REQUEST FOR SPECIAL TEMPORARY AUTHORITY

By this application, SES Government Solutions, Inc. ("SES-GS") respectfully requests special temporary authority ("STA") for a period of 60 days to operate an earth station in Pago Pago, American Samoa, that will communicate with the O3b Ka-band non-geostationary orbit fixed-satellite service ("NGSO FSS") satellite fleet. As discussed below, grant of the requested authority is in the public interest as it will allow SES-GS to provide O3b capacity to the National Oceanic and Atmospheric Agency ("NOAA") to support the provision by the National Weather Service ("NWS") of data on weather and climate, including warnings for the protection of life and property. In order to accommodate the schedule for commencement of operations, SES-GS requests action on this STA by no later than April 29.

SES-GS provides reliable and secure commercial satellite services to U.S. Government, Intelligence and Civilian agencies. SES-GS has agreed to a contract with NOAA to supply capacity on O3b's NGSO fleet to expand NOAA's broadband connectivity outside the continental U.S. NOAA has a NWS office in Pago Pago, and the O3b service will allow a high-speed connection between that station and the primary Pacific NWS center in Hawaii. That link is essential to allow NOAA to update forecast models and issue safety warnings in near real-time by facilitating the exchange of data including weather maps and seismic sensor information. Faster data access will permit NOAA to analyze and respond to potential weather events more quickly.

The service will be provided using two General Dynamics 2.4 meter antennas. SES-GS is preparing an application for a permanent license to support the operation of this facility. SES-GS seeks STA pending submission of and action on its license application to allow service to commence as quickly as possible.

Grant of the requested authority is consistent with Commission precedent. SES-GS requests authority for O3b beam 4: 28.601-28.817 GHz uplink and 18.801-19.017 GHz downlink. NGSO FSS has a primary allocation throughout the beam 4 spectrum. Furthermore, the Commission has granted U.S. market access for the O3b constellation, authorizing U.S. earth stations to communicate with the O3b fleet in these

frequencies.[1] Moreover, the antenna model that SES-GS is seeking to use has already been approved by the Commission for operations with the O3b network throughout the continental U.S., Hawaii, Puerto Rico, and the U.S. Virgin Islands.[2] A full set of antenna patterns for this model is already on file as a part of the O3b Ground Terminal Application. The technical characteristics of the operations proposed under this STA request, including power levels, will be consistent with those specified in the O3b Ground Terminal Application. A radiation hazard study for this antenna is attached.

The requested STA will allow SES-GS to provide service that will support the timely distribution and analysis of critical weather data. Thus, grant of the STA will serve the public interest.

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[1] *See* O3b Limited, Call Sign S2935, File Nos. SAT-LOI-20141029-00118 & SAT-AMD-20150115-00004, granted Jan. 22, 2015 ("O3b Fleet Authorization") (authorizing operations in the 17.8-18.6 GHz, 18.8-19.3 GHz, 27.6-28.4 GHz, and 28.6-29.1 GHz bands).

O3b was granted certain waivers in connection with its request for U.S. market access, including waivers of the geographical coverage requirements for Ka-band NGSO systems in Section 25.145(c) and of the cross-polarization isolation requirements in Section 25.210(i)(1). *See id.,* Attachment to Grant at 3-4. To the extent necessary, SES-GS requests that these waivers be extended to the operations proposed in this STA request.

[2] *See* O3b Limited, Call Sign E140101, File No. SES-LIC-20141001-00781 ("O3b Ground Terminal Application"), granted June 8, 2015.

SES Government Solutions

RADIATION HAZARD STUDY

In this report SES Government Solutions, Inc. ("SES-GS") analyzes the maximum radiofrequency (RF) levels emitted from the satellite communications antenna described below. The reference document for this study is OET Bulletin No. 65, Edition 97-01, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*, August 1997.

1. The following data is used throughout the analysis:

Parameters	Symbol	Value	Units	Notes/Formulas
Transmit Power	P	35.90	W	
Frequency	F	28388	MHz	
Wavelength	λ	0.011	m	299.792458 / F
Antenna Diameter	Dref	2.4	m	
Antenna Surface Area	Aref	4.524	m^2	π $Dref^2$ / 4
Subreflector Diameter	Dsub	N/A	m	Offset feed antenna
Subreflector Surface Area	Asub	N/A	m^2	π $Dsub^2$ / 4
Feed Flange Diameter	Dflange	0.0445	m	Direct measurement
Feed Flange Area	Aflange	0.002	m^2	π $Dflange^2$ / 4
Antenna Gain	Ges	55.20	dBi	Mfg spec
Antenna Gain	G	331131.121		10^(Ges / 10)
Antenna Efficiency	η	0.650		G λ^2 / π^2 $Dref^2$
Pi	π	3.142		

2. Density at Feed Flange

The maximum power flux density at the surface of the feed flange is as follows:

Parameters	Symbol	Value	Units	Notes/Formulas
Density @ flange		92330.362	W/m^2	4 P / Aflange
	Sflange	9232.304	mW/cm^2	

3. Density at Main Reflector

The maximum power flux density at the surface of the main reflector is as follows:

Parameters	Symbol	Value	Units	Notes/Formulas
Density @ Main Reflector		31.740	W/m^2	4 P / Aref
	Ssurface	3.174	mW/cm^2	

4. Density between Main Reflector and Ground

The maximum power flux density in the area between the edge of the main reflector and the ground is as follows

Parameters	Symbol	Value	Units	Notes/Formulas
Density, Main Reflector/Ground		7.935	W/m^2	P / Aref
	Sground	0.794	mW/cm^2	

5. Density within the Near Field

The Near Field environment for a parabolic reflector antenna is contained within a cylinder with the same diameter as the main reflector which extends to a distance called the Near Field Extent

Power within the Near Field is constant with the following maximum flux density:

Parameters	Symbol	Value	Units	Notes/Formulas
Range to Near Field Extent	Rnf	136.357	m	$Dref^2 / 4 \lambda$
Density within the Near Field		20.619	W/m^2	$16.0 \eta P / \pi Dref^2$
	Snf	2.062	mW/cm^2	

6. Density at Transition Region

The Transition Region is the area between the Near Field and Far Field regions where power decreases linearly with distance.

The maximum power flux density within the Transition Region is located at the Near Field extent range and is calculated as follows:

Parameters	Symbol	Value	Units	Notes/Formulas
Range to Transition Region	Rt	136.357	m	Occurs at near field extent
Density @ Transition		20.619	W/m^2	Snf Rnf / Rt
	Snf	2.062	mW/cm^2	

7. Density at Beginning of the Far Field

The Far Field region is the range at which power decreases inversely with the square of the distance. The maximum power flux density within the Far Field region occurs at the Far Field Boundary and is calculated as follows:

Parameters	Symbol	Value	Units	Notes/Formulas
Range to Far Field Boundary	Rff	327.256	m	$0.6 D^2 / \lambda$
Density @ Far Field Boundary		8.832	W/m^2	$P G / 4 \pi Rff^2$
	Sff	0.883	mW/cm^2	

8. Range to Far Field General Population Exposure Limit

In addition to the power flux density calculations at key locations, it's valuable to locate the specific range at which MPE limits are reached to aid in managing exposure control. The following calculation shows the range at which the Far Field General Population MPE limit occurs:

Parameters	Symbol	Value	Units	Notes/Formulas
Range to 1 mW/cm²		307.541	m	Range to General Population Limit
		10.001	W/m²	
		1.000	mW/cm²	

9. Non-Ionizing Radiation Summary

Flux Densities & Exposure Limits

General Population Exposure Limit = 1.0 mW/cm^2

Occupational Exposure Limit = 5.0 mW/cm^2

Region	Symbol	Level	Units	Hazard Assessment
Density @ Antenna Flange	Sflange	9232.304	mW/cm²	Exceeds General Population Exposure limit
				Exceeds Occupational Exposure limit
Density @ Main Reflector	Ssurface	3.174	mW/cm²	Exceeds General Population Exposure limit
				Does not exceed Occupational Exposure limit
Density Between Main Reflector and Ground	Sground	0.794	mW/cm²	Does not exceed General Population Exposure limit
				Does not exceed Occupational Exposure limit
Max Density @ Near Field Extent	Snf	2.062	mW/cm²	Exceeds General Population Exposure limit
				Does not exceed Occupational Exposure limit
Max Density @ Transition Region	St	2.062	mW/cm²	Exceeds General Population Exposure limit
				Does not exceed Occupational Exposure limit
Density @ Beginning of Far Field	Sff	0.883	mW/cm²	Does not exceed General Population Exposure limit
				Does not exceed Occupational Exposure limit

Range to Key Points and General Population Exposure Limit Avoidance Methods

Distance from Antenna	Symbol	Value	Units	Protection Method
Antenna Immediate Area				Fencing and Signage, no public access
Range to Near Field Extent	Rnf	136.357	m	Main lobe offset greater than 1 diameter
Range to Far Field Boundary	Rff	327.256	m	Main lobe offset greater than 1 diameter
Range to 1 mW/cm² MPE Limit		307.541	m	Main lobe offset greater than 1 diameter

10. Conclusion

The above analysis confirms the presence of potentially hazardous power flux densities at the terminals which will require physical and operation protections to manage General Population and Occupational Exposure.

As appropriate, SES GS will use fencing, signage, and other measures to limit access to the relevant area. Procedures will be in place requiring that transmit power be turned off before work on the 2.4m antennas is performed. Where an enclosed area is necessary, the size of the enclosed area will consider the RF hazards and the surrounding terrain. The signage will clearly state the standard Radiation Hazard warning.

Personnel with access to the antenna will be trained to ensure that the antennas are off before working in the vicinity or on the antenna systems directly.

11. Certification

I hereby certify I have reviewed the engineering information submitted, and that it is complete and accurate to the best of my knowledge.

/s/ Majid Borojeni
Majid Borojeni
Network Engineering Director
SES Government Solutions
April 26, 2016