

ENGINEERING EXHIBIT

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

prepared for

Gray Television Licensee, LLC

W28FD-D Greenville, FL

Facility ID 186724

Ch. 28 15 kW Directional

Gray Television Licensee, LLC (“Gray”) is the licensee of digital Low Power Television station W28FD-D, Channel 28, Facility ID 186724, Greenville FL. W28FD-D is licensed to operate at 15 kW effective radiated power (“ERP”) with a directional antenna (file# 0000198523, granted September 7, 2022). *Gray* herein seeks a minor modification Construction Permit to relocate W28FD-D and to utilize increased antenna height.

The proposed facility will employ the currently licensed antenna to be relocated and side-mounted on the tower structure associated with FCC Antenna Structure Registration number 1050956, located 43.5 km (27.1 miles) from the licensed site. No change to the overall structure height is proposed.

The W28FD-D antenna is a Dielectric model DLP-8B having horizontal polarization. The proposed ERP is 15 kW using a “full service” out of channel emission mask. A plot of the directional antenna’s azimuthal pattern is supplied in Figure 1. Figure 2 depicts the coverage contour of the proposed facility as well as that of the licensed facility, demonstrating compliance with §73.3572 for a minor change.

Interference study per OET Bulletin 69¹ shows that the proposal complies with the FCC’s interference protection requirements toward all digital television, television translator, LPTV, and

¹FCC 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 FCC’s implementation of

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 25 percent antenna relative field in downward elevations (pattern data shows 25 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 $9.0 \mu\text{W}/\text{cm}^2$, which is 2.4 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. No increase in structure height is proposed.

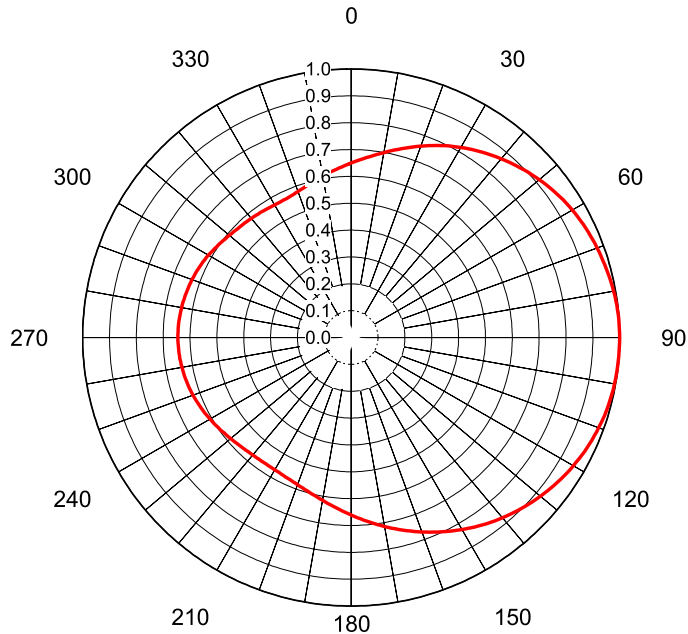
List of Attachments

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.	September 21, 2023	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600

TVStudy show excellent correlation.



AZIMUTH PATTERN Horizontal Polarization

Proposal No. **20220314jmd**
Date **21-Sep-23**
Call Letters **W28FD-D**
Channel **28**
Frequency **557 MHz**
Antenna Type **DLP-8B**
Gain **1.76 (2.45dB)**
Calculated

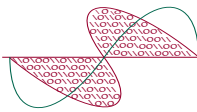
Pattern Number **TLP-B-28 Hpol**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.650	36	0.849	72	0.979	108	0.985	144	0.857	180	0.661	216	0.568	252	0.630	288	0.633
1	0.654	37	0.854	73	0.980	109	0.983	145	0.852	181	0.656	217	0.569	253	0.632	289	0.632
2	0.659	38	0.859	74	0.982	110	0.981	146	0.847	182	0.651	218	0.569	254	0.633	290	0.631
3	0.663	39	0.864	75	0.984	111	0.979	147	0.842	183	0.646	219	0.570	255	0.634	291	0.629
4	0.668	40	0.869	76	0.986	112	0.977	148	0.836	184	0.641	220	0.571	256	0.636	292	0.628
5	0.673	41	0.874	77	0.988	113	0.975	149	0.831	185	0.637	221	0.572	257	0.637	293	0.626
6	0.678	42	0.879	78	0.990	114	0.972	150	0.826	186	0.632	222	0.573	258	0.638	294	0.625
7	0.683	43	0.883	79	0.991	115	0.970	151	0.820	187	0.628	223	0.574	259	0.639	295	0.623
8	0.688	44	0.888	80	0.993	116	0.967	152	0.815	188	0.624	224	0.575	260	0.640	296	0.621
9	0.694	45	0.893	81	0.994	117	0.964	153	0.810	189	0.619	225	0.577	261	0.641	297	0.619
10	0.699	46	0.897	82	0.995	118	0.961	154	0.804	190	0.615	226	0.578	262	0.642	298	0.618
11	0.705	47	0.902	83	0.996	119	0.958	155	0.799	191	0.612	227	0.580	263	0.643	299	0.616
12	0.711	48	0.906	84	0.997	120	0.955	156	0.793	192	0.608	228	0.582	264	0.643	300	0.613
13	0.716	49	0.910	85	0.998	121	0.952	157	0.787	193	0.604	229	0.584	265	0.644	301	0.611
14	0.722	50	0.914	86	0.999	122	0.949	158	0.782	194	0.601	230	0.586	266	0.644	302	0.609
15	0.728	51	0.919	87	0.999	123	0.946	159	0.776	195	0.597	231	0.588	267	0.645	303	0.607
16	0.734	52	0.923	88	0.999	124	0.942	160	0.771	196	0.594	232	0.590	268	0.645	304	0.605
17	0.740	53	0.927	89	1.000	125	0.939	161	0.765	197	0.591	233	0.592	269	0.645	305	0.602
18	0.747	54	0.930	90	1.000	126	0.935	162	0.759	198	0.589	234	0.594	270	0.645	306	0.600
19	0.753	55	0.934	91	1.000	127	0.932	163	0.754	199	0.586	235	0.596	271	0.645	307	0.598
20	0.759	56	0.938	92	0.999	128	0.928	164	0.748	200	0.583	236	0.598	272	0.645	308	0.596
21	0.765	57	0.941	93	0.999	129	0.924	165	0.742	201	0.581	237	0.600	273	0.645	309	0.594
22	0.771	58	0.944	94	0.999	130	0.920	166	0.737	202	0.579	238	0.603	274	0.645	310	0.592
23	0.777	59	0.948	95	0.998	131	0.916	167	0.731	203	0.577	239	0.605	275	0.644	311	0.590
24	0.783	60	0.951	96	0.998	132	0.912	168	0.726	204	0.575	240	0.607	276	0.644	312	0.589
25	0.789	61	0.954	97	0.998	133	0.908	169	0.720	205	0.574	241	0.609	277	0.643	313	0.587
26	0.795	62	0.956	98	0.997	134	0.904	170	0.714	206	0.573	242	0.611	278	0.643	314	0.586
27	0.801	63	0.959	99	0.996	135	0.899	171	0.709	207	0.571	243	0.614	279	0.642	315	0.584
28	0.806	64	0.962	100	0.996	136	0.895	172	0.703	208	0.570	244	0.616	280	0.641	316	0.583
29	0.812	65	0.964	101	0.995	137	0.890	173	0.698	209	0.569	245	0.618	281	0.640	317	0.582
30	0.817	66	0.966	102	0.994	138	0.886	174	0.692	210	0.569	246	0.619	282	0.640	318	0.581
31	0.823	67	0.968	103	0.993	139	0.881	175	0.687	211	0.568	247	0.621	283	0.639	319	0.580
32	0.828	68	0.971	104	0.992	140	0.876	176	0.682	212	0.568	248	0.623	284	0.638	320	0.579
33	0.834	69	0.973	105	0.990	141	0.872	177	0.676	213	0.568	249	0.625	285	0.637	321	0.578
34	0.839	70	0.975	106	0.989	142	0.867	178	0.671	214	0.568	250	0.627	286	0.636	322	0.577
35	0.844	71	0.977	107	0.987	143	0.862	179	0.666	215	0.568	251	0.628	287	0.634	323	0.576

Figure 1
Antenna Azimuthal Pattern
W28FD-D Greenville, FL
Facility ID 186724
Ch. 28 15 kW Directional

prepared for
Gray Television Licensee, LLC

September, 2023



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

Figure 2
Coverage Contour Comparison
W28FD-D Greenville, FL
Facility ID 186724
Ch. 28 15 kW Directional

prepared for
Gray Television Licensee, LLC

September, 2023

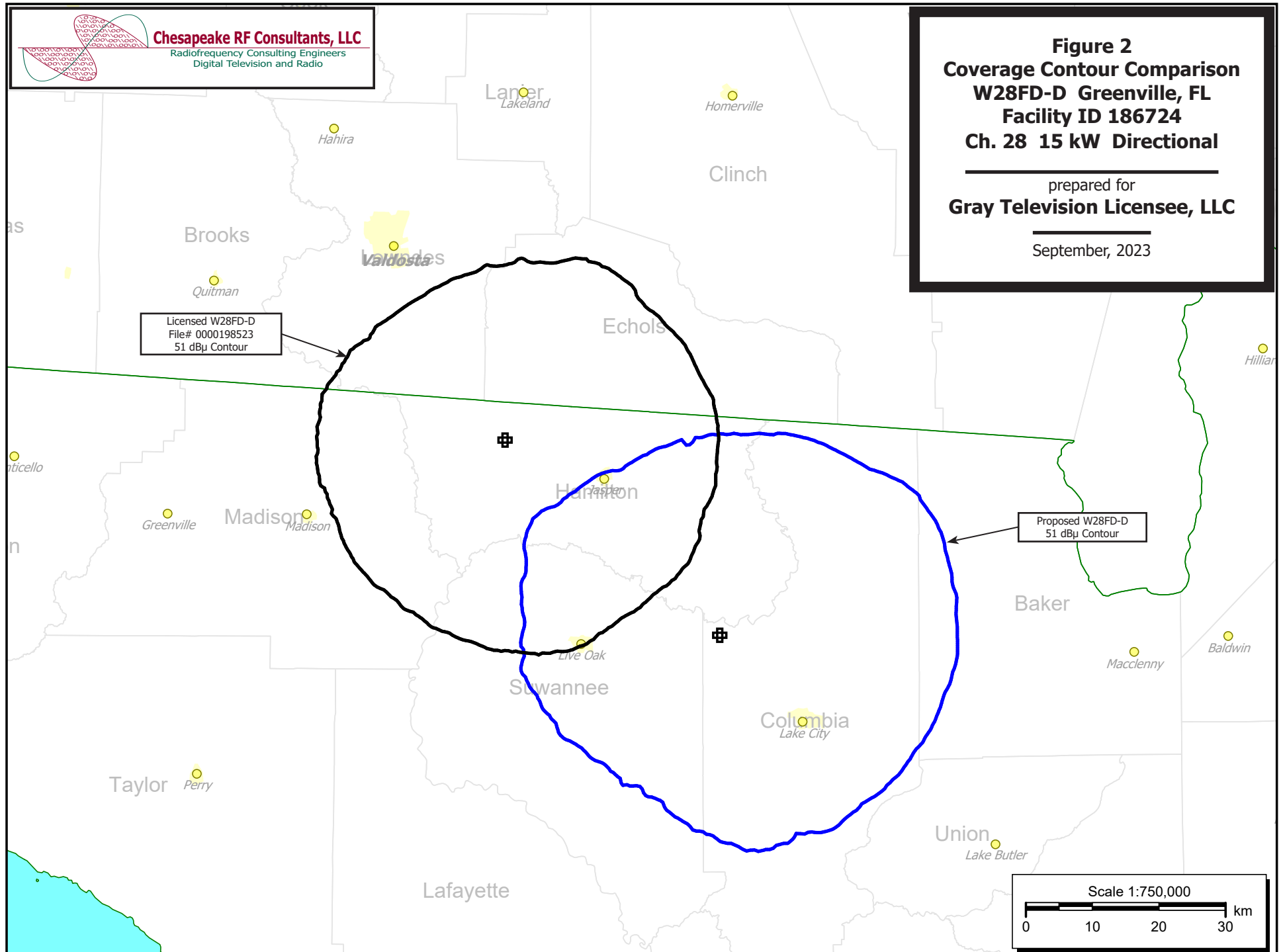


Table 1 W28FD-D TVStudy Analysis of Proposal (page 1 of 3)



tvstudy v2.2.5 (4uoc83)
Database: localhost, Study: W28FD-D 1050956, Model: Longley-Rice
Start: 2023.09.21 12:03:35

Study created: 2023.09.21 12:03:35

Study build station data: LMS TV 2023-09-20

Proposal: W28FD-D D28 LD APP GREENVILLE, FL
File number: W28FD-D 1050956
Facility ID: 186724
Station data: User record
Record ID: 126
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	WYME-CD	D27	DC	LIC	GAINESVILLE, FL	BLANK0000098965	77.5 km
No	WWRJ-LD	D27	LD	LIC	JACKSONVILLE, FL	BLANK00000149999	103.5
No	WWRJ-LD	D27	LD	CP	JACKSONVILLE, FL	BLANK00000150180	115.0
No	WWRJ-LD	N27-	TX	LIC	JACKSONVILLE, FL	BLTTL20140115AAF	103.5
No	WOCQ-LD	D27	LD	LIC	OCALA, FL	BLANK00000204523	142.9
No	WRDQ	D27	DT	LIC	ORLANDO, FL	BLANK00000149085	254.6
Yes	WTXL-TV	D27	DT	LIC	TALLAHASSEE, FL	BLCDT20090217ABY	121.9
No	WMCF-TV	D28	DT	LIC	MONTGOMERY, AL	BLANK00000107502	400.3
No	W28EZ-D	D28	LD	LIC	GAINESVILLE, FL	BLANK00000212377	100.5
No	WZVN-TV	D28	DT	LIC	NAPLES, FL	BLANK00000107164	399.4
Yes	WRBW	D28	DT	LIC	ORLANDO, FL	BLANK00000216447	249.6
No	WFSG	D28	DT	LIC	PANAMA CITY, FL	BLANK00000064507	302.9
No	WSST-LD	D28	LD	LIC	ALBANY, GA	BLANK00000169383	202.1
No	WJBF	D28	DT	LIC	AUGUSTA, GA	BLANK00000116201	355.6
No	W28EU-D	D28	LD	LIC	MACON, GA	BLANK00000112812	324.9
No	WTBZ-LD	N29z	TX	LIC	GAINESVILLE, FL	BLTTL20050907ABX	101.0
Yes	WGFL	D29	DT	LIC	HIGH SPRINGS, FL	BLANK00000100460	77.5
No	WQXT-CD	D29	DC	LIC	ST. AUGUSTINE, FL	BLANK00000098976	140.5
No	W29FO-D	D29	LD	LIC	TALLAHASSEE, FL	BLANK00000215012	122.6
No	WFXL	D29	DT	CP	ALBANY, GA	BLANK00000150485	154.6

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D28
Mask: Full Service
Latitude: 30 18 22.70 N (NAD83)
Longitude: 82 46 4.60 W
Height AMSL: 87.5 m
HAAT: 0.0 m
Peak ERP: 15.0 kW
Antenna: Dielectric-DLP-8B (ID 1010939) 90.0 deg
Elev Pattn: Generic
Elec Tilt: 1.00

50.1 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	6.34 kW	48.2 m	31.3 km
45.0	11.9	52.4	35.3
90.0	15.0	52.4	36.4
135.0	12.1	48.7	34.4
180.0	6.55	50.1	31.9
225.0	5.02	38.3	27.5
270.0	6.24	46.3	30.7
315.0	5.14	54.1	31.7

Table 1 W28FD-D TVStudy Analysis of Proposal
(page 2 of 3)



Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 49 m

Distance to Canadian border: 1263.8 km

Distance to Mexican border: 1467.3 km

Conditions at FCC monitoring station: Vero Beach FL
Bearing: 144.8 degrees Distance: 364.8 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 304.4 degrees Distance: 2303.3 km

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 BLCDT20090217ABY LIC scenario 1

Desired:	Call WTXL-TV	Chan D27	Svc DT	Status LIC	City, State TALLAHASSEE, FL	File Number BLCDT20090217ABY	Distance			
Undesireds:	W28FD-D	D28	LD	APP	GREENVILLE, FL	W28FD-D 1050956	121.9 km			
	WBIF	D26	DT	LIC	MARIANNA, FL	BLANK0000190006	140.7			
	WFNA	D27	DT	LIC	GULF SHORES, AL	BLANK0000120977	369.1			
	WAIQ	D27	DT	LIC	MONTGOMERY, AL	BLANK0000220388	291.0			
	WYME-CD	D27	DC	LIC	GAINESVILLE, FL	BLANK0000098965	177.0			
	WAGA-TV	D27	DT	LIC	ATLANTA, GA	BLANK0000152298	349.5			
	WRDW-TV	D27	DT	CP	AUGUSTA, GA	BLANK0000150357	364.7			
Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX		
43336.7	1,054,438	43294.6	1,054,221	42723.9	1,048,343	42705.9	1,048,219	0.04	0.01	
Undesired				Total IX	Unique IX, before		Unique IX, after			
W28FD-D	D28	LD	APP	22.0	139	18.0	124			
WBIF	D26	DT	LIC	35.0	358	7.0	70			
WFNA	D27	DT	LIC	81.6	1,224	11.0	11			
WAIQ	D27	DT	LIC	80.9	1,823	7.1	173			
WYME-CD	D27	DC	LIC	428.5	3,568	428.5	3,558			
WAGA-TV	D27	DT	LIC	41.5	737	21.3	178			
WRDW-TV	D27	DT	CP	18.2	415	4.1	65			

Interference to BLANK0000216447 LIC scenario 1

Desired:	Call WRBW	Chan D28	Svc DT	Status LIC	City, State ORLANDO, FL	File Number BLANK0000216447	Distance			
Undesireds:	W28FD-D	D28	LD	APP	GREENVILLE, FL	W28FD-D 1050956	249.6 km			
	WRDQ	D27	DT	LIC	ORLANDO, FL	BLANK0000149085	5.0			
	WZVN-TV	D28	DT	LIC	NAPLES, FL	BLANK0000107164	208.9			
	WXPX-TV	D29	DT	LIC	BRADENTON, FL	BLANK0000105367	144.3			
	WMVJ-CD	D29	DC	LIC	MELBOURNE, FL	BLANK0000218614	73.8			
	WQXT-CD	D29	DC	LIC	ST. AUGUSTINE, FL	BLANK0000098976	147.3			
Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX		
39662.2	4,081,343	39639.3	4,078,141	38132.0	3,935,173	38131.0	3,935,173	0.00	0.00	
Undesired				Total IX	Unique IX, before		Unique IX, after			
W28FD-D	D28	LD	APP	1.0	0	1.0	0			
WRDQ	D27	DT	LIC	14.9	2,942	11.9	1,699	11.9	1,699	
WZVN-TV	D28	DT	LIC	1314.0	116,788	1042.9	59,401	1042.9	59,401	
WXPX-TV	D29	DT	LIC	392.4	71,410	123.4	15,132	123.4	15,132	
WMVJ-CD	D29	DC	LIC	54.9	9,349	54.9	9,349	54.9	9,349	
WQXT-CD	D29	DC	LIC	3.0	0	3.0	0	3.0	0	

Table 1 W28FD-D TVStudy Analysis of Proposal
(page 3 of 3)



Interference to BLANK0000100460 LIC scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WGFL	D29	DT	LIC	HIGH SPRINGS, FL	BLANK0000100460	
Undesireds:	W28FD-D	D28	LD	APP	GREENVILLE, FL	W28FD-D 1050956	77.5 km
	WXPX-TV	D29	DT	LIC	BRADENTON, FL	BLANK0000105367	203.5
	WQXT-CD	D29	DC	LIC	ST. AUGUSTINE, FL	BLANK0000098976	118.9
	WFXL	D29	DT	CP	ALBANY, GA	BLANK0000150485	225.8
Service area		Terrain-limited		IX-free, before		IX-free, after	Percent New IX
20693.4	876,914	20693.4	876,914	20292.0	856,895	20179.9	854,715 0.55 0.25
Undesired				Total IX	Unique IX, before	Unique IX, after	
W28FD-D D28 LD APP				128.1 2,262	112.1 2,180		
WXPX-TV D29 DT LIC				61.9 8,035	60.9 7,891		
WQXT-CD D29 DC LIC				292.6 10,376	284.5 9,519		
WFXL D29 DT CP				56.1 2,609	48.1 1,752	32.1 1,670	

Interference to proposal scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	W28FD-D	D28	LD	APP	GREENVILLE, FL	W28FD-D 1050956	
Undesireds:	WWRJ-LD	D27	LD	LIC	JACKSONVILLE, FL	BLANK0000149999	103.5 km
Service area		Terrain-limited		IX-free	Percent IX		
3340.4	89,798	3340.4	89,798	3340.4	89,798	0.00	0.00

**Channel and
Facility
Information**

Section	Question	Response
Facility ID	186724	
State	Florida	
City	GREENVILLE	
LPD Channel	28	

Antenna Location
Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1050956
Coordinates (NAD83)	Latitude	30° 18' 22.7" N+
	Longitude	082° 46' 04.6" W-
	Structure Type	LTOWER-Lattice Tower
	Overall Structure Height	81.4 meters
	Support Structure Height	76.2 meters
	Ground Elevation (AMSL)	26.5 meters
Antenna Data	Height of Radiation Center Above Ground Level	61.0 meters
	Height of Radiation Center Above Mean Sea Level	87.5 meters
	Effective Radiated Power	15 kW

Antenna
Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	1010939
Antenna Manufacturer and Model	Manufacturer:	Dielectric
	Model	DLP-8B
	Rotation	90 degrees
	Electrical Beam Tilt	1.0
	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

Directional Antenna Relative Field Values (Pre-rotated Pattern)

Degree	Value	Degree	Value	Degree	Value	Degree	Value
0	1.000	90	0.661	180	0.645	270	0.650
10	0.996	100	0.615	190	0.641	280	0.699
20	0.981	110	0.583	200	0.631	290	0.759
30	0.955	120	0.569	210	0.613	300	0.817
40	0.920	130	0.571	220	0.592	310	0.869
50	0.876	140	0.586	230	0.579	320	0.914
60	0.826	150	0.607	240	0.570	330	0.951
70	0.771	160	0.627	250	0.579	340	0.975
80	0.714	170	0.640	260	0.610	350	0.993

Additional Azimuths

Degree	V _A
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