

ENGINEERING EXHIBIT

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

Gray Television Licensee, LLC
WTGC-LD New Bern, NC
Facility ID 184529
Ch. 26 15 kW Directional

Gray Television Licensee, LLC (“Gray”) is the licensee of digital Low Power Television station WTGC-LD, Channel 26, Facility ID 184529, New Bern NC. WTGC-LD is licensed to operate at 0.1 kW effective radiated power (“ERP”) with a directional antenna (file# 0000203484). *Gray* herein seeks a minor modification Construction Permit to relocate WTGC-LD and to utilize a different directional antenna at increased power and antenna height.

The proposed facility will employ a new side-mounted antenna on the tower structure associated with FCC Antenna Structure Registration number 1056837, located 44.8 km (27.8 miles) from the licensed site. No change to the overall structure height is proposed.

The proposed antenna is a Dielectric model DLP-8J 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. Since the proposed 51 dB μ 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 μ contour increases to 185,342 persons (2010 census), which is a 25-fold increase beyond the 7,274 persons within the licensed WTGC-LD facility’s 51 dB μ contour.

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 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 30 percent antenna relative field in downward elevations (pattern data shows 30 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 $1.5 \mu\text{W}/\text{cm}^2$, which is 0.4 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.

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, 1.0 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 (WTGC-LD)
(page 3 of 3)

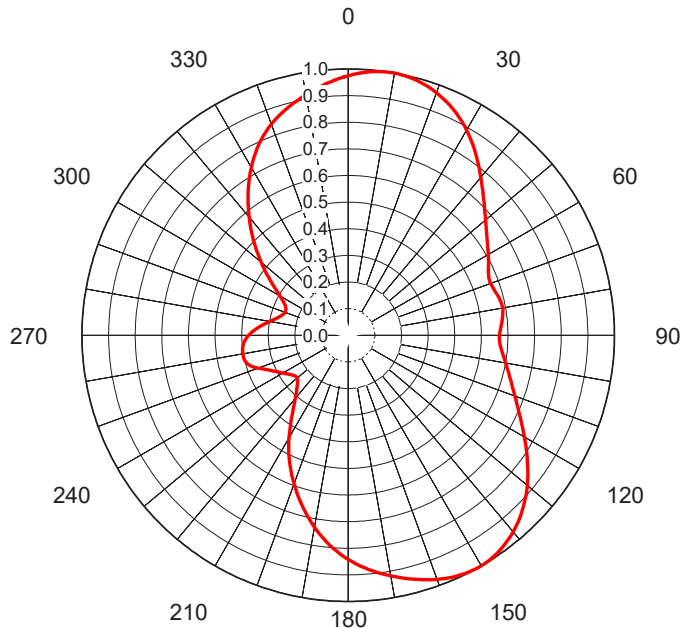


List of Attachments

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 23, 2023	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600



AZIMUTH PATTERN Horizontal Polarization

Proposal No. **20221128jmd**
Date **28-Nov-22**
Call Letters **WTGC-LD**
Channel **26**
Frequency **545 MHz**
Antenna Type **DLP-8J**
Gain **2.08 (3.19dB)**
Calculated

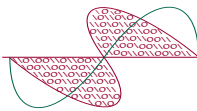
Pattern Number **TLP-J-26 Hpol**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.975	36	0.822	72	0.572	108	0.651	144	0.985	180	0.842	216	0.355	252	0.380	288	0.256
1	0.980	37	0.810	73	0.575	109	0.658	145	0.989	181	0.833	217	0.342	253	0.387	289	0.254
2	0.984	38	0.798	74	0.578	110	0.666	146	0.993	182	0.823	218	0.330	254	0.392	290	0.253
3	0.987	39	0.786	75	0.581	111	0.674	147	0.995	183	0.813	219	0.319	255	0.396	291	0.252
4	0.991	40	0.775	76	0.584	112	0.683	148	0.998	184	0.803	220	0.309	256	0.399	292	0.253
5	0.994	41	0.763	77	0.586	113	0.692	149	0.999	185	0.792	221	0.300	257	0.401	293	0.254
6	0.996	42	0.752	78	0.588	114	0.701	150	1.000	186	0.780	222	0.292	258	0.402	294	0.257
7	0.998	43	0.741	79	0.589	115	0.711	151	1.000	187	0.769	223	0.284	259	0.402	295	0.260
8	0.999	44	0.731	80	0.591	116	0.721	152	0.999	188	0.756	224	0.277	260	0.402	296	0.265
9	1.000	45	0.720	81	0.588	117	0.732	153	0.998	189	0.744	225	0.271	261	0.401	297	0.271
10	1.000	46	0.710	82	0.586	118	0.742	154	0.996	190	0.731	226	0.265	262	0.401	298	0.279
11	0.999	47	0.700	83	0.584	119	0.753	155	0.994	191	0.718	227	0.260	263	0.399	299	0.287
12	0.998	48	0.691	84	0.582	120	0.764	156	0.991	192	0.705	228	0.256	264	0.397	300	0.296
13	0.997	49	0.682	85	0.580	121	0.776	157	0.988	193	0.692	229	0.252	265	0.395	301	0.307
14	0.994	50	0.673	86	0.577	122	0.787	158	0.984	194	0.678	230	0.250	266	0.392	302	0.318
15	0.991	51	0.665	87	0.574	123	0.799	159	0.980	195	0.664	231	0.250	267	0.389	303	0.330
16	0.988	52	0.657	88	0.572	124	0.810	160	0.975	196	0.650	232	0.251	268	0.385	304	0.342
17	0.984	53	0.650	89	0.570	125	0.822	161	0.970	197	0.637	233	0.252	269	0.380	305	0.355
18	0.979	54	0.643	90	0.568	126	0.834	162	0.965	198	0.623	234	0.255	270	0.374	306	0.369
19	0.974	55	0.637	91	0.568	127	0.845	163	0.960	199	0.608	235	0.259	271	0.368	307	0.383
20	0.969	56	0.630	92	0.569	128	0.856	164	0.954	200	0.594	236	0.263	272	0.361	308	0.397
21	0.963	57	0.624	93	0.571	129	0.867	165	0.948	201	0.580	237	0.268	273	0.354	309	0.412
22	0.957	58	0.619	94	0.573	130	0.878	166	0.942	202	0.566	238	0.273	274	0.346	310	0.427
23	0.950	59	0.613	95	0.577	131	0.888	167	0.936	203	0.551	239	0.279	275	0.338	311	0.442
24	0.943	60	0.608	96	0.581	132	0.898	168	0.930	204	0.536	240	0.284	276	0.330	312	0.457
25	0.935	61	0.602	97	0.585	133	0.908	169	0.924	205	0.521	241	0.290	277	0.322	313	0.472
26	0.927	62	0.597	98	0.590	134	0.917	170	0.918	206	0.506	242	0.295	278	0.314	314	0.487
27	0.919	63	0.592	99	0.595	135	0.926	171	0.911	207	0.491	243	0.301	279	0.306	315	0.502
28	0.910	64	0.586	100	0.601	136	0.935	172	0.905	208	0.475	244	0.308	280	0.299	316	0.518
29	0.900	65	0.581	101	0.606	137	0.942	173	0.898	209	0.460	245	0.315	281	0.291	317	0.533
30	0.890	66	0.576	102	0.612	138	0.950	174	0.891	210	0.444	246	0.323	282	0.285	318	0.548
31	0.879	67	0.573	103	0.618	139	0.957	175	0.883	211	0.428	247	0.331	283	0.278	319	0.564
32	0.868	68	0.570	104	0.624	140	0.964	176	0.876	212	0.413	248	0.340	284	0.273	320	0.579
33	0.857	69	0.569	105	0.630	141	0.970	177	0.868	213	0.397	249	0.351	285	0.268	321	0.594
34	0.845	70	0.569	106	0.637	142	0.975	178	0.859	214	0.382	250	0.361	286	0.263	322	0.609
35	0.834	71	0.570	107	0.644	143	0.981	179	0.851	215	0.368	251	0.371	287	0.259	323	0.625

Figure 1
Antenna Azimuthal Pattern
WTGC-LD New Bern, NC
Facility ID 184529
Ch. 26 15 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
WTGC-LD New Bern, NC
Facility ID 184529
Ch. 26 15 kW Directional

prepared for
Gray Television Licensee, LLC

January, 2023

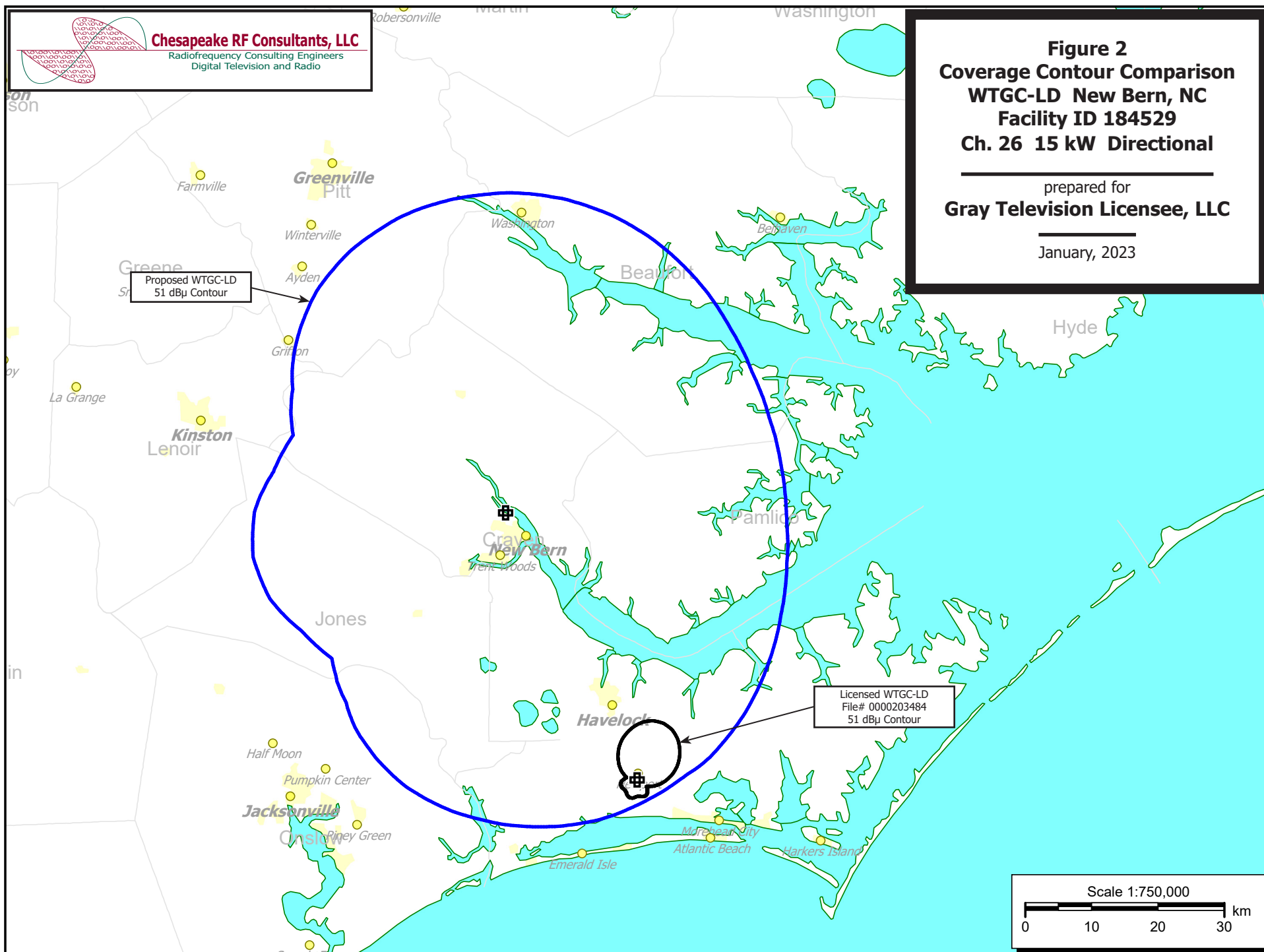


Table 1 WTGC-LD TVStudy Analysis of Proposal (page 1 of 2)



tvstudy v2.2.5 (4uoc83)
Database: localhost, Study: WTGC-LD 1056837 DLP-8J, Model: Longley-Rice
Start: 2023.01.23 13:10:57

Study created: 2023.01.23 13:10:57

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

Proposal: WTGC-LD D26 LD APP New Bern, NC
File number: WTGC-LD 1056837 DLP-8J
Facility ID: 184529
Station data: User record
Record ID: 4816
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	DW22CJ	N22-	TX	APP	JACKSONVILLE, NC	BLTT19990629JD	53.1 km
Yes	WUNK-TV	D25	DT	LIC	GREENVILLE, NC	BLANK0000143143	66.1
No	WVAD-LD	D25	LD	LIC	CHESAPEAKE, VA	BLDTL20121214ABD	199.0
No	WBFF	D26	DT	LIC	BALTIMORE, MD	BLANK0000136477	468.0
No	WRDE-LD	D26	LD	LIC	Salisbury, MD	BLANK0000138066	395.3
No	WGPX-TV	D26	DT	LIC	BURLINGTON, NC	BLANK0000081829	262.8
No	WHEH-LD	D26	LD	LIC	LUMBERTON, NC	BLANK0000073372	328.0
No	W26EY-D	D26	LD	LIC	MANTEO, NC	BLANK0000144443	152.3
No	W26FA-D	D26	LD	LIC	MARION, NC	BLANK0000074929	407.8
No	WARZ-LD	D26	LD	LIC	SMITHFIELD, NC	BLANK0000160116	119.2
No	DWDR-LD	D26	LD	LIC	WILMINGTON, NC	BLDTL20150112ACT	151.2
No	WWMB	D26	DT	LIC	FLORENCE, SC	BLANK0000119979	222.9
No	WNEH	D26	DT	LIC	GREENWOOD, SC	BLANK0000153952	472.5
No	WHTJ	D26	DT	LIC	CHARLOTTESVILLE, VA	BLANK0000112378	340.1
No	W26EV-D	D26	LD	LIC	PORTSMOUTH, VA	BLANK0000093428	194.3
No	W27DP-D	D27	LD	LIC	NEW BERN, NC	BLANK0000190660	49.8
No	W27DP-D	D27	LD	CP	NEW BERN, NC	BLANK0000202220	49.8
No	WUNP-TV	D27	DT	LIC	ROANOKE RAPIDS, NC	BLANK0000121047	145.2
No	WPDE-TV	D27	DT	LIC	FLORENCE, SC	BLANK0000120367	222.9
No	WJGN-CD	D27	DC	LIC	CHESAPEAKE, VA	BLANK0000097777	202.2

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D26
Mask: Full Service
Latitude: 35 8 21.20 N (NAD83)
Longitude: 77 4 39.40 W
Height AMSL: 176.4 m
HAAT: 0.0 m
Peak ERP: 15.0 kW
Antenna: DIE DLP-J 80.0 deg
Elev Pattn: Generic
Elec Tilt: 1.00

50.0 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	14.9 kW	172.4 m	49.4 km
45.0	7.50	169.3	45.7
90.0	4.64	170.9	43.3
135.0	12.2	175.9	48.6
180.0	11.9	169.5	48.1
225.0	1.36	170.9	36.9
270.0	2.06	167.7	38.9
315.0	4.96	171.2	43.7

Table 1 WTGC-LD TVStudy Analysis of Proposal
(page 2 of 2)



Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 171 m

Distance to Canadian border: 847.1 km

Distance to Mexican border: 2149.6 km

Conditions at FCC monitoring station: Laurel MD
Bearing: 2.8 degrees Distance: 448.1 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 291.1 degrees Distance: 2527.5 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 BLANK0000143143 LIC scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WUNK-TV	D25	DT	LIC	GREENVILLE, NC	BLANK0000143143	
Undesireds:	WTGC-LD	D26	LD	APP	New Bern, NC	WTGC-LD 1056837 DLP-8J	66.1 km
	WUBX-CD	D24	DC	LIC	DURHAM, ETC., NC	BLANK0000108883	119.3
	WWAY	D24	DT	LIC	WILMINGTON, NC	BLANK0000100423	166.8
	WJZY	D25	DT	LIC	BELMONT, NC	BLANK0000146872	322.4
	WCIV	D25	DT	LIC	CHARLESTON, SC	BLANK0000184940	348.3
	WLFB	D25	DT	LIC	BLUEFIELD, WV	BLANK0000123625	375.8

	Service area	Terrain-limited		IX-free, before		IX-free, after	Percent New IX
	33894.3 1,992,257	33845.9	1,983,449	33409.8	1,958,746	33366.8 1,955,907	0.13 0.14
Undesired			Total IX	Unique IX, before		Unique IX, after	
WTGC-LD D26 LD APP		43.0	2,839			43.0 2,839	
WUBX-CD D24 DC LIC		5.1	1,029		698	2.0 698	
WWAY D24 DT LIC		331.0	4,042	311.0	3,512	311.0 3,512	
WJZY D25 DT LIC		112.0	20,475	83.0	19,392	83.0 19,392	
WCIV D25 DT LIC		36.0	770	4.0	16	4.0 16	
WLFB D25 DT LIC		1.0	0	1.0	0	1.0 0	

Interference to proposal scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WTGC-LD	D26	LD	APP	New Bern, NC	WTGC-LD 1056837 DLP-8J	
Undesireds:	WUNK-TV	D25	DT	LIC	GREENVILLE, NC	BLANK0000143143	66.1 km
	W27DP-D	D27	LD	LIC	NEW BERN, NC	BLANK0000190660	49.8

	Service area	Terrain-limited		IX-free		Percent IX	
	6209.2 198,754	6209.2	198,754	6208.2	198,754	0.02 0.00	
Undesired			Total IX	Unique IX		Prct Unique IX	
WUNK-TV D25 DT LIC		1.0	0	1.0	0	0.02 0.00	

**Channel and
Facility
Information**

Section	Question	Response
Facility ID	184529	
State	North Carolina	
City	NEW BERN	
LPD Channel	26	

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1056837
Coordinates (NAD83)	Latitude	35° 08' 21.2" N+
	Longitude	077° 04' 39.4" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	219.5 meters
	Support Structure Height	213.3 meters
	Ground Elevation (AMSL)	3.0 meters
Antenna Data	Height of Radiation Center Above Ground Level	173.4 meters
	Height of Radiation Center Above Mean Sea Level	176.4 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	1009551
Antenna Manufacturer and Model	Manufacturer:	Dielectric
	Model	DLP-8J
	Rotation	80 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	0.548	90	0.962	180	0.402	270	0.962
10	0.556	100	0.892	190	0.371	280	0.997
20	0.589	110	0.788	200	0.298	290	0.992
30	0.658	120	0.654	210	0.260	300	0.945
40	0.756	130	0.496	220	0.343	310	0.861
50	0.861	140	0.343	230	0.496	320	0.756
60	0.945	150	0.260	240	0.654	330	0.658
70	0.992	160	0.298	250	0.788	340	0.589
80	0.997	170	0.371	260	0.892	350	0.556

Additional Azimuths

Degree	V _A
76	1.000
284	1.000