

ENGINEERING EXHIBIT

Application for Minor Modification of Digital Low Power Television Station

prepared for

Gray Television Licensee, LLC

WWPI-LD Fort Kent, ME

Facility ID 181585

Ch. 16 (digital) 4.1 kW

Gray Television Licensee, LLC (“Gray”) is the licensee of digital Low Power Television station WWPI-LD, Channel 16, Fort Kent ME, Facility ID 181585. WWPI-LD is licensed (file# 0000081681) to operate at 3.5 kW effective radiated power (“ERP”) with a directional antenna. *Gray* proposes herein a minor modification to relocate WWPI-LD to a different transmitting location and increase ERP.

As proposed herein, WWPI-LD will be relocated to the tower structure associated with FCC Antenna Structure Registration number 1022804, 46.3 km (28.8 miles) from the licensed WWPI-LD site. The proposed WWPI-LD facility will employ a directional antenna system to be side-mounted on the tower and no change to the overall structure height is proposed.

The proposed WWPI-LD facility will operate at 4.1 kW ERP 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 51 dBμ coverage contour of the licensed and proposed facilities, 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,

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 TVStudy show excellent correlation.

and Class A stations (existing and post-auction). The results, summarized in Table 1, show that no interference is caused to any US or Canadian facility (the site is located 16.1 km from the US border with Canada).

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 less than 20 percent relative field at angles 30 – 90 degrees below the horizontal), 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 $10.9 \mu\text{W}/\text{cm}^2$, which is 3.4 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 from FCC Form at Time of Upload

Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E.	October 25, 2019	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600

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

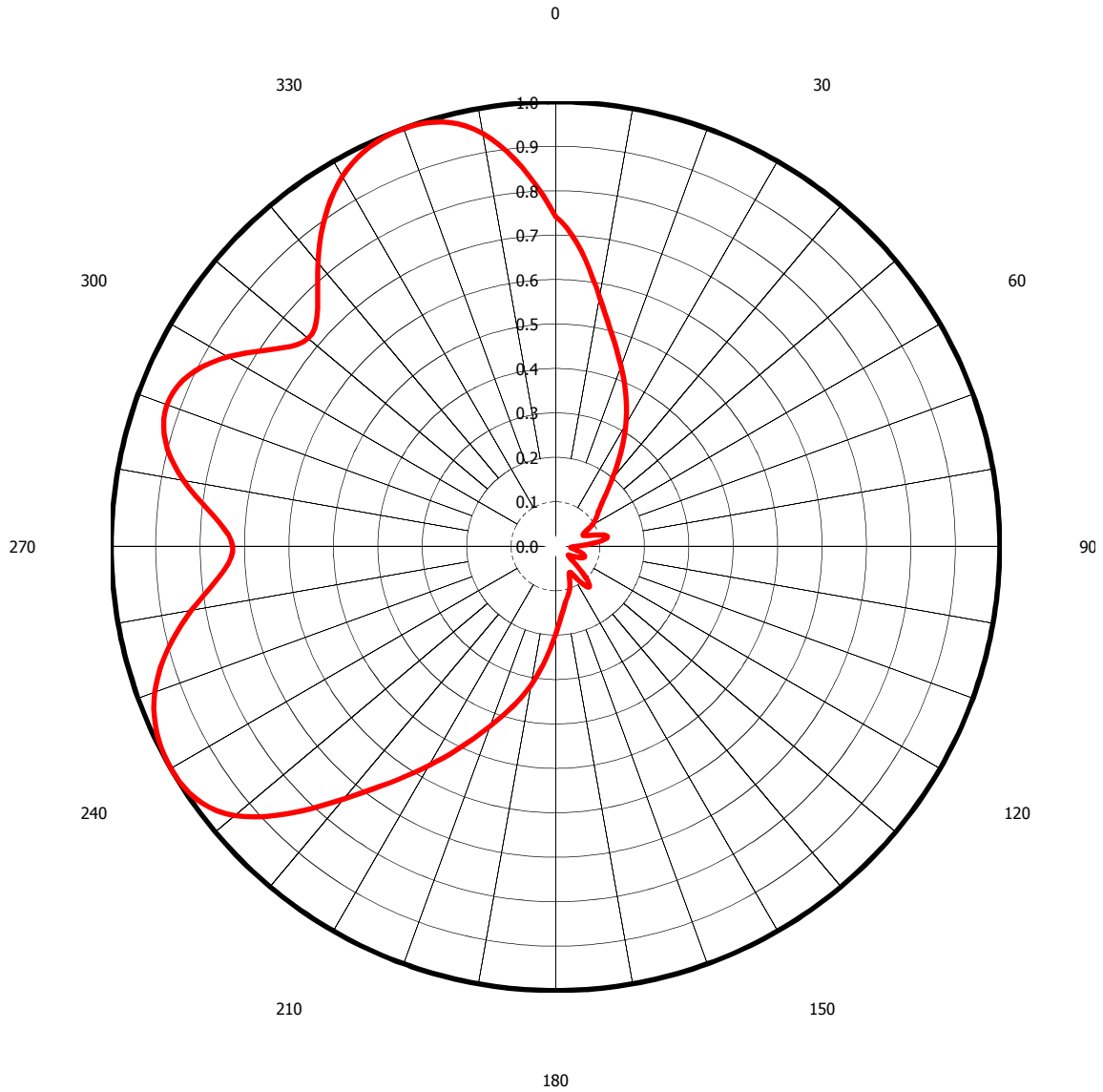


Figure 1
Antenna Azimuthal Pattern
WWPI-LD Fort Kent, ME
Facility ID 181585
Ch. 16 (digital) 4.1 kW

prepared for
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October, 2019

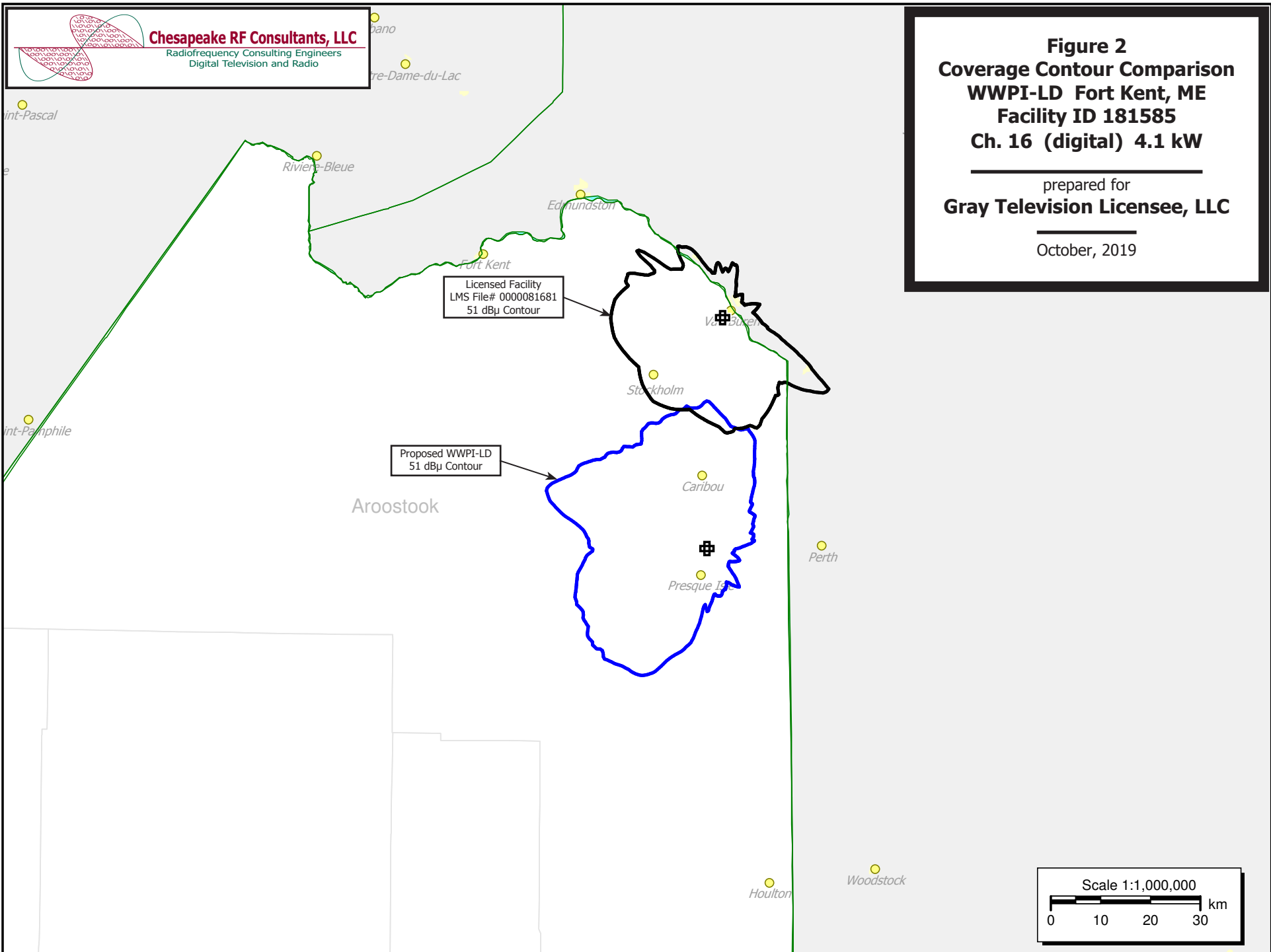


Table 1 WWPI-LD TVStudy Analysis of Proposal

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tvstudy v2.2.5 (4uoc83)
Database: localhost, Study: WWPI-LD prop 20191025, Model: Longley-Rice
Start: 2019.10.25 09:32:24

Study created: 2019.10.25 09:32:24

Study build station data: LMS TV 2019-10-23

Proposal: WWPI-LD D16 LD APP FORT KENT, ME
File number: WWPI-LD prop 20191025
Facility ID: 181585
Station data: User record
Record ID: 2905
Country: U.S.

Build options:
Protect pre-transition records not on baseline channel

Search options:
Non-U.S. records included
Baseline record excluded if station has CP

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
No	W16DG-D	D16	LD	LIC	BANGOR, ME	BLANK0000013416	216.7 km
No	WFFF-TV	D16	DT	CP	BURLINGTON, VT	BLANK0000029843	447.1
No	CIHF-DT-11D15	D15	DT	LIC	WOODSTOCK, NB	BLANKCANADA135	48.1
No	CIVK-DT	D15	DT	LIC	CARLETON, QC	BLANKCANADA255	211.0
No	CIVQ-DT	D15	DT	LIC	QUBEC, QC	BLANKCANADA284	245.0
No	CIHF-DT-1	D16	DT	LIC	FREDERICTON, NB	BLANKCANADA126	138.8
No	CFCM-DT	D17	DT	LIC	QUBEC, QC	BLANKCANADA285	248.6
No	CFTF-DT-2	D17	DC	LIC	TROISPISTOLES, QC	BLANKCANLP419	176.5

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D16
Mask: Full Service
Latitude: 46 43 43.00 N (NAD83)
Longitude: 68 0 1.00 W
Height AMSL: 229.5 m
HAAT: 0.0 m
Peak ERP: 4.10 kW
Antenna: KAT-K723147 1X2 (ID 1001019) 290.0 deg
Elev Pattn: Generic

48.9 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	2.26 kW	72.9 m	32.1 km
45.0	0.110	52.9	14.4
90.0	0.009	36.2	6.5
135.0	0.029	38.4	8.7
180.0	0.162	43.0	14.2
225.0	2.91	63.8	32.0
270.0	2.17	39.6	25.2
315.0	2.49	55.5	29.8

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 50 m

**Proposal 23.94 dBu contour crosses Canadian border, coordination required
Distance to Canadian border: 16.1 km

Distance to Mexican border: 3429.3 km

Conditions at FCC monitoring station: Belfast ME
Bearing: 198.7 degrees Distance: 267.4 km

Proposal is not within the West Virginia quiet zone area

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



Conditions at Table Mountain receiving zone:
Bearing: 269.9 degrees Distance: 3061.2 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%

Interference to proposal scenario 1

Desired:	Call WWPI-LD	Chan D16	Svc LD	Status APP	City, State FORT KENT, ME	File Number WWPI-LD prop 20191025	Distance
Undesireds:	CIHF-DT-1	D16	DT	LIC	FREDERICTON, NB	BLANKCANADA126	138.8 km

Service area	Terrain-limited	IX-free	Percent IX
1723.6	26,456	1584.1	25,961
		1578.0	25,953
			0.38
			0.03

Undesired	Total IX	Unique IX	Prcnt Unique IX
CIHF-DT-1 D16 DT LIC	6.0	8	6.0
		8	0.38
			0.03

Channel and Facility Information

Section	Question	Response
Facility ID	181585	
State	Maine	
City	FORT KENT	
LPT Channel	16	

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1022804
Coordinates (NAD83)	Latitude	46° 43' 43.0" N+
	Longitude	068° 00' 01.0" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	76.5 meters
	Support Structure Height	76.5 meters
	Ground Elevation (AMSL)	205.1 meters
Antenna Data	Height of Radiation Center Above Ground Level	24.4 meters
	Height of Radiation Center Above Mean Sea Level	229.5 meters
	Effective Radiated Power	4.1 kW

Antenna Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	1001019
Antenna Manufacturer and Model	Manufacturer:	KAT
	Model	K723147 1X2
	Rotation	290 degrees
	Electrical Beam Tilt	Not Applicable
	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	.931	90	.431	180	.070	270	.431
10	.852	100	.317	190	.045	280	.570
20	.727	110	.199	200	.048	290	.743
30	.832	120	.129	210	.119	300	.943
40	.960	130	.095	220	.069	310	1.00
50	1.00	140	.069	230	.095	320	.960
60	.943	150	.119	240	.129	330	.832
70	.742	160	.048	250	.199	340	.727
80	.570	170	.045	260	.317	350	.850

Additional Azimuths

Degree	V _A
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