

### Waiver Request

By this application, SES Americom, Inc. (“SES Americom” or “SES”) seeks a license to operate a new earth station antenna in Mt. Airy, Maryland to communicate with U.S.- and foreign-licensed satellites included on the Commission’s Permitted Space Station List. SES Americom’s affiliate, New Skies Satellites B.V. (“NSS”), has been authorized to use the SES-10 satellite to provide service into the United States, and has asked SES Americom to provide earth station service to support market access in the United States.<sup>1</sup> The earth station will operate in the below bands and as further described in Schedule B to the attached Form 312.

Transmit	13.75-14.0 GHz <sup>2</sup>
Transmit	14.0-14.5 GHz
Receive	10.95-11.2 GHz
Receive	11.45-11.7 GHz
Receive	11.7-12.2 GHz

SES requests limited waiver of Section 2.106 footnote NG52 to permit the reception of U.S. domestic services in the 10.95-11.2 GHz and 11.45-11.7 GHz bands on an unprotected, non-interference basis. Grant of this waiver is consistent with Commission policy:

The Commission may waive a rule for good cause shown. Waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the general rule. Generally, the Commission may grant a

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<sup>1</sup> See *New Skies Satellites B.V. Market Access Application*, File No. SAT-PPL-20160117-00005 (“SES-10 Petition”), granted on June 23, 2016 (“SES-10 Grant”). The authorization was subsequently modified to operate the satellite at 66.9° W.L. pursuant to the Commission’s expedited process set out in Section 25.117(h)(1). *New Skies Satellites B.V. Modification*, Call Sign S2950, File No. SAT-MPL-20170108-00002, granted May 24, 2017.

<sup>2</sup> As demonstrated in Attachment 1, operations in the 13.75-14.0 GHz band will not cause harmful interference to U.S. Navy radar stations or NASA TDRSS stations.

waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the public interest.<sup>3</sup>

The Commission has granted a waiver for SES-10 to provide domestic service in these bands.<sup>4</sup> Footnote NG52 was intended to preserve access to the 10.7-11.7 GHz spectrum for terrestrial fixed service (“FS”) stations by limiting FSS use of the band to international operations only.<sup>5</sup> SES-10 will meet the power flux density limits on the ground to protect FS operations,<sup>6</sup> and the number of antennas that will be used to communicate in these bands will be limited, thereby ensuring protection of FS services. Moreover, because SES seeks authority to receive in this spectrum on an unprotected basis, FS use of the band will not be constrained. Therefore, grant of the requested waiver will not undermine the purpose of the rule.

For the foregoing reasons, SES Americom requests that the above waiver request be granted.

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<sup>3</sup> *PanAmSat Licensee Corp.*, 17 FCC Rcd 10483, 10492 (Sat. Div. 2002) (footnotes omitted).

<sup>4</sup> *Id.* at 1-2, ¶ 3.

<sup>5</sup> *See* 47 C.F.R § 2.106, Footnote NG52. This policy was previously codified in footnote NG104.

<sup>6</sup> *See* SES-10 Grant, Attachment to Grant at 1-2, ¶ 3.

**Attachment 1**  
**Compliance with FCC Report & Order (FCC 96-377) for the 13.75-14.0 GHz Band**  
**Analysis and Calculations for 9 Meter Antenna at Woodbine, MD**

**Exhibit For  
SES Americom, LLC  
Woodbine, Maryland  
Vertex Corporation 9 Meter Earth Station**

**Compliance with FCC Report & Order (FCC96-377) for the 13.75 - 14.0 GHz Band  
Analysis and Calculations**

**1. Background**

This Exhibit is presented to demonstrate the extent to which the SES Americom, LLC satellite earth station in Woodbine, Maryland is in compliance with FCC REPORT & ORDER 96-377. The potential interference from the earth station to US Navy shipboard radiolocation operations (RADAR) and the NASA space research activities in the 13.75 - 14.0 GHz Band is addressed in this exhibit. The parameters for the earth station are:

**Table 1. Earth Station Characteristics**

- Coordinates (NAD83): 39° 22' 38.8" N, 77° 04' 52.9" W
- Satellite Location for Earth Station: SES-10 (68.5° W)
- Frequency Band: 13.75-14.0 GHz for uplink
- Polarizations: Linear
- Emissions: N0N, 100KG7W, 1M00G7W, 36M0G7W and 54M0G7W
- Modulation: Digital
- Maximum Aggregate Uplink EIRP: 46.1 dBW for the N0N Carrier  
60.0 dBW for the 100 kHz Carriers  
70.0 dBW for the 1 MHz Carriers  
85.0 dBW for the 36 MHz Carriers  
85.0 dBW for the 54 MHz Carriers
- Transmit Antenna Characteristics
  - Antenna Size: 9.0 meters in Diameter
  - Antenna Type/Model: Vertex Corporation
  - Gain: 60.1 dBi
- RF power into Antenna Flange: No Modulation (N0N)  
-14.0 dBW or -14.0 dBW/4 kHz (Maximum)

- RF power into Antenna Flange (Continued)
  - 100 kHz  
-0.1 dBW  
or -14.0 dBW/4 kHz
  - 1 MHz  
9.9 dBW  
or -14.0 dBW/4 kHz (Maximum)
  - 36 MHz  
24.9 dBW  
or -14.6 dBW/4 kHz (Maximum)
  - 54 MHz  
24.9 dBW  
or -16.4 dBW/4 kHz (Maximum)
- Minimum Elevation Angle: Woodbine, Md
  - 43.6° @ 166.6° Az. (SES 10) at 68.5° W
- Side Lobe Antenna Gain:
  - 32 - 25\*log( $\theta$ )

Because the above uplink spectrum is shared with the Federal Government, coordination in this band requires resolution data pertaining to potential interference between the earth station and both Navy Department and NASA systems. Potential interference from the earth station could impact with the Navy and/or NASA systems in two areas. These areas are noted in FCC Report and Order 96-377 dated September 1996, and consist of (1) Radiolocation and radio navigation, (2) Data Relay Satellites.

Summary of Coordination Issues:

- 1) Potential Impact to Government Radiolocation (Shipboard Radar)
- 2) Potential Impact to NASA Data Relay Satellite Systems (TDRSS)

**2. Potential Impact to Government Radiolocation (Shipboard Radar)**

Radiolocation operations (RADAR) may occur anywhere in the 13.4 - 14 GHz frequency band aboard ocean going United States Navy ships. The Federal Communication Commission (FCC) order 96-377 allocates the top 250 MHz of this 600 MHz band to the Fixed Satellite Service (FSS) on a co-primary basis with the radiolocation operations and provides for an interference protection level of -167 dBW/m<sup>2</sup>/4 kHz.

The closest distance to the shoreline from the Woodbine earth station is approximately 65.9 km Southeast toward the Chesapeake Bay. The calculation of the power spectral density at this distance is given by:

	<u>N0N</u>	<u>100 kHz</u>	<u>1.0 MHz</u>	<u>36.0 MHz</u>	<u>54 MHz</u>
1. Clear Sky EIRP (dBW):	46.1	60.0	70.0	85.0	85.0
2. Carrier Bandwidth:	CW Signal	100 kHz	1 MHz	36 MHz	54 MHz
3. PD at antenna Input: (dBW/4 kHz)	-14.0	-14.0	-14.0	-14.6	-16.4
4. Transmit Antenna Gain:		60.1 dBi			
5. Antenna Gain Horizon:		FCC Reference Pattern			
6. Antenna Elevation Angle:		43.6°			

The proposed earth station will radiate interference toward the Chesapeake Bay according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in off-axis antenna gains of -10.0 dBi toward the Chesapeake Bay.

The signal density at the shoreline, through free space is:

N0N Carriers (CW Carrier)

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m<sup>2</sup>).

$$\begin{aligned}
 &= -14.0 \text{ dBw/4 kHz} + (-10.0) \text{ dBi} - 10 \cdot \log[4\pi \cdot (65900\text{m})^2] \\
 &= -131.4 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 63.0 \text{ dB}) \\
 &= -194.4 \text{ dBW/m}^2/4 \text{ kHz}
 \end{aligned}$$

100 kHz Carriers

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m<sup>2</sup>).

$$\begin{aligned}
 &= -14.0 \text{ dBw/4 kHz} + (-10.0) \text{ dBi} - 10 \cdot \log[4\pi \cdot (65900\text{m})^2] \\
 &= -131.4 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 63.0 \text{ dB}) \\
 &= -194.4 \text{ dBW/m}^2/4 \text{ kHz}
 \end{aligned}$$

1 MHz Carriers

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m<sup>2</sup>).

$$\begin{aligned}
 &= -14.0 \text{ dBw/4 kHz} + (-10.0) \text{ dBi} - 10 \cdot \log[4\pi \cdot (65900\text{m})^2] \\
 &= -131.4 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 63.0 \text{ dB}) \\
 &= -194.4 \text{ dBW/m}^2/4 \text{ kHz}
 \end{aligned}$$

### 36 MHz Carriers

PF<sub>D</sub> = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBW-m<sup>2</sup>).

$$\begin{aligned} &= -14.6 \text{ dBW/4 kHz} + (-10.0) \text{ dBi} - 10 \cdot \log[4\pi \cdot (65900\text{m})^2] \\ &= -131.9 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 63.0 \text{ dB}) \\ &= -194.9 \text{ dBW/m}^2/4 \text{ kHz} \end{aligned}$$

### 54 MHz Carriers

PF<sub>D</sub> = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBW-m<sup>2</sup>).

$$\begin{aligned} &= -16.4 \text{ dBW/4 kHz} + (-10.0) \text{ dBi} - 10 \cdot \log[4\pi \cdot (65900\text{m})^2] \\ &= -133.8 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 63.0 \text{ dB}) \\ &= -196.8 \text{ dBW/m}^2/4 \text{ kHz} \end{aligned}$$

Our calculations identified additional path losses of approximately 63.0 dB including absorption loss and earth diffraction loss for the actual path profiles from the earth station to the nearest shoreline.

The worst case calculated PF<sub>D</sub> including additional path losses to the closest shoreline location is –194.4 dBW/m<sup>2</sup>/4 kHz for the CW, 100 kHz and 1 MHz carriers and -194.9 dBW/m<sup>2</sup>/4 kHz for the 36 MHz carriers and -196.8 dBW/m<sup>2</sup>/4 kHz for the 54 MHz. All carriers are a minimum of 27.4 dB below the –167 dBW/ m<sup>2</sup>/4 kHz interference criteria of R&O 96-377. Therefore, there should be no interference to the US Navy RADAR from the Woodbine earth station due to the distance and the terrain blockage between the site and the shore.

### 3. Potential Impact to NASA’s Data Relay Satellite System (TDRSS)

The geographic location of the SES Americom earth station in Woodbine, Maryland is outside the 390 km radius coordination contour surrounding NASA’s White Sands, New Mexico ground station complex. Therefore, the TDRSS space-to-earth link will not be impacted by the SES Americom earth station in Woodbine, Maryland.

The TDRSS space-to-space link in the 13.772 to 13.778 GHz band is assumed to be protected if an earth station produces an EIRP less than 71 dBW/6 MHz in this band. The 9 meter earth station antenna will have an EIRP less than 71 dBW/6 MHz for both the CW carrier, 100 kHz and 1 MHz carriers in this band. The total EIRP for the CW Carrier is 46.1 dBW and the equivalent EIRP per 6 MHz segment will remain at 46.1 dBW/6 MHz. The total EIRP for the 100 kHz, carriers is 60.0 dBW. The equivalent EIRP per 6 MHz segment will remain at 60.0 dBW/6 MHz. The total EIRP for the 1 MHz, carriers is 70.0 dBW. The equivalent EIRP per 6 MHz segment will remain at 70.0 dBW/6 MHz. Therefore, there should not be interference to the TDRSS space-to-space link for the CW carriers or the 100 kHz and 1 MHz carriers. For the 36 MHz and 54 MHz carriers, the total EIRP of 85.0 dBW (36 MHz), and 85.0 dBW (54 MHz) equate to an EIRP per 6 MHz of 79.0 dBW/6 MHz and 76.0 dBW/6 MHz, respectively. To avoid interference to the TDRSS space-to-space link the 36 MHz and 54 MHz carriers will not be used for the transmit spectrum of 13.772 to 13.778 GHz by this earth station.

#### **4. Coordination Issue Result Summary and Conclusions**

The results of the analysis and calculations performed in this exhibit indicate that compatible operation between the earth station at the Woodbine facility and the US Navy and NASA systems space-to-earth link are possible for all of the proposed carriers. Operations in NASA systems space-to-space link (13772.0 to 13778.0 MHz) will also be permitted for all of the carriers with the exception of the 36 MHz and 54 MHz emissions.