ENGINEERING EXHIBIT

Displacement Application for Modification of Digital Television Translator Station

prepared for

Ramar Communications, Inc.
K46FE-D Artesia, NM
Facility ID 32332
Ch. 16 (digital) 0.86 kW

Ramar Communications, Inc. ("Ramar") is the licensee of digital television translator station K46FE-D, Channel 46, Artesia NM, Facility ID 32332. K46FE-D has received a 120 day notice from a 600 MHz licensee that the wireless licensee intends to commence operations and K46FE-D is predicted to cause interference to the wireless operations. Pursuant to the procedures described in DA 17-584,[1] *Ramar* herein seeks a displacement channel for K46FE-D.

The 120 day notice, attached separately, states that wireless operations will commence on October 31, 2017, in advance of the Special Displacement Window. Therefore, *Ramar* requests a waiver of the Displacement Freeze.[2] A request for Special Temporary Authority is being submitted contemporaneously to operate on the proposed displacement channel pending the final outcome of the Special Displacement Window.

As proposed herein, K46FE-D will operate at its existing antenna location on Channel 16 in lieu of the licensed Channel 46. The existing tower structure is associated with FCC Antenna Structure Registration number 1052108. The proposed K46FE-D facility will employ a replacement antenna system and no change to the overall structure height is proposed.

[1] *"Incentive Auction Task Force and Media Bureau Set Forth Tools Available to LPTV/Translator Stations Displaced Prior to the Special Displacement Window,"* Public Notice, DA 17-584, released June 13, 2017.

[2] *"Freeze on the Filing of Applications for Digital Replacement Translator Stations and Displacement Applications,"* Public Notice, DA 14-808, released June 11, 2014.

The existing K46FE-D facility is licensed to operate at 0.4 kW effective radiated power ("ERP") with a nondirectional antenna. As proposed herein, the Channel 16 K46FE-D facility will operate at 0.86 kW ERP with a directional antenna. Changes also include a reduction in antenna height above ground. A plot of the directional antenna's azimuthal pattern is supplied in Figure 1 Figure 2 depicts the 51 dBµ coverage contour of the licensed and proposed facilities, demonstrating compliance with §73.3572 for a minor change.

Interference study per OET Bulletin 69[3] shows that the proposal complies with the FCC's interference protection requirements toward all digital television, television translator, LPTV, and Class A stations (existing and post-auction). The results, summarized in Table 1, show that any new interference does not exceed the FCC's interference limits (0.5 percent to full power and Class A stations, and 2.0 percent to secondary stations) to any facility.

The site location is within the Mexican coordination zone (229 km to the Mexico border). According to the "TVStudy" summary in Table 1, which includes non-US records from current FCC LMS data, no Mexican station would be affected by the proposal.

The nearest FCC monitoring station is 533 km distant at Douglas, AZ. This exceeds by a large margin the threshold minimum distance specified in §73.1030(c)(3) that would suggest consideration of the monitoring station. The site is not located within the areas requiring coordination with "quiet" zones specified in §73.1030(a) and (b). There are no authorized AM stations within 3 kilometers of the site.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed operation was evaluated for human exposure to RF energy using the procedures outlined in the FCC's OET Bulletin Number 65. Based on OET-65 equation (10), and considering 10 percent antenna relative field in downward elevations (pattern data shows

[3]FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating TV Coverage and Interference*, February 6, 2004 ("OET-69"). This analysis employed the FCC's current "TVStudy" software with the default application processing template settings, 1 km cell size, and 1 km terrain increment. Comparisons of various results of this computer program (run on a Mac processor) to the FCCs implementation of TVStudy show excellent correlation.

less than 10 percent relative field at angles 20 to 90 degrees below the antenna), the calculated signal density near the tower at two meters above ground level attributable to the proposed facility is 0.2 $\mu W/cm^2$, which is 0.05 percent of the general population/uncontrolled maximum permitted exposure limit. This is well below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal's contribution is less than five percent.

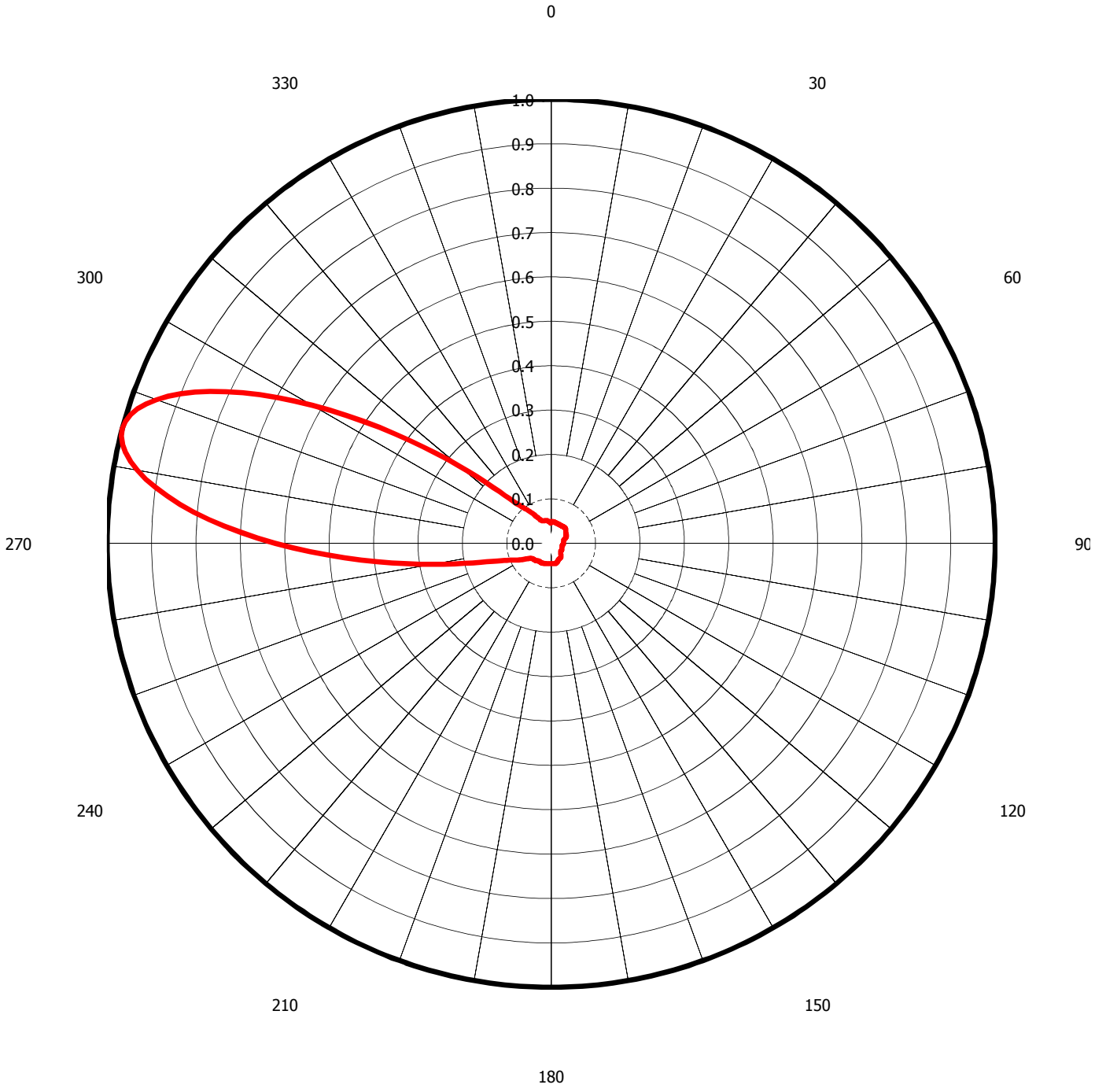
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines. This exhibit is limited to the evaluation of exposure to RF electromagnetic field. No increase in structure height is proposed.

List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2	Coverage Contour Comparison
Table 1	OET Bulletin 69 Interference Study
Form 2100	Saved Version of Engineering Sections from FCC Form at Time of Upload

Chesapeake RF Consultants, LLC
Joseph M. Davis, P.E. September 30, 2017
207 Old Dominion Road Yorktown, VA 23692 703-650-9600

Azimuth Pattern - Relative Field
(True North)



Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 1
Antenna Azimuthal Pattern
K46FE-D Artesia, NM
Facility ID 32332
Ch. 16 (digital) 0.86 kW

prepared for
Ramar Communications, Inc.

September, 2017

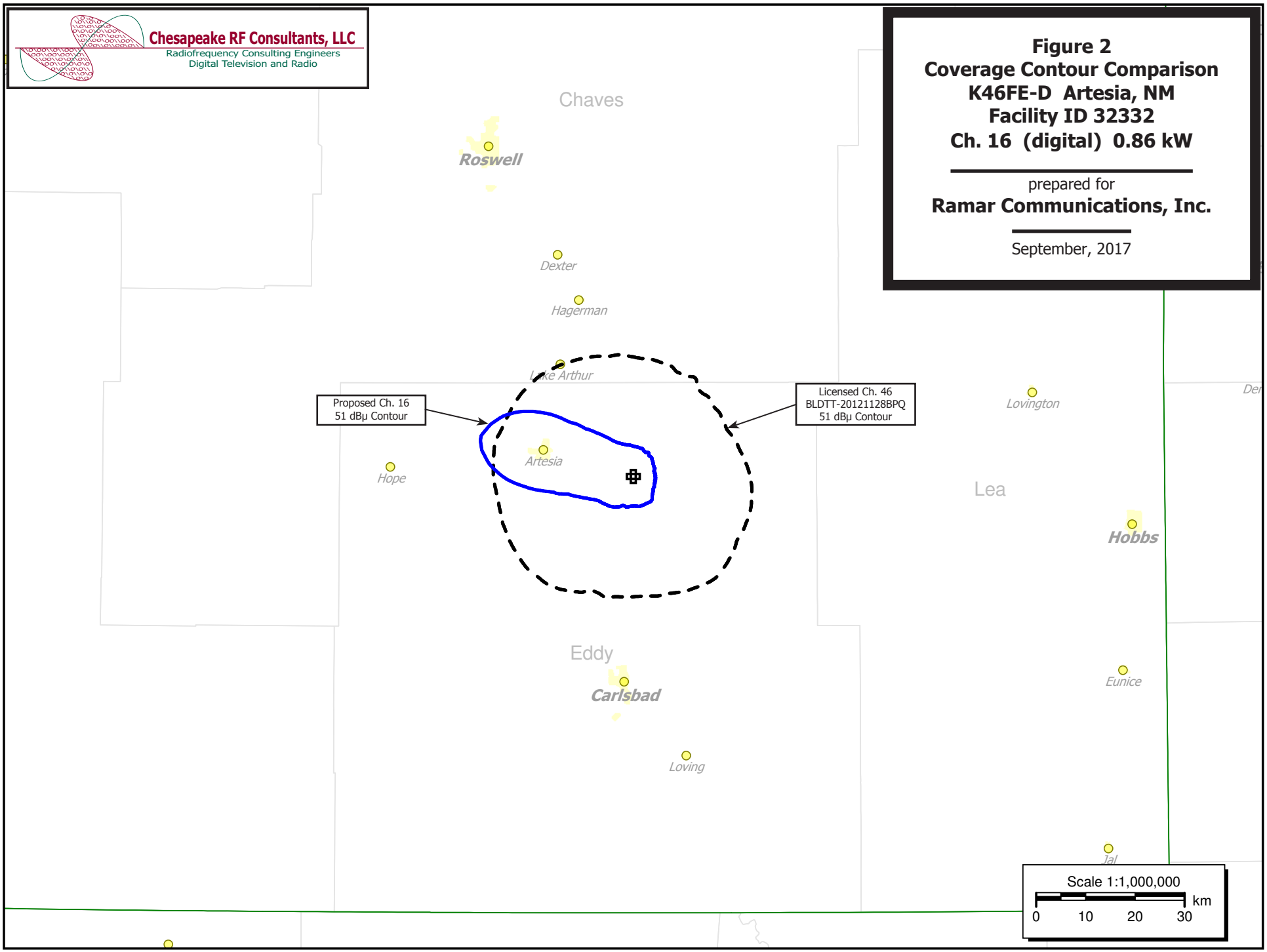

Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio
Figure 2
Coverage Contour Comparison
K46FE-D Artesia, NM
Facility ID 32332
Ch. 16 (digital) 0.86 kW
prepared for
Ramar Communications, Inc.
September, 2017
Chaves
Roswell
Dexter
Hagerman
Lake Arthur
Proposed Ch. 16
51 dBµ Contour
Licensed Ch. 46
BLDTT-20121128BPQ
51 dBµ Contour
Artesia
Hope
Lovington
Lea
Hobbs
Eddy
Carlsbad
Eunice
Loving
Jal
Scale 1:1,000,000
km
0
10
20
30

Table 1 K46FE-D OET Bulletin 69 Interference Study


```
tvstudy v2.2.3 (6K70F1)
Database: localhost,  Study: K46FE-D Ch-16 Prop,  Model: Longley-Rice
Start: 2017.09.30 13:20:43

Study created: 2017.09.30 13:20:04

Study build station data: LMS TV 2017-09-29_LMSTV

    Proposal: K46FE-D D16 LD APP ARTESIA, NM
 File number: K46FE-D Ch-16 Prop
 Facility ID: 32332
Station data: User record
   Record ID: 1242
     Country: U.S.
        Zone: II

Build options:
Protect records not on baseline channel
Protect baseline records from LPTV

Search options:
Non-U.S. records included
Stations potentially affected by proposal:
```

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
No	K15FT-D	D15	LD	LIC	ROSWELL, NM	BLDTT20091211AEV	69.4 km
No	KFOX-TV	D15	DT	LIC	EL PASO, TX	BLCDT20051103AAE	240.3
No	KMLM-DT	D15	DT	CP	ODESSA, TX	BLANK0000026954	197.2
No	KLUZ-TV	D16	DT	CP	ALBUQUERQUE, NM	BLANK0000028361	338.9
No	KUPT-LD	D16	LD	LIC	ALBUQUERQUE, NM	BLDTL20141007ACL	339.2
No	K16EX-D	D16	LD	LIC	CLOVIS, NM	BLDTT20121217ACM	204.8
Yes	K16BZ-D	D16	LD	LIC	RUIDOSO, NM	BLDTT20091211AEN	161.5
No	K16HB-D	D16	LD	LIC	AMARILLO, TX	BLDTL20091008ACB	348.1
No	K16JU-D	D16	LD	CP	BIG SPRING, TX	BNPDTL20100312ACW	254.8
No	KTSM-TV	D16	DT	LIC	EL PASO, TX	BLANK0000001605	240.3
No	K16JV-D	D16	LD	CP	FORT STOCKTON, TX	BNPDTL20100329ACZ	251.4
No	KPTB-DT	D16	DT	LIC	LUBBOCK, TX	BLCDT20090210AFA	237.6
No	K16KY-D	D16	LD	CP	MIDLAND, TX	BNPDTL20100323AII	219.5
No	KSAN-TV	D16	DT	LIC	SAN ANGELO, TX	BLANK0000004868	377.7
No	KVBA-LD	D17	LD	CP	HIGH ROLLS, NM	BDCCDTL20120208AAO	155.4
No	K45JA	D17	LD	CP	HOBBS, NM	BLANK0000010673	99.7
No	K17EM	N17	TX	LIC	ROSWELL, NM	BLTT19970515JB	69.4
No	KVIA-TV	D17	DT	LIC	EL PASO, TX	BLCDT20140828ACL	240.3
No	KVIA-TV	D17	DT	APP	EL PASO, TX	BMPCDT20120914ABB	240.3
No	DK52JQ	D17	LD	APP	MIDLAND, TX	BDISDTL20070613AAA	196.7
No	XHHR	D16	DT	LIC	OJINAGA, CH	BLANKBPFS20160304AAL	360.7

```
No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

    Channel: D16
       Mask: Stringent
   Latitude:  32 47 38.00 N (NAD83)
  Longitude: 104 12 31.00 W
Height AMSL: 1176.8 m
       HAAT: 0.0 m
   Peak ERP: 0.860 kW
    Antenna: SCA PR-TV Ch-16 Hpol 285.0 deg
Elev Pattrn: Generic

48.9 dBu contour:
Azimuth      ERP       HAAT   Distance
  0.0 deg  0.002 kW    87.7 m    6.9 km
 45.0      0.002       71.5      6.1
 90.0      0.000       75.3      4.8
135.0      0.000      103.1      5.9
180.0      0.002       91.7      6.9
225.0      0.002      135.6      8.9
270.0      0.330      137.8     28.8
315.0      0.023      135.8     15.7
```

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 105 m

Distance to Canadian border: 1801.3 km

**Proposal is within coordination distance of Mexican border
Distance to Mexican border: 228.6 km

Conditions at FCC monitoring station: Douglas AZ
Bearing: 255.8 degrees Distance: 532.2 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 353.9 degrees Distance: 819.1 km

No land mobile station failures found

Proposal is not within the Offshore Radio Service protected area

Study cell size: 1.00 km
Profile point spacing: 1.00 km

Maximum new IX to full-service and Class A: 0.50%
Maximum new IX to LPTV: 2.00%

Interference to BLDTT20091211AEN LIC, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	K16BZ-D	D16	LD	LIC	RUIDOSO, NM	BLDTT20091211AEN	
Undesireds:	K46FE-D	D16	LD	APP	ARTESIA, NM	K46FE-D Ch-16 Prop	161.5 km
	KLUZ-TV	D16	DT	CP	ALBUQUERQUE, NM	BLANK0000028361	210.0
	KUPT-LD	D16	LD	LIC	ALBUQUERQUE, NM	BLDTL20141007ACL	210.4
	KTSM-TV	D16	DT	LIC	EL PASO, TX	BLANK0000001605	189.4

Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
6813.9	35,778	5466.0	32,721	5313.0	31,402	5295.1	31,402	0.34	0.00

Undesired	Total IX		Unique IX, before		Unique IX, after	
K46FE-D D16 LD APP	29.9	0			17.9	0
KLUZ-TV D16 DT CP	120.1	103	113.2	103	105.2	103
KUPT-LD D16 LD LIC	4.0	0	1.0	0	0.0	0
KTSM-TV D16 DT LIC	35.9	1,216	31.9	1,216	31.9	1,216

Interference to proposal, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	K46FE-D	D16	LD	APP	ARTESIA, NM	K46FE-D Ch-16 Prop	
Undesireds:	K16BZ-D	D16	LD	LIC	RUIDOSO, NM	BLDTT20091211AEN	161.5 km

Service area		Terrain-limited		IX-free		Percent IX	
557.9	16,295	553.9	16,295	496.8	16,283	10.29	0.07

Undesired	Total IX		Unique IX		Prcnt Unique IX	
K16BZ-D D16 LD LIC	57.0	12	57.0	12	10.29	0.07

Channel and Facility Information

Section	Question	Response
Proposed Community of License	Facility ID	32332
	State	New Mexico
	City	ARTESIA
	LPT Channel	16

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1052108
Coordinates (NAD83)	Latitude	32° 47' 38.0" N+
	Longitude	104° 12' 31.0" W-
	Structure Type	TOWER-A free standing or guyed struct
	Overall Structure Height	321.3 meters
	Support Structure Height	294.6 meters
	Ground Elevation (AMSL)	1131.1 meters
Antenna Data	Height of Radiation Center Above Ground Level	45.7 meters
	Height of Radiation Center Above Mean Sea Level	1176.8 meters
	Effective Radiated Power	0.86 kW

Antenna Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	No
	Antenna ID	
Antenna Manufacturer and Model	Manufacturer:	SCA
	Model	PR-TV
	Rotation	285 degrees
	Electrical Beam Tilt	Not Applicable
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Horizontal
Elevation Radiation Pattern	Does the proposed antenna propose elevation radiation patterns that vary with azimuth for reasons other than the use of mechanical beam tilt?	No
	Uploaded file for elevation antenna (or radiation) pattern data	
	Out-of-Channel Emission Mask:	Stringent

Directional Antenna Relative Field Values (Pre-rotated Pattern)

Degree	V_A (Authorized Value)	Degree	V_A (Authorized Value)	Degree	V_A (Authorized Value)	Degree	V_A (Authorized Value)
0	1.0	**90**	0.047	**180**	0.025	**270**	0.047
10	0.808	**100**	0.046	**190**	0.027	**280**	0.049
20	0.430	**110**	0.046	**200**	0.028	**290**	0.049
30	0.165	**120**	0.046	**210**	0.030	**300**	0.053
40	0.090	**130**	0.040	**220**	0.038	**310**	0.059
50	0.059	**140**	0.038	**230**	0.040	**320**	0.090
60	0.053	**150**	0.030	**240**	0.046	**330**	0.165
70	0.049	**160**	0.028	**250**	0.046	**340**	0.430
80	0.049	**170**	0.027	**260**	0.046	**350**	0.808

Additional Azimuths

Degree	V_A