

**ATTACHMENT B**

**UMFUS Compatibility Showing  
(Simi Valley, CA; Call Sign E170163)**

**1. Section 25.136(a)(4) assessment – 27.5-28.35 GHz**

**1.1. Section 25.136(a)(4)(i) – Number of earth stations**

As of November 2020, the only other earth station licensed or proposed in the 27.5-28.35 GHz band in the relevant license area is an earth station licensed to SES Americom, Inc. (call sign E160022) that is grandfathered in 27.85-28.35 GHz.

**1.2. Section 25.136(a)(4)(ii) and (iii) – Power Flux Density (“PFD”) contour population and highway/event/railway/port coverage**

**1.2.1. Assumptions**

The Section 25.136 PFD was determined using the publicly available software program Visualyse and based upon the Table 1 technical parameters for the Jupiter 3 earth station.

<b>Parameter</b>	<b>Value</b>
Latitude/longitude	34° 16' 6.7"N / 118° 42' 11.4"W
Frequency (GHz)	28
Channel bandwidth (MHz)	470
Transmit power (dBW)	5.09
Antenna midline height above ground (m)	7
Antenna size (m)	10
On-axis antenna Gain (dBi)	67.91
Clear sky EIRP (dBW)	73
Antenna radiation pattern	Manufacturer calculated off-axis gain pattern (see Figure 1)
Clutter	Recommendation ITU-R P.452-16, Dense suburban
Terrain	NASA SRTM data 30 m resolution <sup>1</sup>

*Table 1. Jupiter 3 gateway earth station technical parameters at 28 GHz*

Figure 1 shows the sum of the manufacturer’s calculated co-polarized and cross-polarized off-axis gain patterns. Measured antenna patterns are not available for the off-axis angles of importance because of the size of the antenna<sup>2</sup>; hence, calculated antenna patterns provided by the manufacturer are used.

<sup>1</sup> <http://dwtkns.com/srtm30m/>

<sup>2</sup> See 47 C.F.R. § 25.132(d)

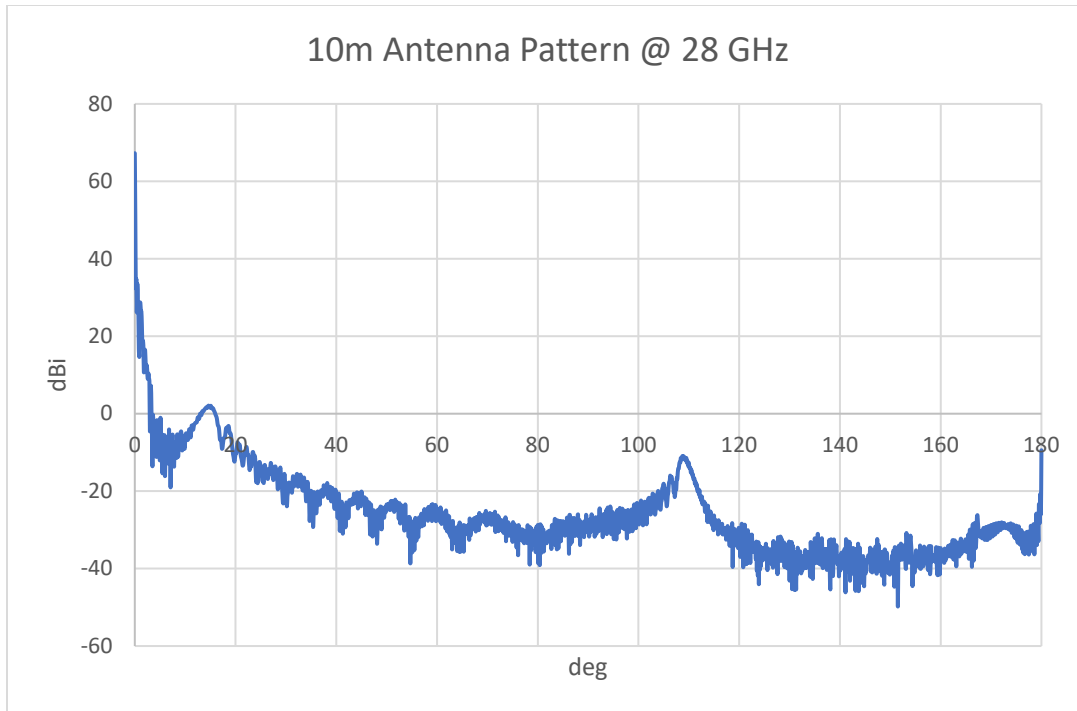


Figure 1. SED calculated off-axis gain pattern at 28 GHz

The earth station uses adaptive modulation and coding as well as uplink power control to maintain the desired availability. The percentage of time that the earth station will exceed the clear sky levels is small. Using Recommendation ITU-R P.618, Hughes has determined that the power levels are within 1 dB of the clear sky input power for 98.21% of the time and within 2 dB of the clear sky input power for 99.34% of the time.

Further, the earth station is licensed for clear sky EIRP levels pursuant to Section 25.204(e) of the Commission's rules.

### 1.2.2. Results for 27.5-27.85 GHz

Visualyse Version 7 software was run using the Recommendation ITU-R P.452-16 propagation model option to generate the Section 25.136 contour for the 28 GHz band where the earth station generates a PFD, at 10 meters above ground level, of greater than or equal to  $-77.6 \text{ dBm/m}^2/\text{MHz}$ . The resulting PFD contour is shown in Figure 2 (and further specified in a KMZ file submitted with this application).



Figure 2. Section 25.136 pfd contour around the Simi Valley earth station in the 27.5-28.35 GHz band

The 27.5-27.85 GHz PFD contour does not cover any major roads (*i.e.*, Interstate, Other Freeways and Expressways, or Other Principal Arterial, according to the Federal Highway Administration HEPGIS map or Other Freeways and Expressways, or Other Principal Arterials identified by the California State Department of Transportation). The PFD contour also does not contain any major event venue, urban mass transit route, passenger railroad, or cruise ship port according to a visual inspection in Google Earth.

The population covered by the 27.5-27.85 GHz PFD contour was determined using the actual area method, where the population within the contour was calculated based on the proportion of the census geographic area covered by the PFD contour. Figure 3 shows the PFD contour overlaid on a census block map of the service area, with census block ID numbers depicted.

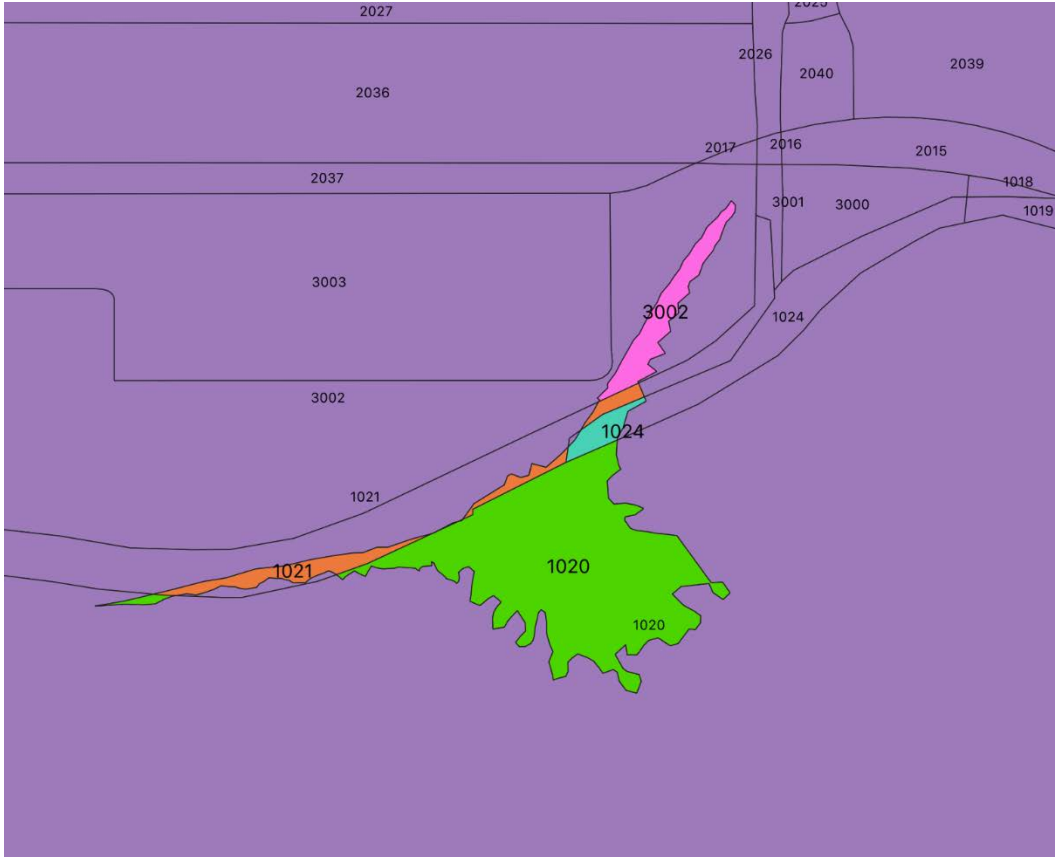


Figure 3. 27.5-27.85 GHz pfd contour overlaid on labeled census blocks

Table 2 provides the percentage of area of each census block covered by the contour, the associated population covered, and sums the population covered. The population covered is 14 and meets the population coverage limit of 835 persons. Note that the SES earth station in Ventura County is grandfathered and thus does not count against the population limit.

Census Tract	Census Block	Block Population	Total Block Area	Area Covered	Weighted Population
007512	1020	443	1082348	33046.4	13.5
007512	1021	0	32635	4719.3	0.0
007512	1024	0	12836	1448.2	0.0
008002	3002	0	118194	3970.4	0.0
<b>Total</b>					<b>14</b>

Table 2. Population coverage of 27.5-27.85 GHz pfd contour

### 1.3. Section 25.136(a)(4)(iv) – Coordination

As demonstrated in the attached Coordination Report (Attachment A), coordination of the modified earth station operations was completed through Comsearch pursuant to Sections 25.136(a)(4)(iv) and 101.103(d) of the Commission’s rules.

## 2. Section 25.136(d)(4) assessment – 47.2-48.2 GHz

### 2.1. Section 25.136(d)(4)(i) – Number of earth stations

As of November 2020, there are no other earth stations licensed or proposed in the 47.2-48.2 GHz band in the relevant license area.

### 2.2. Section 25.136(d)(4)(ii) and (iii) – PFD contour population and highway/event/railway/port coverage

#### 2.2.1. Assumptions

The Section 25.136 PFD was determined using the publicly available software program Visualyse and based upon the Table 5 technical parameters for the Jupiter 3 earth station.

Parameter	Value
Latitude/longitude	34° 16' 6.7"N / 118° 42' 11.4"W
Frequency (GHz)	47
Channel bandwidth (MHz)	470
Transmit power (dBW)	0.39
Antenna midline height above ground (m)	7
On-axis antenna Gain (dBi)	71.61
Clear sky EIRP (dBW)	72
Antenna radiation pattern	Manufacturer calculated off-axis gain pattern
Clutter	Recommendation ITU-R P.452-16, Dense suburban
Terrain	NASA SRTM data 30 m resolution <sup>3</sup>

Table 3. Jupiter 3 gateway earth station technical parameters at 47 GHz

Figure 6 provides a plot of the manufacturer's calculated combined co-polarized and cross-polarized off-axis gain patterns. Measured antenna patterns are not available for the off-axis angles of importance because of the size of the antenna; hence, calculated antenna patterns provided by the manufacturer are used.

<sup>3</sup> <http://dwtkns.com/srtm30m/>

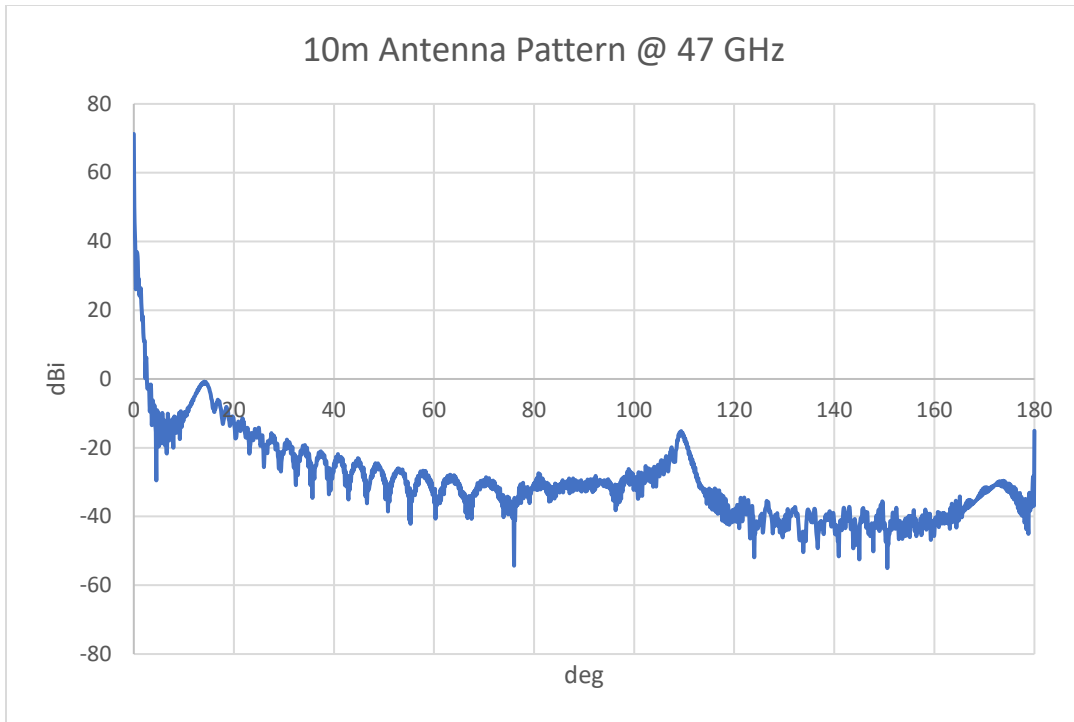


Figure 4. SED calculated off-axis gain pattern at 47 GHz

The earth station uses adaptive modulation and coding as well as uplink power control to maintain the desired availability. The percentage of time that the earth station will exceed the clear sky levels is small. Using Recommendation ITU-R P.618, Hughes has determined that the power levels are within 1 dB of the clear sky input power for 94.06% of the time and within 2 dB of the clear sky input power for 97.69% of the time.

Further, the earth station is licensed for clear sky EIRP levels pursuant to Section 25.204(e) of the Commission's rules.

### 2.2.2. Results

Visualyse Version 7 software was run using the Recommendation ITU-R P.452-16 propagation model option to generate the Section 25.136 contour for the 47 GHz band where the earth station generates a pfd, at 10 meters above ground level, of greater than or equal to  $-77.6 \text{ dBm/m}^2/\text{MHz}$ . The resulting PFD contour is shown in Figure 7 (and further specified in a KMZ file submitted with this application).

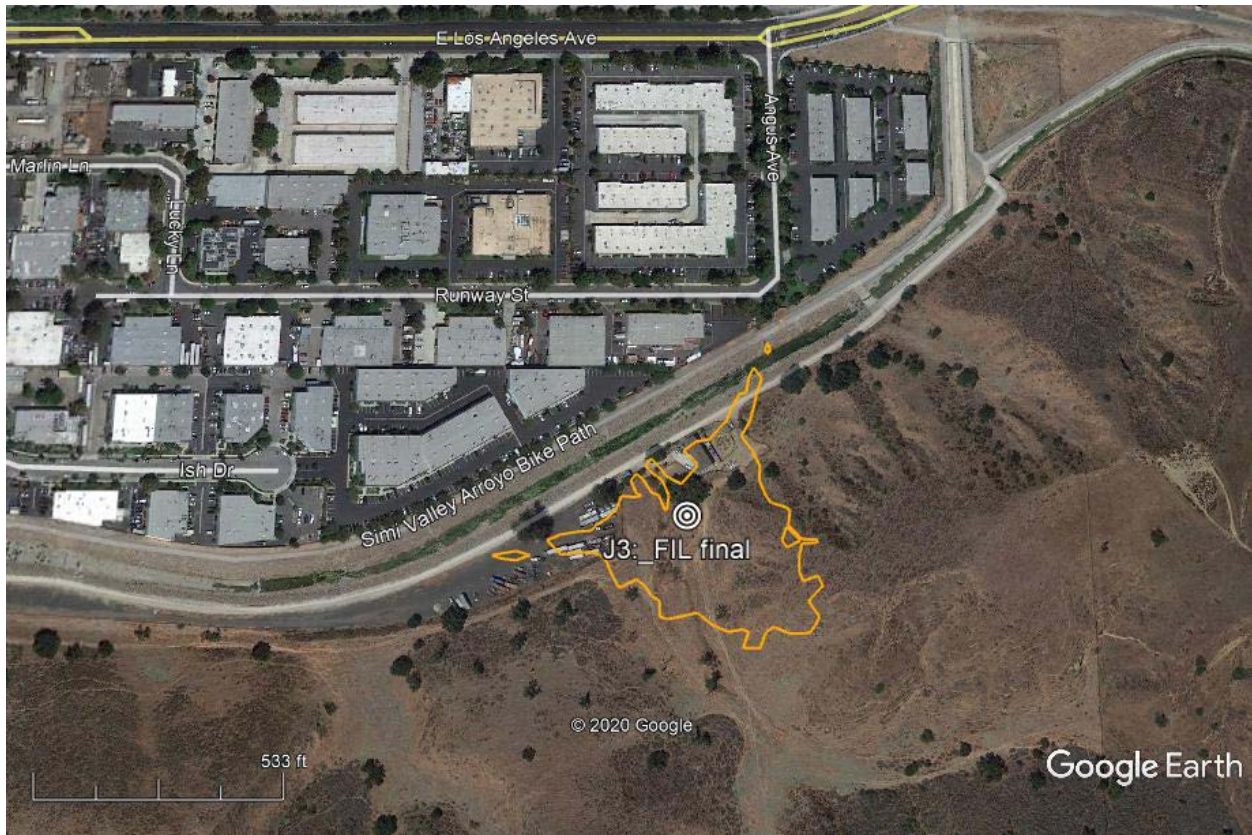


Figure 5. Section 25.136 pfd contour around the Simi Valley earth station in the 47 GHz band

The 47 GHz PFD contour does not cover any major roads (*i.e.*, Interstate, Other Freeways and Expressways, or Other Principal Arterial according to the Federal Highway Administration HEPGIS map, or highways designated as Other Freeways and Expressways, or Other Principal Arterials by the California Department of Transportation). The PFD contour also does not contain any major event venue, urban mass transit route, passenger railroad, or cruise ship port according to a visual inspection in Google Earth.

The population covered by the 47 GHz PFD contour was determined using the actual area method, where the population within the contour was calculated based on the proportion of the census geographic area covered by the PFD contour. Figure 8 shows the 47 GHz PFD contour overlaid on a census block map of the service area, with census block ID numbers depicted.

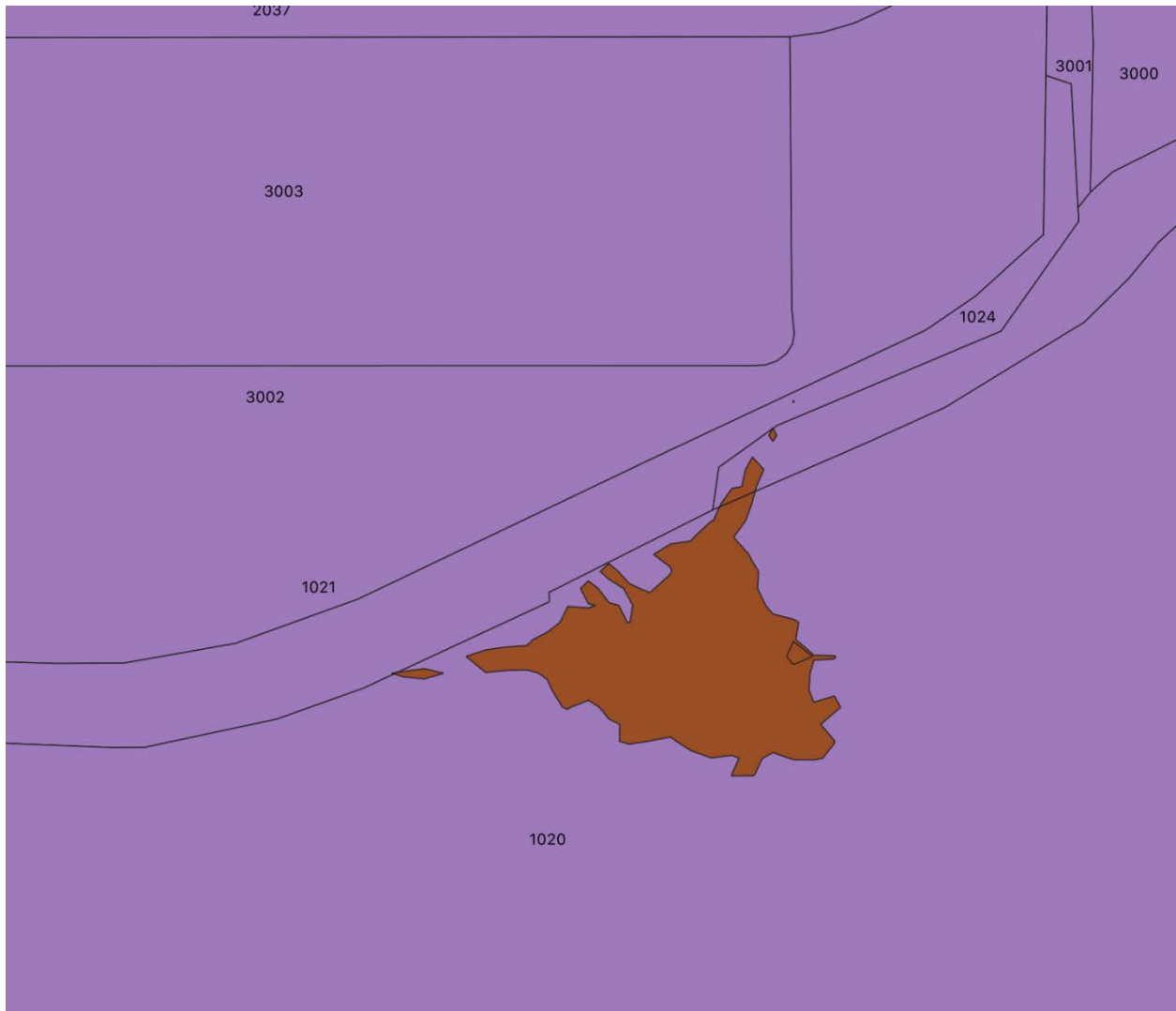


Figure 6. 47 GHz pfd contour overlaid on labeled census blocks

Table 6 provides the percentage of area of each census block covered by the contour, the associated population covered, and sums the population covered. The population coverage limit of 2250 persons is met.

Census Tract	Census Block	Block Population	Total Block Area	Area Covered	Weighted Population
007512	1020	443	1082348	16306	6.7
007512	1021	0	32635	3	0
007512	1024	0	12836	269	0
<b>Total</b>					<b>7</b>

Table 4. Population coverage of 47 GHz pfd contour



**2.3. Section 25.136(d)(4)(iv) – Coordination**

As demonstrated in the attached Coordination Report (Attachment B), coordination of the modified parameters for the earth station was completed through Comsearch pursuant to Sections 25.136(d)(4)(iv) and 101.103(d) of the Commission’s rules.

**3. Section 25.136(e)(3) assessment – 50.4-51.4 GHz**

Operations in the 50.4-51.4 GHz band are grandfathered pursuant to 47 C.F.R. § 25.136(e)(3). The proposed modifications create no significant increase in interference risk to terrestrial operations with respect to PFD contour coverage of populations and major roads and venues, as shown below.

**3.1. PFD contour population and highway/event/railway/port coverage**

**3.1.1. Assumptions**

The Section 25.136 PFD was determined using the publicly available software program Visualyse and based upon the Table 5 technical parameters for the Jupiter 3 earth station.

Parameter	Old site	New site
Latitude/longitude	34°16'9.80"N / 118°42'12.80"W	34° 16' 6.7"N / 118° 42' 11.4"W
Frequency (GHz)	50.9	50.9
Channel bandwidth (MHz)	470	470
Transmit power (dBW)	0	0
Antenna midline height above ground (m)	7	7
On-axis antenna Gain (dBi)	72	72
Clear sky EIRP (dBW)	72	72
Antenna radiation pattern	Manufacturer calculated off-axis gain pattern	Manufacturer calculated off-axis gain pattern
Clutter	Recommendation ITU-R P.452-16, Dense suburban	Recommendation ITU-R P.452-16, Dense suburban
Terrain	NASA SRTM data 30 m resolution <sup>4</sup>	NASA SRTM data 30 m resolution <sup>5</sup>

*Table 6. Jupiter 3 gateway earth station technical parameters at 51 GHz*

Figure 7 provides a plot of the manufacturer’s calculated combined co-polarized and cross-polarized off-axis gain patterns. Measured antenna patterns are not available for the off-axis angles of importance because of the size of the antenna; hence, calculated antenna patterns provided by the manufacturer are used.

<sup>4</sup> <http://dwtkns.com/srtm30m/>

<sup>5</sup> <http://dwtkns.com/srtm30m/>

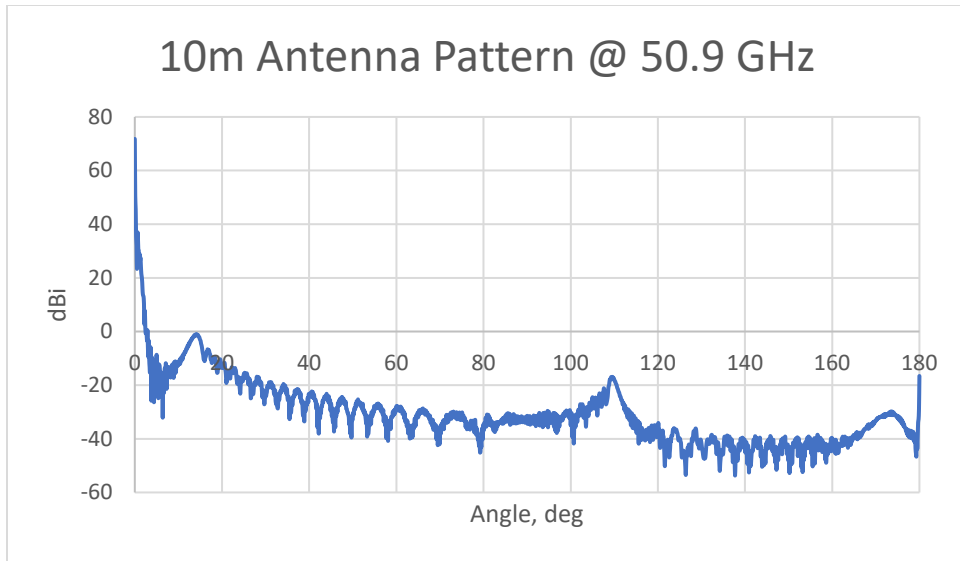


Figure 7. SED calculated off-axis gain pattern at 50.9 GHz

### 3.1.2. Results

Visualyse Version 7 software was run using the Recommendation ITU-R P.452-16 propagation model option to generate the Section 25.136 contour for the 50.9 GHz band where the earth station generates a pfd, at 10 meters above ground level, of greater than or equal to  $-77.6 \text{ dBm/m}^2/\text{MHz}$ . The resulting PFD contours for the old and new sites are shown in yellow and orange, respectively, in Figure 8.



Figure 8. Section 25.136 pfd contours around the Simi Valley earth station in the 50.9 GHz band at the old site location (yellow) and the new (orange)

Neither PFD contour covers: (i) any major roads (*i.e.*, Interstate, Other Freeways and Expressways, or Other Principal Arterial according to the Federal Highway Administration HEPGIS map, or highways designated as Other Freeways and Expressways, or Other Principal Arterials by the Washington State Department of Transportation); or (ii) any major event venue, urban mass transit route, passenger railroad, or cruise ship port, according to a visual inspection in Google Earth.