ku band aperture antenna to be installed in VariousVarious at the SESVarious. This Radiation Analysis calculates the non-ionizing radiation levels expected to be emitted from the earth station on a worse cases basis and is performed in accordance with the Federal Communications Commissions Office of Engineering and Technology (OET) Bulletin, No. 65.

Requirements

OET 65 outlines the maximum permissible exposure limits in two cases for operation in this frequency range.

1. The first case is the maximum level that a person may be exposed to in the general population. The exposure limit is defined as a non-ionizing power level equal to 1 milliwatt per centimeter squared averaged over a thirty minute period.
2. The second case is a controlled environment where the maximum permissible exposure limit must not exceed 5 milliwatts per centimeter squared averaged over any six minute period.

Summary

The results indicate that no significant hazard will be presented to the general population and will be fully mitigated in the controlled area by the use of procedures that require the removal of transmit power before accessing the area around the main reflector.

Analysis

This analysis was performed on seven zones with the results shown in Radiation Hazard Zones. The Table labeled Input Values provides the - input data required to perform the analysis. The table labeled OET 65 Calculated Values provides the intermediate calculation used to perform the assessment in accordance with OET 65. The Analysis is performed for each a the each of seven radiation zones as shown in figure 1 – Analysis Zones. These zones are:

1. Point between the feed and the sub-reflector
2. The power at the surface of the antenna
3. The power level between the main reflector and ground
4. The near-field or Fresnel region in which the maxima can be reached before the field starts to diminish with distance
5. The Transition region where power begins to decrease inversely with distance from the antenna
6. The Far Field or Fraunhofer region where power decreases inversely with the square of the distance. This is the point at which the antenna beam is fully collimated
7. The off axis level in the near field. This is defined as the area outside of the main beam removed and at least one antenna diameter removed from the main beam

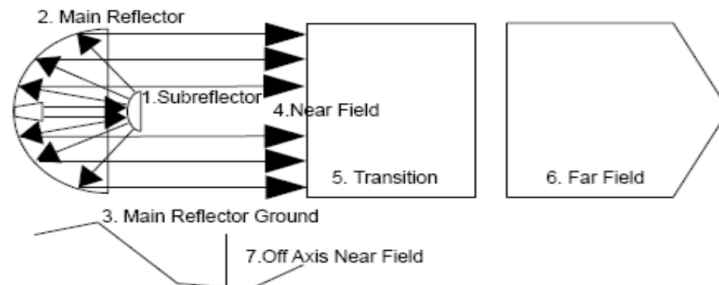


Figure 1 – Analysis Zones

Radiation Hazard Analysis

Operator: **SES**
 Location Designation: **Various**
 County: **Various**
 Town: **Various**
 State/Zip: **Various**

FCC Callsign:
 SES ID:
 STA:

Input Values	Value	Unit	
$D = \text{Aperture Diameter}$	1.00	Meters	
$d = \text{Subreflector Diameter}$	0.056	Meters	
$G = \text{Antenna Gain}$	41.5	dBi	
FCC Designation	ku	Band	
$F = \text{Frequency}$	14.000	GHz	
$P = \text{Transmitter Power Watts}$	7.5	Watts	
$R_{ua} = \text{closest point to uncontrolled area}$	50	meters	
Elevation angle at closest point R_{ua}	10	Degrees	
Height (AGL)	2.00	meters	
OET 65 Calculated Values	Formula	Value	Unit
$\lambda = \text{Wavelength}$	$\frac{c}{F}$	0.0214	meters
$G = \text{Antenna Gain}$	$10^{(G/10)}$	14125.37545	(W) linear
$\eta = \text{Aperture Efficiency}$	$\frac{G\lambda^2/4\pi}{\pi D^2/4}$	66%	percentage
$A = \text{Area of reflector}$	πR^2	0.785	meters ²
$a = \text{area of subreflector}$	πd^2	24.630	cm ²
$R_{nf} = \text{Near-Field Region}$	$\frac{D^2}{4\lambda}$	11.674	meters
		2	Meters AGL
$R_t = \text{Transition Region}$	$\begin{matrix} >R_{nf} \\ <R_{ff} \end{matrix}$	11.674	>meters
		28.019	<meters
$R_{ff} = \text{Far Field Region}$	$\frac{0.6D^2}{\lambda}$	28.019	meters
		5	Meters AGL

Band	Frequency
L	1000-2000
S	2000-4000
C	4000-8000
X	8000-12500
Ku	12500-18000
K	18000-25500
Ka	26500-40000
O	40000-50000
V	50000-75000

Radiation Analysis Zone	Formula	Level	Value	Exposure Limits	
				General Public	Occupational
				<1mW/cm2	<5mW/cm2
1	$\frac{4P}{a}$	1218.023	mW/cm2	>FCC MPE See Note 1	>FCC MPE See Note 2
2	$\frac{4P}{A}$	3.820	mW/cm2	>FCC MPE See Note 1	<FCC MPE
3	$\frac{P}{A}$	0.955	mW/cm2	<FCC MPE	<FCC MPE
4	$\frac{4\eta P}{A}$	2.507	mW/cm2	>FCC MPE See Note 1	<FCC MPE
5	$\leq S_{nf}$	2.507	mW/cm2	>FCC MPE See Note 1	<FCC MPE
6	$\frac{PG}{4\pi R_{ff}^2}$	1.074	mW/cm2	>FCC MPE See Note 3	<FCC MPE
7	$S_{nf} - 20 \text{ dB}$	0.02507	mW/cm2	<FCC MPE	<FCC MPE

Notes

1. The antenna is installed in a controlled location access is restricted to authorized personnel only. The antenna is marked with RF Radiation Hazard signage.
2. Inside the controlled area, MPE levels exceed the MPE exposure for occupational levels. The levels will be reduced to safe MPE by removing power to the transmitters when work is performed on or around the antenna. This area can only be accessed by qualified personnel.
3. The field develops 2 meters above ground level at the minimum elevation angle which is not accessible to the general public.