

## **ENGINEERING EXHIBIT**

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

prepared for

#### **Gray Television Licensee, LLC**

WTGB-LD Ocala, FL

Facility ID 182322

Ch. 17 5 kW Directional

*Gray Television Licensee, LLC* (“Gray”) is the permittee of unbuilt digital Low Power Television station WTGB-LD, Channel 17, Ocala FL, Facility ID 182322. WTGB-LD is authorized to operate pursuant to a Construction Permit (“CP”, file# BNPDTL-20090825AMY) with 1 kW effective radiated power (“ERP”), directional. *Gray* herein seeks a modification of the CP to specify a different transmitting location and increased ERP with a different directional antenna.

The proposed facility will employ an antenna to be side-mounted on the existing tower structure associated with FCC Antenna Structure Registration number 1019813. The site is located more than 75 miles (121 km) from the reference coordinates of the markets listed in Appendix A of DA 09-1487<sup>1</sup> and is 28.3 km (17.6 miles) from the CP site. No change to the overall structure height is proposed.

The proposed antenna is a Kathrein 1x2 K723147 array having horizontal polarization (2 stacked panels oriented at the same azimuth). The proposed ERP is 5 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 dB $\mu$  coverage contour of the proposed facility as well as that of the CP facility, demonstrating compliance with §73.3572 for a minor change.

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<sup>1</sup>“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 69<sup>2</sup> 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 40 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  $5.2 \mu\text{W}/\text{cm}^2$ , which is 1.6 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 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 change in structure height is proposed.

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<sup>2</sup>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 1.0 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.

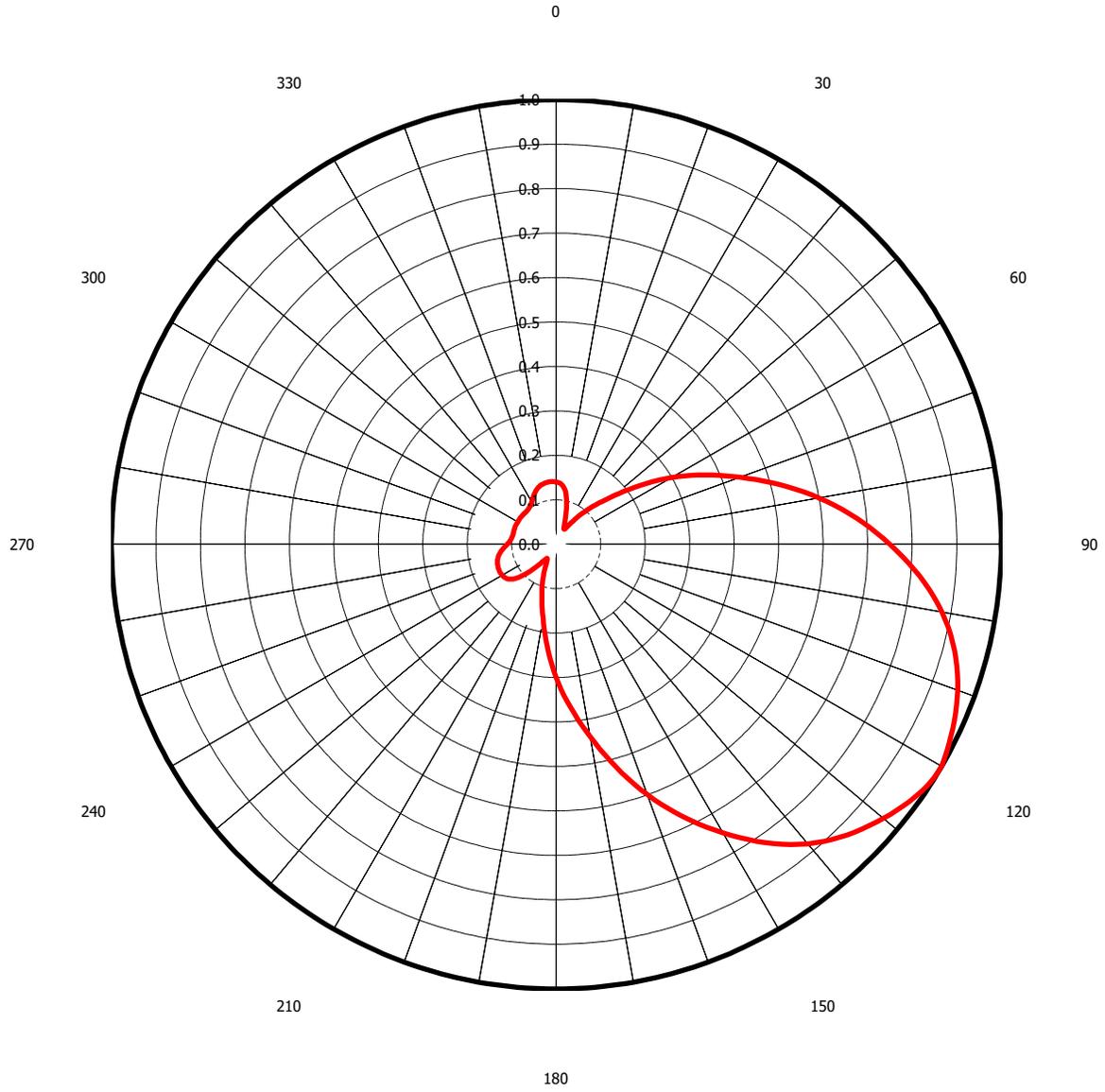
List of Attachments

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 30, 2023  
207 Old Dominion Road      Yorktown, VA 23692      703-650-9600

**Azimuth Pattern - Relative Field  
(True North)**



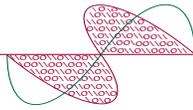
**Figure 1**  
**Antenna Azimuthal Pattern**  
**WTGB-LD Ocala, FL**  
**Facility ID 182322**  
**Ch. 17 5 kW Directional**

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January, 2023

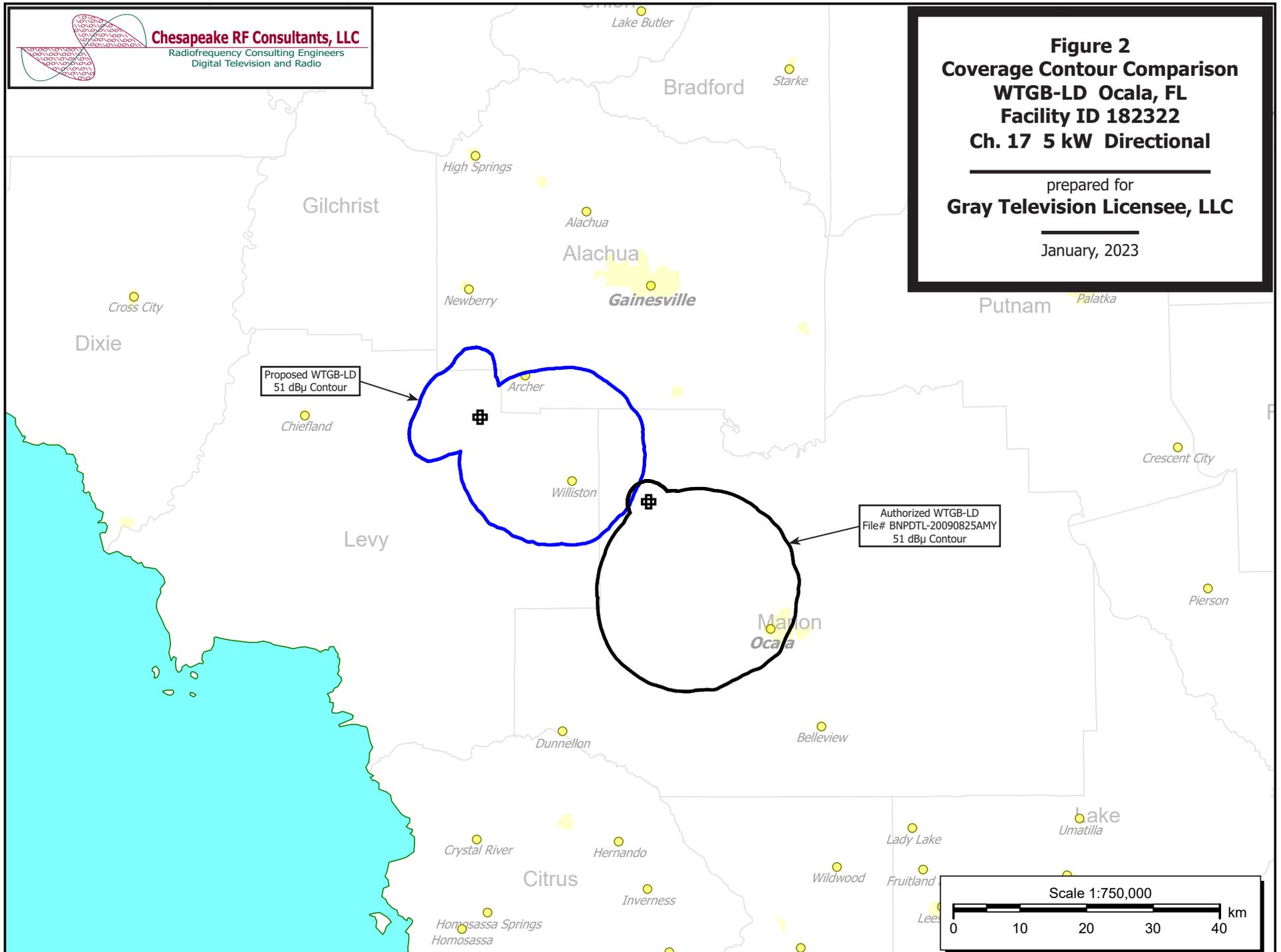


**Chesapeake RF Consultants, LLC**  
Radiofrequency Consulting Engineers  
Digital Television and Radio

**Figure 2**  
**Coverage Contour Comparison**  
**WTGB-LD Ocala, FL**  
**Facility ID 182322**  
**Ch. 17 5 kW Directional**

prepared for  
**Gray Television Licensee, LLC**

January, 2023



**Table 1 WTGB-LD TVStudy Analysis of Proposal**  
 (page 1 of 3)



tvstudy v2.2.5 (4uoc83)  
 Database: localhost, Study: W17EL-D\_1019813\_CP-MOD, Model: Longley-Rice  
 Start: 2023.01.27 14:24:49

Study created: 2023.01.27 14:24:49

Study build station data: LMS TV 2023-01-27

Proposal: WTGB-LD D17 LD APP Ocala, FL  
 File number: W17EL-D 1019813\_CP-MOD  
 Facility ID: 182322  
 Station data: User record  
 Record ID: 4821  
 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	WCJB-TV	D16	DT	LIC	GAINESVILLE, FL	BLCDT20071119AJB	19.6 km
No	WRCF-CD	D16	DC	LIC	ORLANDO, FL	BLANK0000099575	176.4
No	WRCF-CD	D16	DC	LIC	ORLANDO, FL	BLANK0000121630	176.4
No	W16DQ-D	D16	LD	LIC	TAMPA, FL	BLANK0000122658	186.6
No	WGBP-TV	D17	DD	APP	OPELIKA, AL	BLANK0000194947	396.7
No	WGBP-TV	D17	DD	LIC	OPELIKA, AL	BLANK0000129713	396.7
No	WPXB-LD	D17	LD	LIC	DAYTONA BEACH, FL	BLANK0000157385	142.7
No	WJVF-LD	D17	LD	LIC	Jacksonville, FL	BLANK0000129911	149.7
No	WJVF-LD	D17	LD	CP	Jacksonville, FL	BLANK0000157569	133.0
No	WJVF-LD	D17	LD	LIC	Jacksonville, FL	BLANK0000203935	133.0
No	WFXU	D17	DT	LIC	LIVE OAK, FL	BLANK0000112143	126.5
No	WTCN-CD	D17	DC	LIC	PALM BEACH, FL	BLANK0000072130	360.1
No	W17EM-D	D17	LD	CP	PANAMA CITY, FL	BNPDTL20090825BW	287.1
No	W17EM-D	D17	LD	APP	PANAMA CITY, FL	BLANK0000116864	287.1
No	DWHRT-LD	D17z	LD	APP	SEBRING, ETC., FL	BLANK0000013279	248.0
Yes	WFTS-TV	D17	DT	LIC	TAMPA, FL	BLANK0000125994	184.0
No	WEWA-LD	D17	LD	LIC	WEWAHITCHKA, FL	BLANK0000190157	262.6
No	W17ES-D	D17	LD	LIC	ADEL, GA	BLANK0000194414	200.5
No	WTAT-TV	D17	DT	LIC	CHARLESTON, SC	BLANK0000184941	473.4
No	WESH	D18	LD	LIC	DAYTONA BEACH, FL	BLANK0000121420	137.1
Yes	W18FA-D	D18	LD	CP	GAINESVILLE, FL	BNPDTL20090825AOI	7.1
No	WJXT	D18	DT	LIC	JACKSONVILLE, FL	BLANK0000097950	133.7
No	WMOR-TV	D18	DT	LIC	LAKELAND, FL	BLANK0000125736	186.6
No	WQFT-LD	D18	LD	LIC	OCALA, FL	BLANK0000203079	86.8

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D17  
 Mask: Simple  
 Latitude: 29 28 23.50 N (NAD83)  
 Longitude: 82 35 19.90 W  
 Height AMSL: 59.4 m  
 HAAT: 0.0 m  
 Peak ERP: 5.00 kW  
 Antenna: KAT 1x2 723147 120.0 deg  
 Elev Pattn: Generic

49.0 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	0.098 kW	37.5 m	11.6 km
45.0	0.084	33.3	10.6
90.0	2.81	39.0	26.1
135.0	4.23	36.9	27.5
180.0	0.450	32.8	15.7
225.0	0.040	42.0	9.9

**Table 1 WTGB-LD TVStudy Analysis of Proposal**  
(page 2 of 3)



270.0 0.060 43.9 11.2  
315.0 0.050 39.5 10.1

Database HAAT does not agree with computed HAAT  
Database HAAT: 0 m Computed HAAT: 38 m

Distance to Canadian border: 1356.4 km

Distance to Mexican border: 1461.9 km

Conditions at FCC monitoring station: Vero Beach FL  
Bearing: 136.9 degrees Distance: 281.9 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:  
Bearing: 306.0 degrees Distance: 2370.8 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%

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Interference to BLANK0000125994 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WFTS-TV	D17	DT	LIC	TAMPA, FL	BLANK0000125994	
Undesireds:	WTGB-LD	D17	LD	APP	Ocala, FL	W17EL-D 1019813_CP-MOD	184.0 km
	WRCF-CD	D16	DC	LIC	ORLANDO, FL	BLANK0000099575	142.1
	WTCN-CD	D17	DC	LIC	PALM BEACH, FL	BLANK0000072130	224.7
	WMOR-TV	D18	DT	LIC	LAKELAND, FL	BLANK0000125736	2.5
	Service area		Terrain-limited		IX-free, before	IX-free, after	Percent New IX
	40224.9	5,243,104	40207.0	5,241,657	40165.0	5,237,632	40156.9 5,236,676 0.02 0.02
Undesired			Total IX		Unique IX, before	Unique IX, after	
WTGB-LD D17 LD APP		8.1	956		8.1	956	
WTCN-CD D17 DC LIC		23.1	2,042	23.1	2,042	2,042	
WMOR-TV D18 DT LIC		18.9	1,983	18.9	1,983	1,983	

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Interference to BNPDTL20090825AOI CP scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	W18FA-D	D18	LD	CP	GAINESVILLE, FL	BNPDTL20090825AOI	
Undesireds:	WTGB-LD	D17	LD	APP	Ocala, FL	W17EL-D 1019813_CP-MOD	7.1 km
	WJXT	D18	DT	LIC	JACKSONVILLE, FL	BLANK0000097950	135.0
	WMOR-TV	D18	DT	LIC	LAKELAND, FL	BLANK0000125736	180.0
	WQFT-LD	D18	LD	LIC	OCALA, FL	BLANK0000203079	79.7
	NEW	D19	LD	CP	GAINESVILLE, FL	BNPDTL20090825ANR	0.0
	Service area		Terrain-limited		IX-free, before	IX-free, after	Percent New IX
	1524.3	107,776	1524.3	107,776	1477.9	106,286	1460.7 105,898 1.16 0.37
Undesired			Total IX		Unique IX, before	Unique IX, after	
WTGB-LD D17 LD APP		43.4	1,441		17.2	388	
WJXT D18 DT LIC		29.3	751	17.2	379	379	
WMOR-TV D18 DT LIC		3.0	0	3.0	0	0	
WQFT-LD D18 LD LIC		2.0	14	0.0	0	0	
NEW D19 LD CP		26.3	1,111	13.1	739	58	

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Interference to proposal scenario 1

**Table 1 WTGB-LD TVStudy Analysis of Proposal**  
 (page 3 of 3)



Call	Chan	Svc	Status	City, State	File Number	Distance
Desired: WTGB-LD	D17	LD	APP	Ocala, FL	W17EL-D 1019813_CP-MOD	
Undesireds: WCJB-TV	D16	DT	LIC	GAINESVILLE, FL	BLCDT20071119AJB	19.6 km
WJVF-LD	D17	LD	LIC	Jacksonville, FL	BLANK0000129911	149.7
W17EM-D	D17	LD	CP	PANAMA CITY, FL	BNPDTL20090825BWX	287.1
Service area	Terrain-limited		IX-free		Percent IX	
863.2 23,695	863.2	23,695	847.1	23,577	1.87	0.50
Undesired	Total IX		Unique IX		Prcnt Unique IX	
WCJB-TV D16 DT LIC	16.1	118	16.1	118	1.87	0.50

**Channel and  
Facility  
Information**

Section	Question	Response
Facility ID	182322	
State	Florida	
City	OCALA	
LPD Channel	17	

**Antenna Location  
Data**

Section	Question	Response
<b>Antenna Structure Registration</b>	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1019813
<b>Coordinates (NAD83)</b>	Latitude	29° 28' 23.5" N+
	Longitude	082° 35' 19.9" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	92.0 meters
	Support Structure Height	88.4 meters
	Ground Elevation (AMSL)	21.6 meters
<b>Antenna Data</b>	Height of Radiation Center Above Ground Level	37.8 meters
	Height of Radiation Center Above Mean Sea Level	59.4 meters
	Effective Radiated Power	5 kW

**Antenna  
Technical Data**

Section	Question	Response
<b>Antenna Type</b>	Antenna Type	Directional Custom
	Do you have an Antenna ID?	No
	Antenna ID	
<b>Antenna Manufacturer and Model</b>	Manufacturer:	Kathrein
	Model	1x2 K723147
	Rotation	120 degrees
	Electrical Beam Tilt	Not Applicable
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Horizontal
<b>Elevation Radiation Pattern</b>	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	0.040	180	0.100	270	0.040
10	0.960	100	0.060	190	0.100	280	0.090
20	0.880	110	0.120	200	0.100	290	0.170
30	0.750	120	0.140	210	0.110	300	0.300
40	0.600	130	0.140	220	0.130	310	0.440
50	0.440	140	0.130	230	0.140	320	0.600
60	0.300	150	0.110	240	0.140	330	0.750
70	0.170	160	0.100	250	0.120	340	0.880
80	0.090	170	0.100	260	0.060	350	0.960

**Additional Azimuths**

Degree	V <sub>A</sub>
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