

## **ENGINEERING EXHIBIT**

### **Digital Low Power Television Station Application for Minor Modification of Licensed Facility** prepared for

**Gray Television Licensee, LLC**  
WTMH-LD Macon, GA  
Facility ID 185793  
Ch. 21 15 kW Nondirectional

*Gray Television Licensee, LLC* (“Gray”) is the licensee of digital Low Power Television station WTMH-LD, Channel 21, Facility ID 185793, Macon GA. WTMH-LD is licensed to operate at 9 kW effective radiated power (“ERP”) with a directional antenna (file# 0000190020). *Gray* herein seeks a minor modification Construction Permit to utilize a nondirectional antenna at increased ERP and antenna height.

No change in site location is proposed. The proposed facility will employ a new antenna system to be side-mounted on the tower structure associated with FCC Antenna Structure Registration number 1019967. No change to the overall structure height is proposed.

The proposed antenna is a Dielectric model DLP-12B having horizontal polarization. The proposed ERP is 15 kW using a “full service” out of channel emission mask.

Figure 1 depicts the 51 dB $\mu$  coverage contour of the proposed and licensed facilities, demonstrating compliance with §73.3572 for a minor change. Since the proposed 51 dB $\mu$  contour encompasses that of the licensed facility, no service loss area will be created. Considerable service improvement will result as the population within the 51 dB $\mu$  contour increases to 422,853 persons (2010 census), which is a 4.2-fold increase beyond the 99,650 persons within the licensed WTMH-LD facility’s 51 dB $\mu$  contour.

Interference study per OET Bulletin 69<sup>1</sup> shows that the proposal complies with the FCC's interference protection requirements toward all digital television, television translator, LPTV, and Class A stations. FCC processing of this proposal is requested using a 1.0 km cell size and 0.5 km terrain profile increment. 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 10 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  $0.7 \mu\text{W}/\text{cm}^2$ , which is 0.2 percent of the general population / uncontrolled maximum permissible 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.

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<sup>1</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 0.5 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 (WTMH-LD)**  
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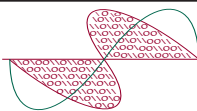


*List of Attachments*

Figure 1      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.      December 5, 2022  
207 Old Dominion Road      Yorktown, VA 23692      703-650-9600

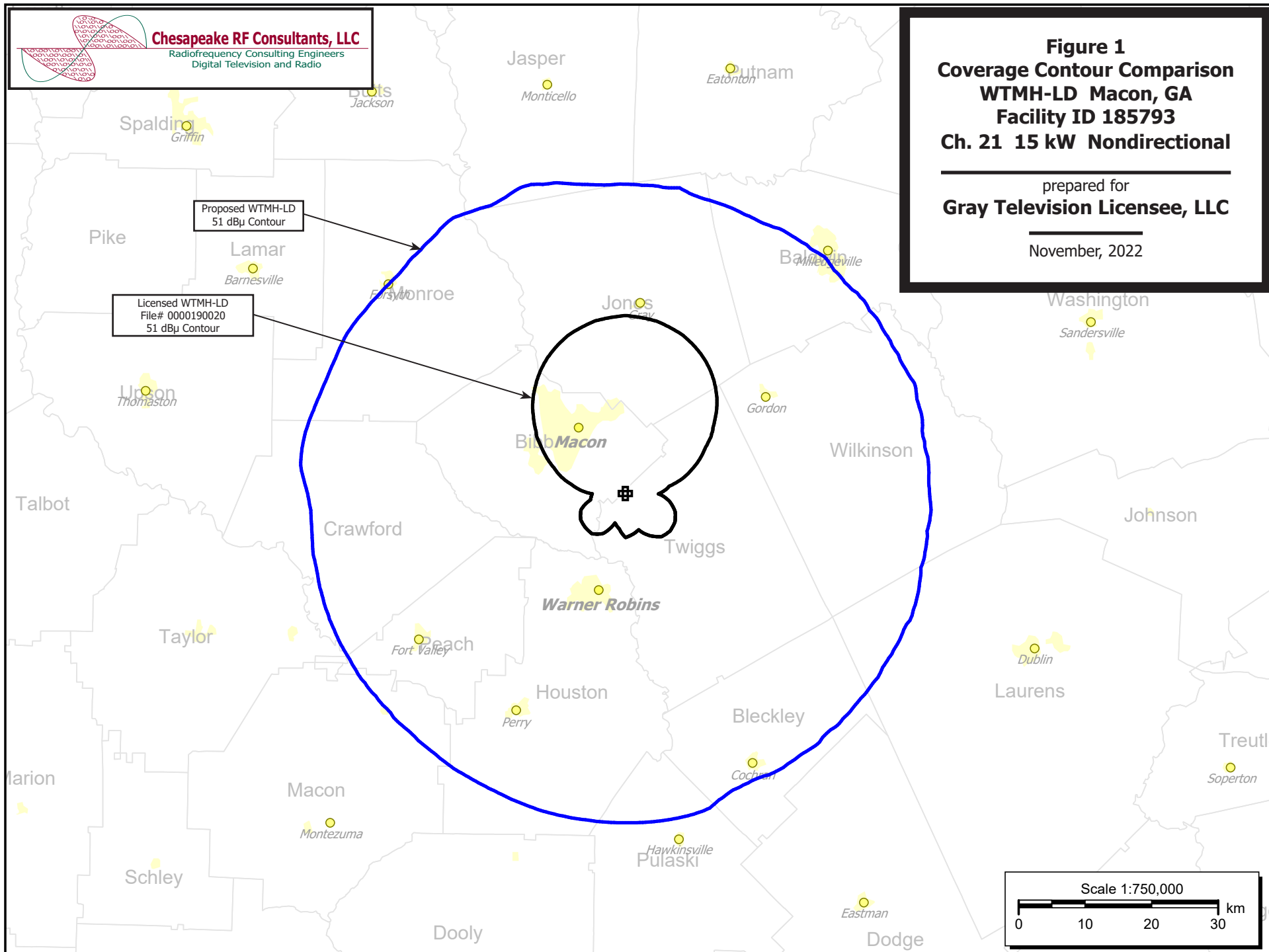


**Chesapeake RF Consultants, LLC**  
Radiofrequency Consulting Engineers  
Digital Television and Radio

**Figure 1**  
**Coverage Contour Comparison**  
**WTMH-LD Macon, GA**  
**Facility ID 185793**  
**Ch. 21 15 kW Nondirectional**

prepared for  
**Gray Television Licensee, LLC**

November, 2022



**Table 1 WTMH-LD TVStudy Analysis of Proposal**  
(page 1 of 4)



tvstudy v2.2.5 (4uoc83)  
Database: localhost, Study: WTMH-LD 1019967 Prop 1.0-0.5, Model: Longley-Rice  
Start: 2022.12.05 11:38:11

Study created: 2022.12.05 11:38:11

Study build station data: LMS TV 2022-12-04

Proposal: WTMH-LD D21 LD APP Macon, GA  
File number: WTMH-LD 1019967 Prop  
Facility ID: 185793  
Station data: User record  
Record ID: 4778  
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	W31FE-D	N14+	TX	LIC	Savannah, GA	BLTT20040915ADW	116.7 km
No	WCGZ-LD	D20	LD	LIC	LANETT, AL	BLANK0000190010	141.1
No	W20EQ-D	D20	LD	CP	ATHENS, GA	BNPDTL20090825AJQ	130.2
No	WANN-CD	D20	DC	LIC	ATLANTA, GA	BLANK0000092680	138.1
No	W20EW-D	D20	LD	LIC	AUGUSTA, GA	BLANK0000194478	151.2
Yes	W20DL-D	D20	LD	LIC	MACON, GA	BLANK0000197999	14.6
No	WCTV	D20	DT	LIC	THOMASVILLE, GA	BLANK0000121784	234.1
No	DW20CY	D20	LD	APP	TIFTON, GA	BDFCDTL20091118AGP	145.5
No	WAUT-LD	D21	LD	LIC	AUBURN, AL	BLANK0000179315	178.6
Yes	WDHN	D21	DT	LIC	DOTHAN, AL	BLCDT20090303ACR	235.7
No	WTO	D21	DT	LIC	HOMEWOOD, AL	BLANK0000192390	313.3
No	WETU-LD	D21	LD	LIC	MONTGOMERY, AL	BLANK0000132463	260.0
No	WPAN	D21	DT	LIC	FORT WALTON BEACH, FL	BLANK0000124712	428.8
No	WJEB-TV	D21	DT	LIC	JACKSONVILLE, FL	BLANK0000105949	333.7
No	W21EH-D	D21	LD	CP	TALLAHASSEE, FL	BNPDTL20090825AJC	262.3
Yes	WABE-TV	D21	DT	LIC	ATLANTA, GA	BLANK0000143418	133.3
Yes	DWANX-LP	D21+	LD	APP	COLUMBUS, GA	BLANK0000071786	134.6
No	WKSJ-LD	D21	LD	LIC	SUMMERVILLE/TRION, GA	BLDTL20100104AAD	249.8
No	W21EL-D	D21	LD	LIC	VALDOSTA, GA	BLANK0000177717	231.6
No	W21DV-D	D21	LD	LIC	BRYSON CITY, NC	BLANK0000080638	292.7
No	WUNG-TV	D21	DT	LIC	CONCORD, NC	BLANK0000113063	397.0
No	W34EP-D	D21	LD	CP	SAPPHIRE VALLEY,ETC., NC	BLANK0000199977	306.3
Yes	WEBA-TV	D21	DT	LIC	ALLENDALE, SC	BLANK0000145391	207.2
No	W14CX-D	D21	LD	CP	KNOXVILLE, TN	BLANK0000195611	362.5
No	WCOV-TV	D22	DT	LIC	MONTGOMERY, AL	BLANK0000115937	259.3
No	WTWC-TV	D22	DT	LIC	TALLAHASSEE, FL	BLANK0000118579	233.5
No	W22EC-D	D22	LD	LIC	LA GRANGE, GA	BLANK0000195925	153.1
No	WHSG-TV	D22	DT	LIC	MONROE, GA	BLANK0000081582	133.3
No	WJCL	D22	DT	LIC	SAVANNAH, GA	BLANK0000029019	222.0
No	WCTD-LD	D22	LD	LIC	DUCKTOWN, TN	BLANK0000185309	221.2

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D21  
Mask: Full Service  
Latitude: 32 45 4.30 N (NAD83)  
Longitude: 83 33 26.70 W  
Height AMSL: 270.7 m  
HAAT: 0.0 m  
Peak ERP: 15.0 kW  
Antenna: Omnidirectional  
Elec Pattn: Generic  
Elec Tilt: 1.00

49.5 dBu contour:

**Table 1 WTMH-LD TVStudy Analysis of Proposal**  
(page 2 of 4)



Azimuth	ERP	HAAT	Distance
0.0 deg	15.0 kW	146.3 m	48.3 km
45.0	15.0	137.0	47.6
90.0	15.0	133.6	47.4
135.0	15.0	153.7	48.8
180.0	15.0	192.5	51.1
225.0	15.0	174.7	50.1
270.0	15.0	164.8	49.5
315.0	15.0	160.9	49.2

Database HAAT does not agree with computed HAAT  
Database HAAT: 0 m Computed HAAT: 158 m

Distance to Canadian border: 995.1 km

Distance to Mexican border: 1496.1 km

Conditions at FCC monitoring station: Powder Springs GA  
Bearing: 319.1 degrees Distance: 164.3 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:  
Bearing: 299.1 degrees Distance: 2096.5 km

No land mobile station failures found

Study cell size: 1.00 km  
Profile point spacing: 0.50 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 BLANK0000197999 LIC scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	W20DL-D	D20	LD	LIC	MACON, GA	BLANK0000197999	
Undesireds:	WTMH-LD	D21	LD	APP	Macon, GA	WTMH-LD 1019967 Prop	14.6 km
	WUNF-TV	D20	DD	LIC	ASHEVILLE, NC	BLANK0000093577	284.1
Service area		Terrain-limited		IX-free, before		IX-free, after	Percent New IX
132.9		67,027		131.9		66,940	0.76 0.30
				IX-free, before		IX-free, after	Percent New IX
Undesired		Total IX		Unique IX, before		Unique IX, after	
WTMH-LD D21 LD APP		1.0		199		1.0	199
WUNF-TV D20 DD LIC		1.0		354		1.0	354

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Interference to BLCDT20090303ACR LIC scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WDHN	D21	DT	LIC	DOETHAN, AL	BLCDT20090303ACR	
Undesireds:	WTMH-LD	D21	LD	APP	Macon, GA	WTMH-LD 1019967 Prop	235.7 km
	WCTV	D20	DT	LIC	THOMASVILLE, GA	BLANK0000121784	145.3
	WTTT	D21	DT	LIC	HOMEWOOD, AL	BLANK0000192390	286.2
	WPAN	D21	DT	LIC	FORT WALTON BEACH, FL	BLANK0000124712	208.0
	WABE-TV	D21	DT	LIC	ATLANTA, GA	BLANK0000143418	294.5
	WCOV-TV	D22	DT	LIC	MONTGOMERY, AL	BLANK0000115937	114.6
	WTWC-TV	D22	DT	LIC	TALLAHASSEE, FL	BLANK0000118579	142.0
Service area		Terrain-limited		IX-free, before		IX-free, after	Percent New IX
22894.1		452,939		22744.6		452,287	0.00 0.00
				IX-free, before		IX-free, after	Percent New IX
Undesired		Total IX		Unique IX, before		Unique IX, after	
WTMH-LD D21 LD APP		3.0		0		0.0	0
WCTV D20 DT LIC		20.4		175		0.0	0
WTTT D21 DT LIC		98.1		382		32.4	115
WPAN D21 DT LIC		41.1		463		35.1	458

**Table 1 WTMH-LD TVStudy Analysis of Proposal**  
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WABE-TV D21 DT LIC	15.1	15	2.0	8	1.0	8
WCOV-TV D22 DT LIC	268.2	1,614	210.5	1,348	210.5	1,348
WTWC-TV D22 DT LIC	59.1	759	38.7	584	38.7	584

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Interference to BLANK0000143418 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WABE-TV	D21	DT	LIC	ATLANTA, GA	BLANK0000143418	
Undesireds:	WTMH-LD	D21	LD	APP	Macon, GA	WTMH-LD 1019967 Prop	133.3 km
	WANN-CD	D20	DC	LIC	ATLANTA, GA	BLANK0000092680	5.4
	WDNN-CD	D20	DC	LIC	DALTON, GA	BLANK0000098043	125.1
	WDHN	D21	DT	LIC	DOTHAN, AL	BLCDT20090303ACR	294.5
	WTTT	D21	DT	LIC	HOMEWOOD, AL	BLANK0000192390	230.8
	WEBA-TV	D21	DT	LIC	ALLENDALE, SC	BLANK0000145391	279.7
	WUXP-TV	D21	DT	LIC	NASHVILLE, TN	BLANK0000159943	357.2
	WHSG-TV	D22	DT	LIC	MONROE, GA	BLANK0000081582	2.8
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	Service area	Terrain-limited		IX-free, before		IX-free, after	Percent New IX
	18936.3	5,310,713	18622.9	5,292,169	17387.3	5,093,974	17095.7 5,086,014 1.68 0.16
Undesired	Total IX		Unique IX, before		Unique IX, after		
WTMH-LD D21 LD APP	366.5	16,107			291.6	7,960	
WANN-CD D20 DC LIC	348.9	76,782	182.3	47,624	181.3	47,531	
WDNN-CD D20 DC LIC	19.1	1,913	5.0	159	5.0	159	
WDHN D21 DT LIC	46.8	1,392	13.9	271	11.9	89	
WTTT D21 DT LIC	386.0	44,937	262.3	31,554	252.4	30,046	
WEBA-TV D21 DT LIC	53.5	2,068	32.7	1,572	26.7	1,440	
WUXP-TV D21 DT LIC	32.9	2,855	6.9	82	6.0	82	
WHSG-TV D22 DT LIC	660.6	111,538	455.1	78,783	438.2	77,476	

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Interference to BLANK0000071786 APP scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	DWANN-LP	D21+	LD	APP	COLUMBUS, GA	BLANK0000071786	
Undesireds:	WTMH-LD	D21	LD	APP	Macon, GA	WTMH-LD 1019967 Prop	134.6 km
	WAUT-LD	D21	LD	LIC	AUBURN, AL	BLANK0000179315	55.4
	WDHN	D21	DT	LIC	DOTHAN, AL	BLCDT20090303ACR	133.6
	WTTT	D21	DT	LIC	HOMEWOOD, AL	BLANK0000192390	212.6
	WETU-LD	D21	LD	LIC	MONTGOMERY, AL	BLANK0000132463	127.5
	WABE-TV	D21	DT	LIC	ATLANTA, GA	BLANK0000143418	161.1
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	Service area	Terrain-limited		IX-free, before		IX-free, after	Percent New IX
	3766.8	307,625	3723.6	307,461	3411.2	300,396	3411.2 300,396 0.00 0.00
Undesired	Total IX		Unique IX, before		Unique IX, after		
WTMH-LD D21 LD APP	2.0	29			0.0	0	
WAUT-LD D21 LD LIC	92.4	1,566	52.2	1,288	52.2	1,288	
WDHN D21 DT LIC	236.0	5,727	198.8	5,456	198.8	5,456	
WTTT D21 DT LIC	23.1	105	10.1	0	10.1	0	
WETU-LD D21 LD LIC	1.0	21	0.0	0	0.0	0	
WABE-TV D21 DT LIC	18.1	75	4.0	7	4.0	7	

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Interference to BLANK0000145391 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WEBA-TV	D21	DT	LIC	ALLENDALE, SC	BLANK0000145391	
Undesireds:	WTMH-LD	D21	LD	APP	Macon, GA	WTMH-LD 1019967 Prop	207.2 km
	WABE-TV	D21	DT	LIC	ATLANTA, GA	BLANK0000143418	279.7
	WUNG-TV	D21	DT	LIC	CONCORD, NC	BLANK0000113063	251.9
	WUNJ-TV	D21	DT	LIC	WILMINGTON, NC	BLANK0000126699	318.8
	WJCL	D22	DT	LIC	SAVANNAH, GA	BLANK0000029019	125.7
	WACH	D22	DT	LIC	COLUMBIA, SC	BLANK0000093772	118.7
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	Service area	Terrain-limited		IX-free, before		IX-free, after	Percent New IX
	14824.0	640,701	14782.4	637,663	14689.0	632,880	14688.0 632,880 0.01 0.00
Undesired	Total IX		Unique IX, before		Unique IX, after		

**Table 1 WTMH-LD TVStudy Analysis of Proposal**  
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WTMH-LD D21 LD APP	5.9	758			1.0	0
WABE-TV D21 DT LIC	18.8	3,416	8.9	1,650	6.9	911
WUNG-TV D21 DT LIC	31.7	2,058	13.9	166	13.9	166
WUNJ-TV D21 DT LIC	2.0	9	0.0	0	0.0	0
WJCL D22 DT LIC	23.0	96	23.0	96	23.0	96
WACH D22 DT LIC	35.6	1,096	29.7	979	29.7	979

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Interference to proposal scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WTMH-LD	D21	LD	APP	Macon, GA	WTMH-LD 1019967 Prop	
Undesireds:	WDHN	D21	DT	LIC	DOTHAN, AL	BLCDT20090303ACR	235.7 km
	WABE-TV	D21	DT	LIC	ATLANTA, GA	BLANK0000143418	133.3
	WEBA-TV	D21	DT	LIC	ALLENDALE, SC	BLANK0000145391	207.2

Service area		Terrain-limited		IX-free		Percent IX	
7597.1	440,778	7502.1	439,992	7334.4	434,468	2.23	1.26
Undesired		Total IX		Unique IX		Prct Unique IX	
WDHN D21 DT LIC		37.0	4,029	25.0	468	0.33	0.11
WABE-TV D21 DT LIC		139.7	4,213	127.7	1,495	1.70	0.34
WEBA-TV D21 DT LIC		7.0	843	2.0	0	0.03	0.00



**Channel and  
Facility  
Information**

Section	Question	Response
Facility ID	185793	
State	Georgia	
City	MACON	
LPD Channel	21	

Antenna Location  
Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1019967
Coordinates (NAD83)	Latitude	32° 45' 04.3" N+
	Longitude	083° 33' 26.7" W-
	Structure Type	TOWER-A free standing or guyed struct
	Overall Structure Height	274.0 meters
	Support Structure Height	273.1 meters
	Ground Elevation (AMSL)	95.4 meters
Antenna Data	Height of Radiation Center Above Ground Level	175.3 meters
	Height of Radiation Center Above Mean Sea Level	270.7 meters
	Effective Radiated Power	15 kW

**Antenna  
Technical Data**

Section	Question	Response
Antenna Type	Antenna Type	Non-Directional
	Do you have an Antenna ID?	
	Antenna ID	
Antenna Manufacturer and Model	Manufacturer:	Dielectric
	Model	DLP-8B
	Rotation	
	Electrical Beam Tilt	1
	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:	Full Service