

ENGINEERING EXHIBIT

Application for Minor Modification of Digital Low Power Television Station Construction Permit

prepared for

Gray Television Licensee, LLC

W20EQ-D Athens, GA

Facility ID 182462

Ch. 20 0.2 kW Directional

Gray Television Licensee, LLC (“Gray”) is the permittee of unbuilt digital Low Power Television station W20EQ-D, Channel 20, Athens GA, Facility ID 182462. W20EQ-D is authorized to operate pursuant to a Construction Permit (“CP”, file# BNPDTL-20090825AJQ) with 5 kW effective radiated power (“ERP”), nondirectional. *Gray* herein seeks a modification of the CP to specify a different transmitting location, a reduction in ERP, and use of a directional antenna.

The proposed facility will employ an antenna to be side-mounted on a structure having an overall height above ground of 6.6 meters. The structure does not require an FCC Antenna Structure Registration number since its overall height is less than 61 meters above ground and the structure passes the FCC’s “TOWAIR” slope test program. The proposed site is located more than 75 miles (121 km) from the reference coordinates of the markets listed in Appendix A of DA 09-1487¹ and is 35.3 km (21.9 miles) from the site authorized in the CP.

The proposed antenna is a Kathrein model K723147 (single panel) having horizontal polarization. The proposed ERP is 0.2 kW using a “simple” out of channel emission mask. A plot of the directional antenna’s azimuthal pattern is supplied in Figure 1. Figure 2 depicts the 51 dBμ coverage contour of the proposed facility as well as that of the CP facility, demonstrating compliance with §73.3572 for a minor change.

¹“Commencement of Rural, First-come, First-served digital licensing for Low Power Television and TV Translators Beginning August 25, 2009 and Commencement of Nationwide, First-come, First-served Digital Licensing for Low Power Television and TV Translator Services Beginning January 25, 2010,” Public Notice, DA 09-1487, Released June 29, 2009.

Interference study per OET Bulletin 69² shows that the proposal complies with the FCC's interference protection requirements toward all digital television, television translator, LPTV, and Class A stations. 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.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed facility 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 20 percent antenna relative field in downward elevations (pattern data shows 20 percent or less relative field at angles 30 to 90 degrees below the antenna), the calculated power density attributable to the proposed facility at locations near the transmitter site at a height of two meters above ground level is 15.9 $\mu\text{W}/\text{cm}^2$, which is 4.7 percent of the general population / uncontrolled maximum permissible exposure limit. This is 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.

²FCC 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 1.0 km terrain increment. Comparisons of various results of this computer program (run on a Mac processor) to the FCC's implementation of TVStudy show excellent correlation.

Engineering Exhibit
Gray Television Licensee, LLC (W20EQ-D)
(page 3 of 3)



List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2	Coverage Contour Comparison
Table 1	TVStudy Analysis of Proposal
Form 2100	Saved Version of Engineering Sections of FCC Form at Time of Upload

Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E.	January 24, 2023	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600

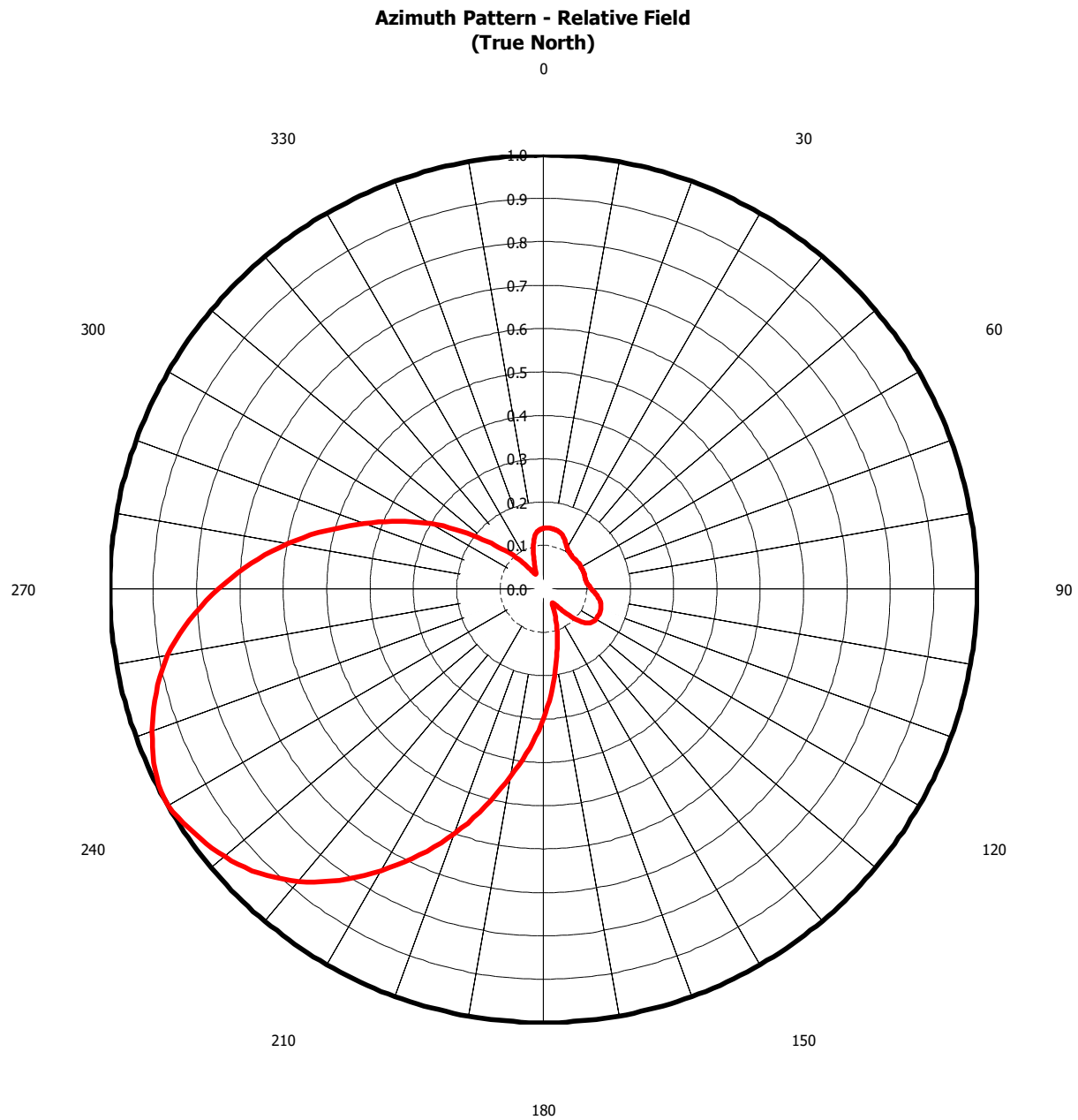
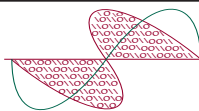


Figure 1
Antenna Azimuthal Pattern
W20EQ-D Athens, GA
Facility ID 182462
Ch. 20 0.2 kW Directional

prepared for
Gray Television Licensee, LLC

January, 2023



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

Figure 2
Coverage Contour Comparison
W20EQ-D Athens, GA
Facility ID 182462
Ch. 20 0.2 kW Directional

prepared for
Gray Television Licensee, LLC

January, 2023

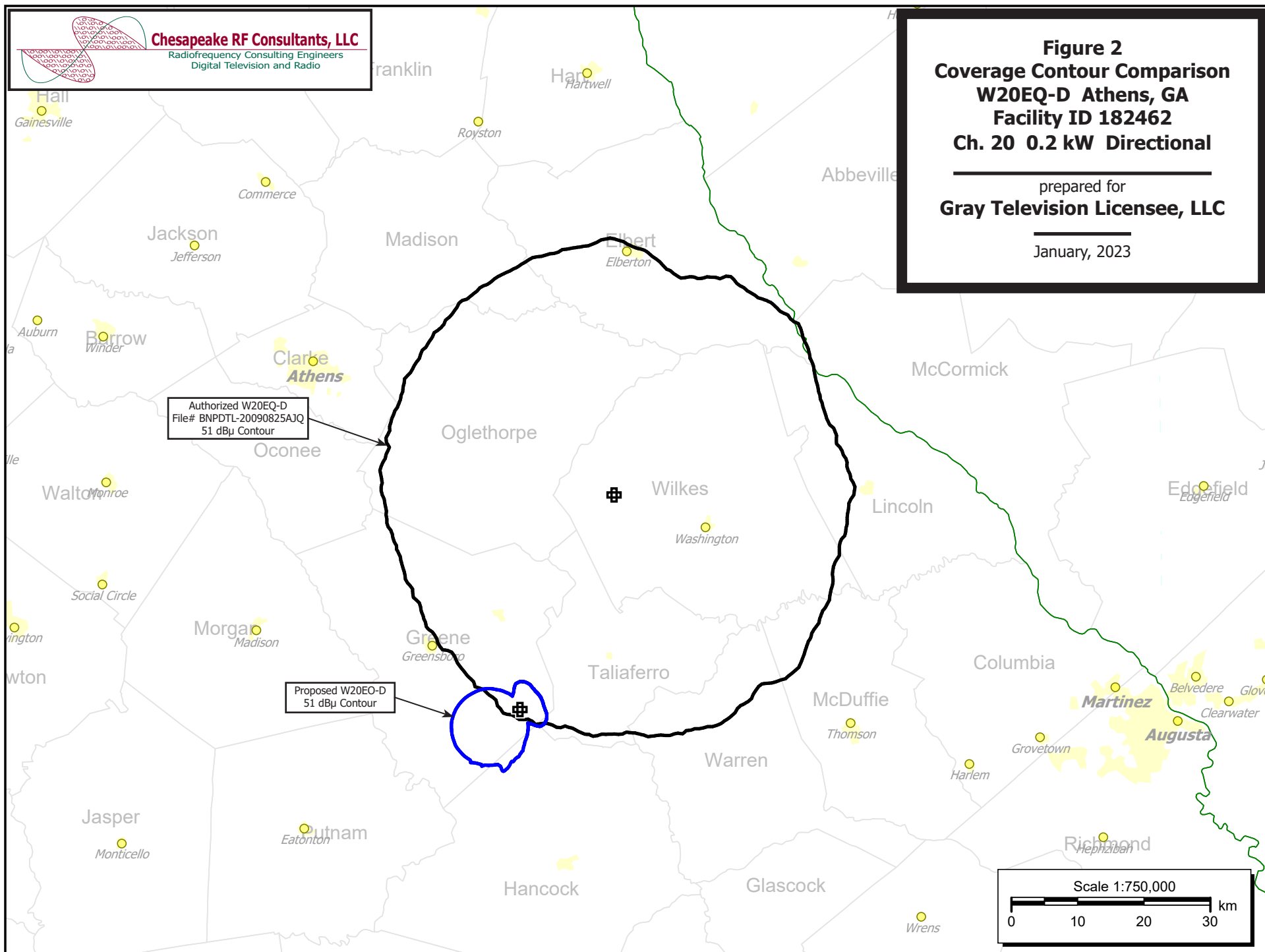


Table 1 W20EQ-D TVStudy Analysis of Proposal (page 1 of 2)



tvstudy v2.2.5 (4uoc83)
Database: localhost, Study: W20EQ-D prop CP-MOD, Model: Longley-Rice
Start: 2023.01.23 17:26:57

Study created: 2023.01.23 17:26:57

Study build station data: LMS TV 2023-01-23

Proposal: W20EQ-D D20 LD APP ATHENS, GA
File number: W20EQ-D prop CP-MOD
Facility ID: 182462
Station data: User record
Record ID: 4817
Country: U.S.

Build options:
Protect pre-transition records not on baseline channel

Search options:
Baseline record excluded if station has CP

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
No	WANF	D19	DT	LIC	ATLANTA, GA	BLANK0000205000	125.3 km
No	WBPI-CD	D19	DC	LIC	AUGUSTA, GA	BLANK0000059661	102.1
No	W19DN-D	D19	LD	LIC	MACON, GA	BLANK0000179078	95.4
No	WABM	D20	DT	LIC	BIRMINGHAM, AL	BLANK0000192391	349.2
No	WJJN-LD	D20	LD	LIC	DOTHAN, AL	BLANK0000122171	332.6
No	WCGZ-LD	D20	LD	LIC	LANETT, AL	BLANK0000190010	191.7
No	WCWJ	D20	DT	LIC	JACKSONVILLE, FL	BLANK0000097952	384.0
No	W20ET-D	D20	LD	CP	MADISON, FL	BNPDTL20090825AHV	344.4
No	WANN-CD	D20	DC	LIC	ATLANTA, GA	BLANK0000092680	125.3
No	W20EW-D	D20	LD	LIC	AUGUSTA, GA	BLANK0000194478	88.8
No	WDNN-CD	D20	DC	LIC	DALTON, GA	BLANK0000098043	228.5
No	W20DL-D	D20	LD	LIC	MACON, GA	BLANK0000197999	92.9
No	WHDS-LD	D20	LD	LIC	SAVANNAH, GA	BLANK0000101192	240.6
No	WCTV	D20	DT	LIC	THOMASVILLE, GA	BLANK0000121784	324.6
No	DW20CY	D20	LD	APP	TIFTON, GA	BDFCDTL20091118AGP	231.6
No	WYMT-TV	D20	DT	CP	HAZARD, KY	BLANK0000185947	412.0
No	W20EK-D	D20	LD	LIC	ANDREWS, ETC, NC	BLANK0000120275	208.4
No	WUNF-TV	D20	DD	LIC	ASHEVILLE, NC	BLANK0000093577	197.8
No	WUNC-TV	D20	DT	LIC	CHAPEL HILL, NC	BLANK0000138116	441.7
No	WDMC-LD	D20	LD	LIC	CHARLOTTE, NC	BLANK0000164588	291.6
No	WCBD-TV	D20	DT	LIC	CHARLESTON, SC	BLANK0000184909	316.9
No	WZTV	D20	DT	LIC	NASHVILLE, TN	BLANK0000115725	460.7
No	WABE-TV	D21	DT	LIC	ATLANTA, GA	BLANK0000143418	123.5
No	DWANX-LP	D21+	LD	APP	COLUMBUS, GA	BLANK0000071786	214.1
No	WTMH-LD	D21	LD	LIC	MACON, GA	BLANK0000205957	95.1
No	W21DV-D	D21	LD	LIC	BRYSON CITY, NC	BLANK0000080638	213.1
No	WEBA-TV	D21	DT	LIC	ALLENDALE, SC	BLANK0000145391	156.2

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D20
Mask: Simple
Latitude: 33 29 21.70 N (NAD83)
Longitude: 83 2 25.00 W
Height AMSL: 192.0 m (Adjusted based on actual ground elevation calculation)
HAAT: 0.0 m
Peak ERP: 0.200 kW
Antenna: KAT-1x K723147 (ID 1008960) 240.0 deg
Elev Pattn: Generic

49.4 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	0.004 kW	1.6 m	4.7 km
45.0	0.002	13.2	4.0
90.0	0.002	10.8	4.2

Table 1 W20EQ-D TVStudy Analysis of Proposal
(page 2 of 2)



135.0	0.002	3.0	3.8
180.0	0.018	39.9	7.7
225.0	0.169	32.1	12.1
270.0	0.113	27.4	10.7
315.0	0.003	3.5	4.5

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 16 m

Distance to Canadian border: 910.6 km

Distance to Mexican border: 1576.7 km

Conditions at FCC monitoring station: Powder Springs GA
Bearing: 285.4 degrees Distance: 161.1 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 296.9 degrees Distance: 2100.4 km

No land mobile station failures found

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 proposal scenario 1
4.42% interference received

Desired:	Call W20EQ-D	Chan D20	Svc LD	Status APP	City, State ATHENS, GA	File Number W20EQ-D prop CP-MOD	Distance
Undesireds:	WUNF-TV	D20	DD	LIC	ASHEVILLE, NC	BLANK0000093577	197.8 km
	Service area			Terrain-limited		IX-free	Percent IX
	162.8	1,205		158.8	1,198	131.0	17.51 4.42
Undesired				Total IX		Unique IX	Prcnt Unique IX
WUNF-TV D20 DD LIC				27.8	53	27.8	53 17.51 4.42

**Channel and
Facility
Information**

Section	Question	Response
Facility ID	182462	
State	Georgia	
City	ATHENS	
LPD Channel	20	

Antenna Location
Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	No
	ASR Number	
Coordinates (NAD83)	Latitude	33° 29' 21.7" N+
	Longitude	083° 02' 25.0" W-
	Structure Type	POLE-Pole used only to mount an antenna
	Overall Structure Height	6.6 meters
	Support Structure Height	6.6 meters
	Ground Elevation (AMSL)	182.0 meters
Antenna Data	Height of Radiation Center Above Ground Level	6.1 meters
	Height of Radiation Center Above Mean Sea Level	188.1 meters
	Effective Radiated Power	0.2 kW

Antenna
Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	1008960
Antenna Manufacturer and Model	Manufacturer:	KAT
	Model	1x K723147
	Rotation	240 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:	Simple

Directional Antenna Relative Field Values (Pre-rotated Pattern)

Degree	Value	Degree	Value	Degree	Value	Degree	Value
0	1.000	90	0.04	180	0.10	270	0.04
10	0.96	100	0.06	190	0.10	280	0.09
20	0.88	110	0.12	200	0.10	290	0.17
30	0.75	120	0.14	210	0.11	300	0.30
40	0.60	130	0.14	220	0.13	310	0.44
50	0.44	140	0.13	230	0.14	320	0.60
60	0.30	150	0.11	240	0.14	330	0.75
70	0.17	160	0.10	250	0.12	340	0.88
80	0.09	170	0.10	260	0.06	350	0.96

Additional Azimuths

Degree	V _A
--------	----------------