

## **ENGINEERING EXHIBIT**

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

prepared for

#### **WBOC, Inc.**

WBOC-LD Georgetown, DE

Facility ID 187976

Ch. 42 (digital) 15 kW

*WBOC, Inc.* (“*WBOC*”) is the licensee of digital Low Power Television station WBOC-LD, Channel 42, Georgetown DE, Facility ID 187976. WBOC-LD is licensed to operate with 9.1 kW effective radiated power (“ERP”), directional (file # 0000033972). *WBOC* herein seeks a Construction Permit to authorize relocation of WBOC-LD, increase ERP and antenna height, and utilize a different directional antenna.

As proposed herein, WBOC-LD will be relocated to the tower structure associated with FCC Antenna Structure Registration number 1301089, 40.3 km (25.0 miles) from the licensed WBOC-LD site. The proposed WBOC-LD facility will employ a new antenna system to be side-mounted on the tower and no change to the overall structure height is proposed.

The proposed WBOC-LD facility will operate with a directional antenna at 15 kW ERP using a “stringent” 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. As shown thereon, the proposed site is within 30 miles of the licensed site (25 miles distant) and has protected contour overlap with that facility. The contour overlap and distance comply with §74.788(b) for a minor change.

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. 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.

The nearest FCC monitoring station is 126 km distant at Laurel, MD. This exceeds by a large margin the threshold minimum distance specified in §73.1030(c)(3) that would suggest consideration of the monitoring station. The site is not located within the areas requiring coordination with "quiet" zones specified in §73.1030(a) and (b). There are no authorized AM stations within 3 kilometers of the site. The site location is beyond the border areas requiring international coordination.

### **Human Exposure to Radiofrequency Electromagnetic Field (Environmental)**

The proposed operation 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 considering 15 percent antenna relative field in downward elevations (pattern data shows less than 15 percent relative field at angles 10 to 90 degrees below the antenna), the calculated signal density near the tower at two meters above ground level attributable to the proposed facility is  $0.2 \mu\text{W}/\text{cm}^2$ , which is 0.05 percent of the general population/uncontrolled maximum permitted 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

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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 1 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.

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.

Environmental matters covered by this exhibit are limited to the evaluation of exposure to RF electromagnetic field. The proposed transmitting antenna will be installed on an existing antenna support structure which was constructed prior to March 16, 2001. No change in structure height is proposed.

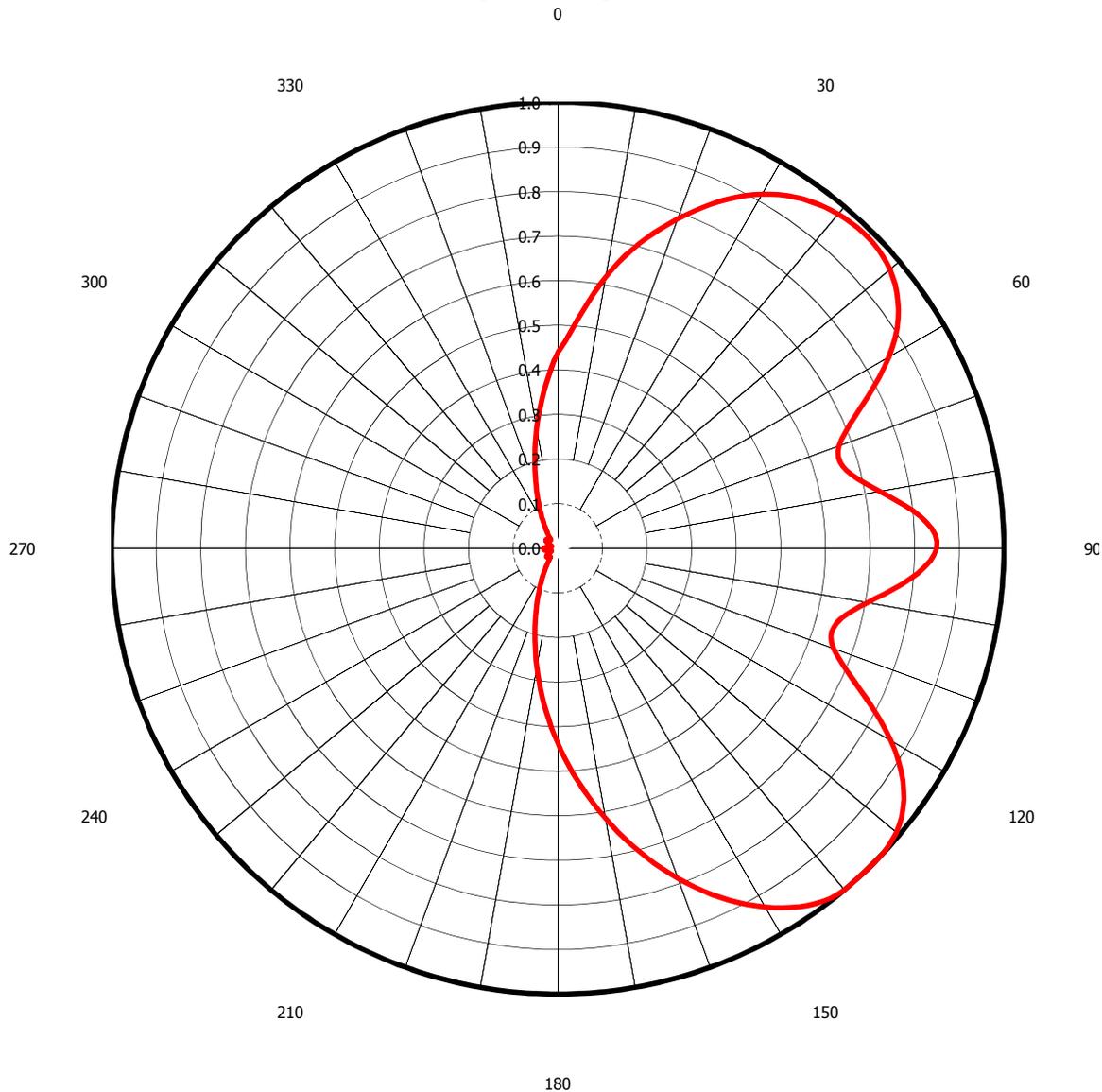
List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2	Coverage Contour Comparison
Table 1	Interference Analysis Results Summary
Form 2100	Saved Version of Engineering Sections from FCC Form at Time of Upload

**Chesapeake RF Consultants, LLC**

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

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



**Figure 1**  
**Antenna Azimuthal Pattern**  
**WBOC-LD Georgetown, DE**  
**Facility ID 187976**  
**Ch. 42 (digital) 15 kW**

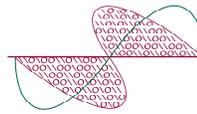
prepared for  
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November, 2017





**Table 1 WBOC-LD OET Bulletin 69 Interference Study**  
 (page 1 of 2)



tvstudy v2.2.3 (6K70F1)

Database: localhost, Study: WBOC-LD Prop 20171108 STR, Model: Longley-Rice  
 Start: 2017.11.08 14:55:01

Study created: 2017.11.08 14:54:22

Study build station data: LMS TV 2017-11-07 LMSTV

Proposal: WBOC-LD D42 LD APP GEORGETOWN, DE  
 File number: WBOC-LD Prop 20171108 STR  
 Facility ID: 187976  
 Station data: User record  
 Record ID: 1487  
 Country: U.S.

Build options:  
 Protect records not on baseline channel

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
No	WEVD-LD	N27+	TX	LIC	DOVER, DE	BLTTL19870929IH	76.8 km
No	WUTB	D41	DT	LIC	BALTIMORE, MD	BLCDT20100809CHT	130.0
No	W51DO	D41	LD	CP	HAMPTON, VA	BDISDTL20100721FZS	173.5
Yes	WMPT	D42	DT	LIC	ANNAPOLIS, MD	BLEDT20100813BHC	100.8
No	W42CK	N42+	TX	LIC	HAGERSTOWN, MD	BLTTL19991020AAP	221.7
No	WRAY-TV	D42	DT	LIC	WILSON, NC	BLCDT20060609AAX	370.7
No	WSKG-TV	D42	DT	LIC	BINGHAMTON, NY	BLEDT20050526ACA	396.1
No	WKOB-LD	D42	LD	CP	NEW YORK, NY	BMPDTL20140710AAE	288.0
No	W22EW-D	N42+	TX	LIC	PORT JERVIS, NY	BLTTL20070223AHH	328.2
Yes	WTFX-TV	D42	DT	LIC	PHILADELPHIA, PA	BLCDT20120511ADN	174.2
No	WPNT	D42	DT	LIC	PITTSBURGH, PA	BLCDT20060608AAB	434.5
No	W42DG-D	D42	LD	LIC	STATE COLLEGE, PA	BLDTL20071109AAR	312.3
No	WHSV-TV	D42	LD	LIC	HARRISONBURG, VA	BLCDT20110113AAD	238.4
No	WCVE-TV	D42	DT	LIC	RICHMOND, VA	BLCDT20050606AHG	203.9
No	WNJT	D43	DT	LIC	TRENTON, NJ	BLEDT20110427ABE	214.0
No	WDCN-LD	D43	LD	CP	FAIRFAX, VA	BDCCDTL20101119ADD	133.7

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D42  
 Mask: Stringent  
 Latitude: 38 30 18.00 N (NAD83)  
 Longitude: 75 38 36.00 W  
 Height AMSL: 257.8 m  
 HAAT: 0.0 m  
 Peak ERP: 15.0 kW  
 Antenna: TUA-C2 20171103 90.0 deg  
 Elev Pattn: Generic  
 Elec Tilt: 0.75

51.4 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	2.89 kW	252.6 m	43.7 km
45.0	14.3	247.8	51.8
90.0	10.8	245.4	50.2
135.0	14.9	243.3	51.8
180.0	2.86	244.7	43.3
225.0	0.012	249.7	15.2
270.0	0.014	252.7	16.2
315.0	0.012	251.1	15.1

Database HAAT does not agree with computed HAAT  
 Database HAAT: 0 m Computed HAAT: 248 m

Distance to Canadian border: 554.8 km

Distance to Mexican border: 2427.7 km

**Table 1 WBOC-LD OET Bulletin 69 Interference Study**  
(page 2 of 2)



Conditions at FCC monitoring station: Laurel MD  
Bearing: 306.1 degrees Distance: 125.6 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:  
Bearing: 283.5 degrees Distance: 2538.2 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%

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Interference to BLEDT20100813BHC LIC, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance			
	WMPT	D42	DT	LIC	ANNAPOLIS, MD	BLEDT20100813BHC				
Undesireds:	WBOC-LD	D42	LD	APP	GEORGETOWN, DE	WBOC-LD Prop 20171108	100.8 km			
	WUTB	D41	DT	LIC	BALTIMORE, MD	BLCDT20100809CHT	33.5			
	WRAY-TV	D42	DT	LIC	WILSON, NC	BLCDT20060609AAX	378.5			
	WTFX-TV	D42	DT	LIC	PHILADELPHIA, PA	BLCDT20120511ADN	164.1			
	WCVE-TV	D42	DT	LIC	RICHMOND, VA	BLCDT20050606AHG	187.6			
	Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX					
	23885.1	7,940,357	23588.3	7,897,513	21451.1	7,719,205	20841.0	7,701,989	2.84	0.22
Undesired			Total IX	Unique IX, before	Unique IX, after					
WBOC-LD	D42	LD	APP	710.6	24,071	610.1	17,216			
WUTB	D41	DT	LIC	452.4	42,328	400.4	38,216			
WRAY-TV	D42	DT	LIC	1.0	0	0.0	0			
WTFX-TV	D42	DT	LIC	1271.8	108,207	1047.8	72,110			
WCVE-TV	D42	DT	LIC	650.0	64,462	462.0	31,821			

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Interference to BLCDT20120511ADN LIC, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance			
	WTFX-TV	D42	DT	LIC	PHILADELPHIA, PA	BLCDT20120511ADN				
Undesireds:	WBOC-LD	D42	LD	APP	GEORGETOWN, DE	WBOC-LD Prop 20171108	174.2 km			
	WUTB	D41	DT	LIC	BALTIMORE, MD	BLCDT20100809CHT	154.8			
	WVIA-TV	D41	DT	LIC	SCRANTON, PA	BLEDT20120319AAB	137.6			
	WMPT	D42	DT	LIC	ANNAPOLIS, MD	BLEDT20100813BHC	164.1			
	WSKG-TV	D42	DT	LIC	BINGHAMTON, NY	BLEDT20050526ACA	232.3			
	WCVE-TV	D42	DT	LIC	RICHMOND, VA	BLCDT20050606AHG	347.6			
	WNJT	D43	DT	LIC	TRENTON, NJ	BLEDT20110427ABE	54.1			
	Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX					
	25921.5	9,482,211	25196.2	9,292,389	22826.7	8,453,293	22799.8	8,453,142	0.12	0.00
Undesired			Total IX	Unique IX, before	Unique IX, after					
WBOC-LD	D42	LD	APP	34.7	453	26.8	151			
WUTB	D41	DT	LIC	5.9	367	1.0	7			
WVIA-TV	D41	DT	LIC	1.0	55	1.0	55			
WMPT	D42	DT	LIC	1530.6	267,218	1451.8	233,108			
WSKG-TV	D42	DT	LIC	6.0	1,130	4.0	959			
WCVE-TV	D42	DT	LIC	1.0	178	0.0	0			
WNJT	D43	DT	LIC	905.8	604,548	832.0	570,745			

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Interference to proposal, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance	
	WBOC-LD	D42	LD	APP	GEORGETOWN, DE	WBOC-LD Prop 20171108		
	Service area	Terrain-limited	IX-free	Percent IX				
	4744.5	333,505	4744.5	333,505	4744.5	333,505	0.00	0.00

**Channel and Facility Information**

Section	Question	Response
Proposed Community of License	Facility ID	187976
	State	Delaware
	City	GEORGETOWN
	LPD Channel	42

**Antenna Location Data**

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1301089
Coordinates (NAD83)	Latitude	38° 30' 18.0" N+
	Longitude	075° 38' 36.0" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	305.4 meters
	Support Structure Height	271.3 meters
	Ground Elevation (AMSL)	14.0 meters
Antenna Data	Height of Radiation Center Above Ground Level	243.8 meters
	Height of Radiation Center Above Mean Sea Level	257.8 meters
	Effective Radiated Power	15 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:	DIE
	Model	TUA-C2-06/12M
	Rotation	90 degrees
	Electrical Beam Tilt	0.75
	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:	Stringent

**Directional Antenna Relative Field Values (Pre-rotated Pattern)**

Degree	V <sub>A</sub> (Authorized Value)						
0	0.849	90	0.437	180	0.031	270	0.439
10	0.704	100	0.270	190	0.018	280	0.617
20	0.658	110	0.138	200	0.015	290	0.786
30	0.862	120	0.060	210	0.028	300	0.917
40	0.991	130	0.026	220	0.031	310	0.978
50	1.000	140	0.031	230	0.025	320	0.972
60	0.929	150	0.024	240	0.060	330	0.857
70	0.788	160	0.015	250	0.138	340	0.671
80	0.615	170	0.026	260	0.272	350	0.733

**Additional Azimuths**

Degree	V <sub>A</sub>
48	1.000
359	0.85