

# Analysis 27.5 - 28.35 GHz

This analysis for a 3.5m GSO earth station transmitting in the 27.5-28.35 GHz band at Las Cruces, NM. The purpose of the analysis is to consider whether the proposed earth station satisfies the limitations in FCC rules 25.136; PFD -77.6 dBm/m<sup>2</sup>/MHz at 10 m above ground level must not affect more than a stated population limit. The proposed earth station location is the West section of Las Cruces which is in Doña Ana county, NM where the population at the 2010 Census was 209,233. For a county of this size the rule limits the affected population to 450 people. In addition, FCC rules 25.136 requires no more than two other earth stations in the county, and blocks impact on certain roads, routes, and venues.

## Earth Station Technical Parameters

Antenna diameter	<b>3.5 m</b>
Antenna Isotropic gain	<b>58.3 dBi</b>
Maximum Transmit Power	<b>50 Watts</b> (at antenna flange)
Carrier Bandwidth	500 MHz
Uplink EIRP (500 MHz BW)	72 dBW
Power at Tx flange	13.7 dBW per 500 MHz -13.3 dBW per MHz 16.7 dBm/MHz
Antenna Horizon gain	-10 dBi
Horizon Power	6.7 dBm/MHz

## Earth Station Power Flux Density (PFD)

<b>PFD at 500 m</b>	<b>6.7 dBm/MHz - Spreading Spherical loss at 500m <math>4\pi R^2</math></b> <b>-58.3 dBm/m<sup>2</sup>/MHz</b>	<b>Fails FCC -77.6 by 19dB</b>
<b>PFD at 5 km</b>	<b>-78.3 dBm/m<sup>2</sup>/MHz</b>	<b>Passes FCC -77.6</b>

## 25.136 Urban Mass Transit Route Freeways

The earth station is located **500 m from Interstate I-10** as shown below



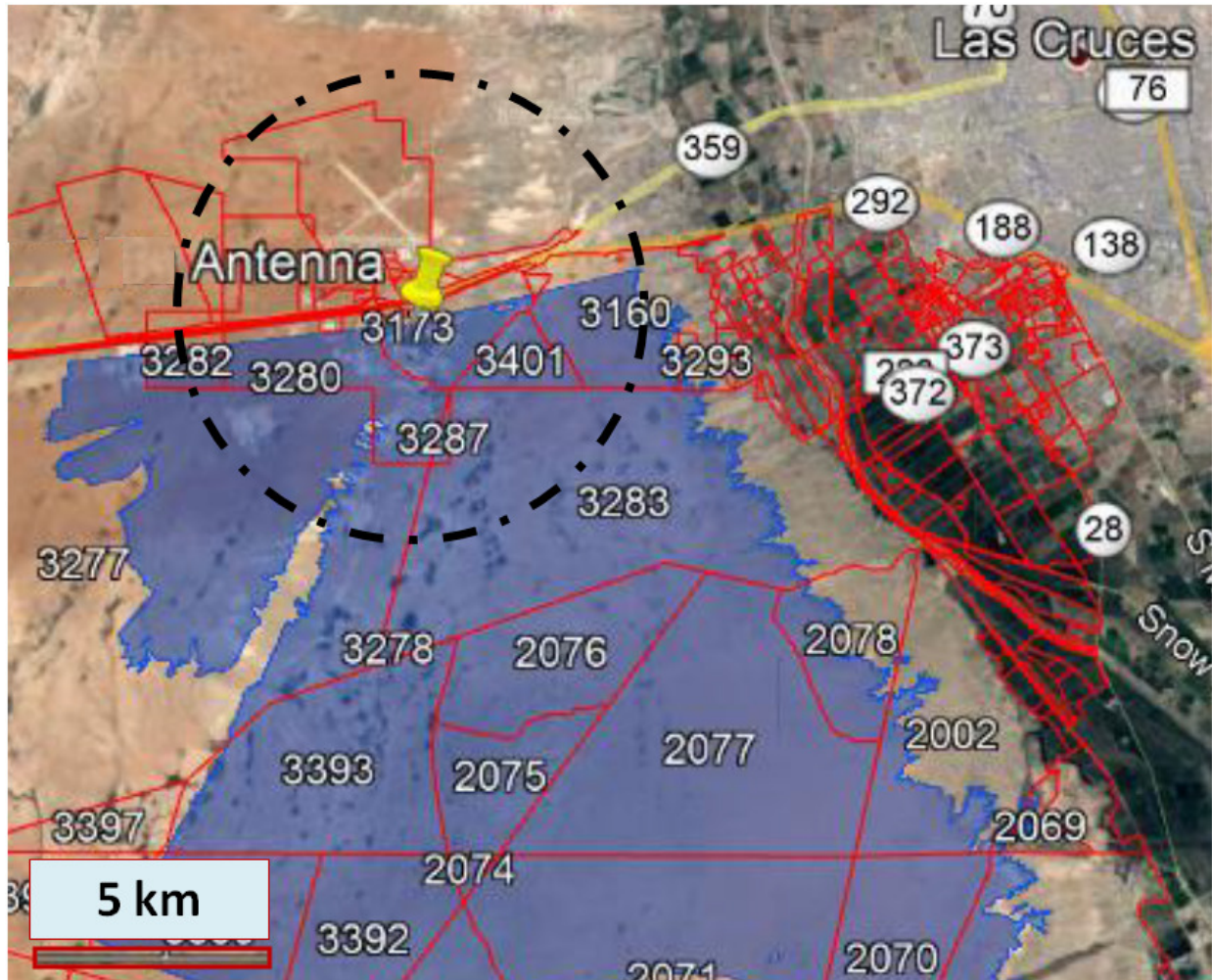
**To meet 25.136 with regards to the I-10 at 500m distance, shielding will be added on the North side of the 3.5 m station with a minimum signal attenuation of 19 dB.**

25.136 Maximum Permitted Aggregate Population 450 People

The earth station is located in an extremely low populated area when considering a radius of 5 km.

**Past the 5 km radius, the PFD complies with 25.136 as it is below -77.6 dBm/m<sup>2</sup>/MHz.**

The 5 km radius is shown by the dotted black circle below, around the 3.5m station.



BLOCK FIPS	COUNTY NAME	BLOCK POPULATION	COVERED AREA FRACTION	COVERED POPULATION
350130015003277	DONA ANA	699	0.35	243
350130015003283	DONA ANA	110	0.79	87
350130015003280	DONA ANA	48	0.87	42
350130015003293	DONA ANA	83	0.11	9
350130015003160	DONA ANA	6	0.57	3

**The covered population within the black 5 km radius and South of the 3.5m station is estimated to be 384 people, below the 450 limit, such that it complies with FCC 25.136 rule.**

The above map and table are taken from the Comsearch 29 June 2020 Report of a Las Cruces Gateway Earth Station.

Below is the complete Table 3 from the Comsearch 29 June 2020 Report, the covered area in the report extended further as the Transmit Parameters were greater, extending past 5 km to meet 25.136.

BLOCK FIPS	COUNTY NAME	BLOCK POPULATION	COVERED AREA FRACTION	COVERED POPULATION
350130015003277	DONA ANA	699	0.35	243
350130015003283	DONA ANA	110	0.79	87
350130015003280	DONA ANA	48	0.87	42
350130016002049	DONA ANA	190	0.08	16
350130015003293	DONA ANA	83	0.11	9
350130015003160	DONA ANA	6	0.57	3
350130016002002	DONA ANA	0	0.31	0
350130015003393	DONA ANA	0	0.97	0
350130015003399	DONA ANA	0	0.79	0
350130016002074	DONA ANA	0	1.00	0
350130015003288	DONA ANA	0	1.00	0
350130016002078	DONA ANA	0	0.52	0
350130015003173	DONA ANA	0	0.69	0
350130015003327	DONA ANA	0	0.00	0
350130015003398	DONA ANA	0	0.42	0
350130016002070	DONA ANA	0	0.75	0
350130016002077	DONA ANA	0	1.00	0
350130015003401	DONA ANA	0	1.00	0
350130016002075	DONA ANA	0	1.00	0
350130015003396	DONA ANA	1	0.03	0
350130016002076	DONA ANA	0	1.00	0
350130015003286	DONA ANA	0	1.00	0
350130015003282	DONA ANA	0	0.75	0
350130015003278	DONA ANA	0	1.00	0
350130016002071	DONA ANA	0	0.56	0
350130015003168	DONA ANA	0	0.06	0
350130016002069	DONA ANA	0	0.20	0
350130015003392	DONA ANA	0	0.89	0
350130015003281	DONA ANA	0	0.00	0
350130015003287	DONA ANA	0	1.00	0
			<b>Total</b>	<b>400</b>

### Conclusion

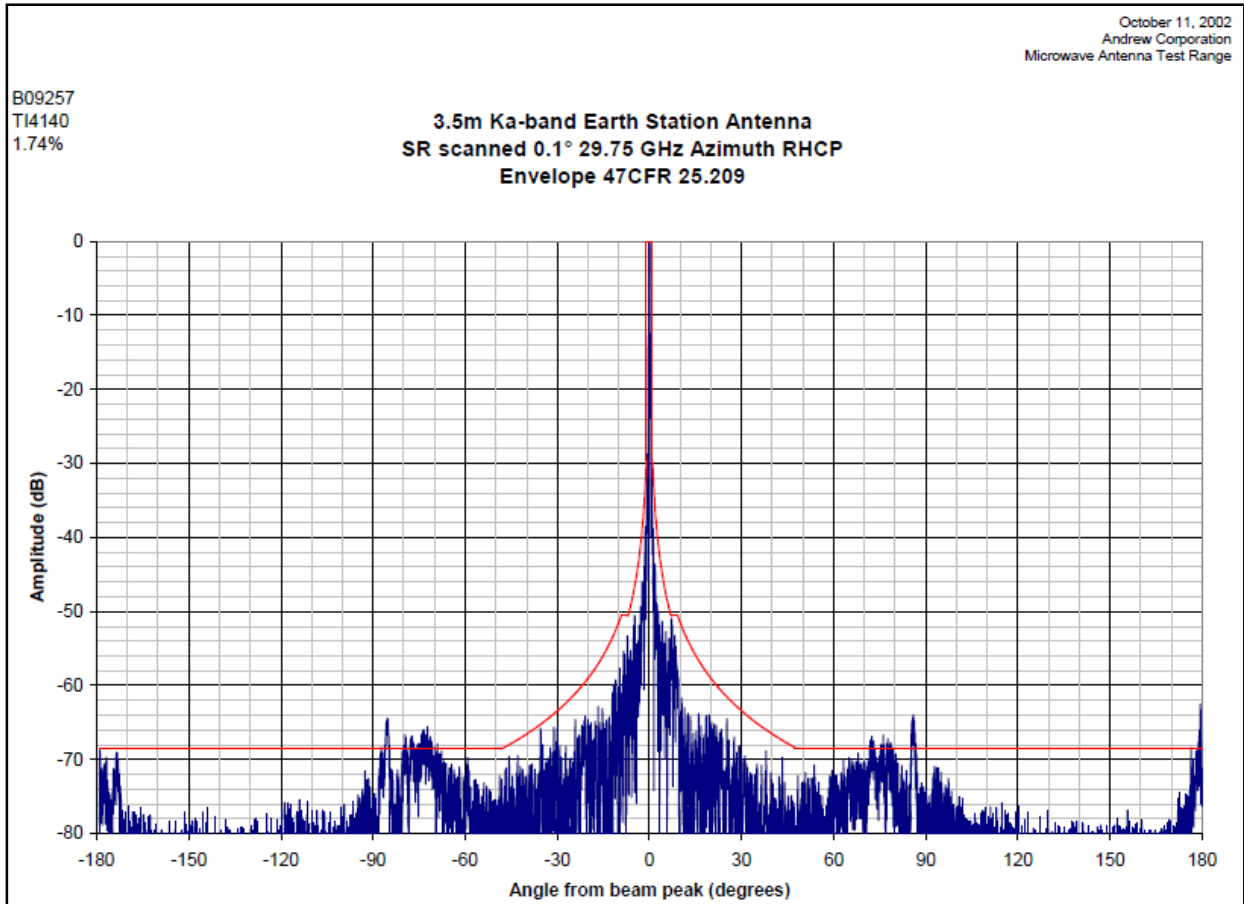
The calculations show that the proposed 3.5m ka-band earth station requires 19 dB of shielding toward the North in order to prevent exceeding power from reaching the I-10 Interstate. Such shielding will be implemented on the North side of the earth station.

No other signal mitigation is required since the population located within a 5 km radius toward the South of the earth station does not exceed the limit the of 450 people.

Based on the above analysis it is concluded that earth station complies with rules FCC 25.136.

References

- 1) Comsearch Report 29 June 2020 Las Cruces NM 27.5 to 28.35 GHz
- 2) Andrew Corporation 11 October 2002 Transmit Pattern Plot Red line at -68.3 dBi for -10 dBi versus 58.3 dBi



- 3) Portion of FCC 25.136

(a) FSS is secondary to the Upper Microwave Flexible Use Service in the 27.5-28.35 GHz band.

Table 1 to Paragraph (a)(4)(ii)

Population within UMFUS license area	Maximum permitted aggregate population within $-77.6 \text{ dBm/m}^2/\text{MHz}$ PFD contour of earth stations
Greater than 450,000	0.1 percent of population in UMFUS license area.
Between 6,000 and 450,000	450 people.
Fewer than 6,000	7.5 percent of population in UMFUS license area.

(i) There are no more than two other authorized earth stations operating in the 27.5-28.35 GHz band within the county

port. In addition, the area mentioned in paragraph (a)(4)(ii) of this section shall not cross any of the following types of roads, as defined in functional classification guidelines issued by the Federal Highway Administration pursuant to 23 CFR 470.105(b): Interstate, Other Freeways and Expressways, or Other Principal Arterial. The Federal Highway