

ENGINEERING EXHIBIT

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

Gray Television Licensee, LLC
WWAX-LD Westmoreland, NH
Facility ID 186687
Ch. 27 15 kW Nondirectional

Gray Television Licensee, LLC (“Gray”) is the licensee of digital Low Power Television station WWAX-LD, Channel 27, Facility ID 186687, Westmoreland NH. WWAX-LD is licensed to operate at 0.41 kW effective radiated power (“ERP”) with a directional antenna (file# 0000196718). *Gray* herein seeks a minor modification Construction Permit to relocate WWAX-LD and to utilize a nondirectional antenna at increased ERP and antenna height.

The proposed facility will employ a new antenna to be side-mounted on the tower structure associated with FCC Antenna Structure Registration number 1046016, located 44.3 km (27.6 miles) from the licensed site. No change to the overall structure height is proposed. The antenna supporting structure is owned by *Gray* and is utilized by *Gray’s* full-service television station WFSB (Ch. 36, Facility ID 53115, Hartford CT).

The proposed antenna is a Dielectric model TLP-12A/VP-R having elliptical polarization. The proposed ERP is 15 kW horizontally polarized and 4.5 kW vertically polarized using a “full service” out of channel emission mask.

Figure 1 depicts the 51 dB μ coverage contour of the proposed and licensed facilities, 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 2,464,561 persons (2010 census), which is more than a 10-fold increase beyond the 227,263 persons within the licensed WWAX-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. FCC processing of this proposal is requested using a 1.0 km cell size and 0.2 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 except with respect to WGGB-TV which does not present a conflict for the proposal.

WGGB-TV (ABC, Ch. 26, Fac ID 25682, Springfield MA, file# 0000083684) would receive 2.90 percent new interference, which exceeds the 0.5 percent limit towards full-service television stations. According to FCC TVStudy analysis, the interference would occur at locations beyond WGGB-TV's DMA (Springfield - Holyoke) in areas that are within the Hartford & New Haven DMA. The areas subject to new interference are within the service area of ABC network affiliate WTNH (Ch. 10, New Haven CT). Gray is also the licensee of WGGB-TV and consents to interference exceeding 0.5 percent from the proposed WWAX-LD facility.

Accordingly, the proposal complies with §74.793 regarding interference protection to digital television, low power television, television translator, and Class A television facilities.

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 $1.3 \mu\text{W}/\text{cm}^2$, which is 0.4 percent of the general population / uncontrolled maximum permissible exposure limit. This is below the five percent threshold limit described in §1.1307(b) regarding

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 0.1 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.

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.

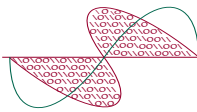
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power 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	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 30, 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
WWAX-LD Westmoreland, NH
Facility ID 186687
Ch. 27 15 kW Nondirectional

prepared for
Gray Television Licensee, LLC

September, 2022

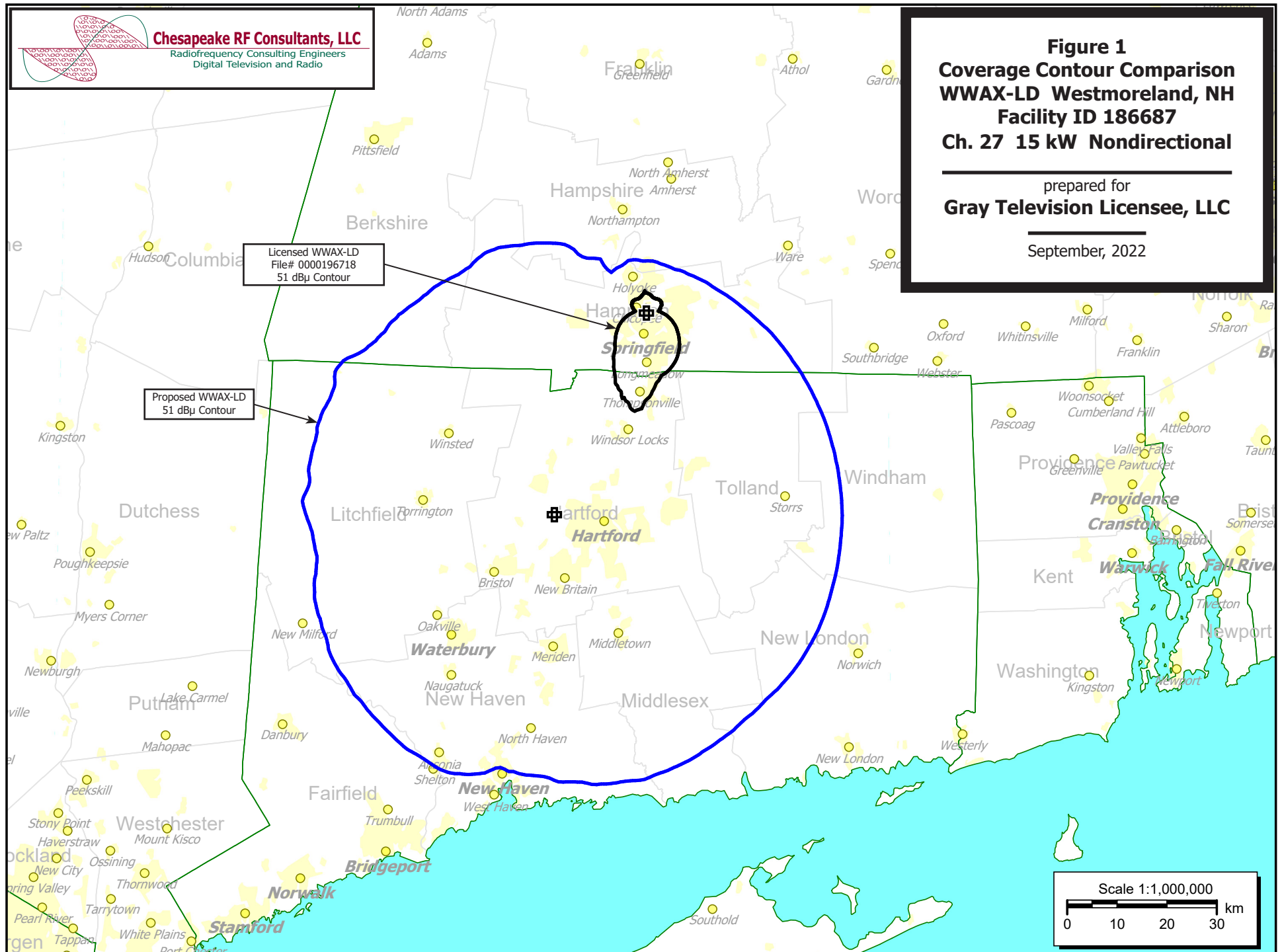


Table 1 WWAX-LD TVStudy Analysis of Proposal (page 1 of 4)



tvstudy v2.2.5 (4uoc83)
Database: localhost, Study: WWAX-LD 1046016 468ft prop, Model: Longley-Rice
Start: 2022.09.30 11:37:59

Study created: 2022.09.30 11:37:59

Study build station data: LMS TV 2022-09-30

Proposal: WWAX-LD D27 LD APP WESTMORELAND, NH
File number: WWAX-LD 1046016 468ft
Facility ID: 186687
Station data: User record
Record ID: 4599
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	W26EU-D	D26-	LD	LIC	BOSTON, MA	BLANK0000150613	143.3 km
Yes	WGGB-TV	D26	DT	LIC	SPRINGFIELD, MA	BLANK0000083684	53.5
No	WYCU-LD	D26	LD	LIC	CHARLESTOWN, ETC., NH	BLDTL20121214ABJ	184.9
No	WFUT-DT	D26	DT	LIC	NEWARK, NJ	BLANK0000177210	150.8
No	WYBN-LD	D26	LD	LIC	COBLESKILL, NY	BLANK0000123807	137.2
No	WYXN-LD	D26	LD	LIC	NEW YORK, NY	BLDTL20091123AAX	148.6
No	WNYJ-LD	N26-	TX	LIC	New York, NY	BLTTL20070223AHI	162.3
No	DW26CE	N26-	TX	APP	NEW YORK, NY	BLTTL20080306ABU	102.3
No	W26DC-D	D26	LD	LIC	ROSLYN, NY	BLDTT20140310ADR	130.2
Yes	WUNI	D27	DT	LIC	MARLBOROUGH, MA	BLANK0000030092	127.7
No	WMAR-TV	D27	DT	LIC	BALTIMORE, MD	BLANK0000136334	423.0
No	W27EC-D	D27+	LD	LIC	BELVIDERE, NJ	BLANK0000058689	219.2
No	WPSJ-CD	D27	DC	LIC	HAMMONTON, NJ	BLANK0000194450	281.0
Yes	WNYT	D27	LD	LIC	ALBANY, NY	BLANK0000155446	131.2
No	WIVT	D27	DT	LIC	BINGHAMTON, NY	BLANK0000090477	261.5
Yes	WNYW	D27	DT	LIC	NEW YORK, NY	BLANK0000079881	155.3
No	WMJQ-CD	D27	DC	LIC	SYRACUSE, NY	BLANK0000121173	310.5
No	WYJH-LD	D27	LD	LIC	WHITE LAKE, NY	BLANK0000193917	94.0
No	WOLF-TV	D27	LD	LIC	HAZLETON, PA	BLANK0000155439	218.0
No	WRZH-LD	N27+	TX	LIC	RED LION-HARRISBURG, PA	BLTTL19870929IH	366.5
No	W24EZ-D	N28z	TX	LIC	ALLINGTOWN, CT	BLTTL20010608AAO	55.5
No	WHPX-TV	D28	DT	LIC	NEW LONDON, CT	BLANK0000080171	8.2
No	W28DA-D	D28	LD	LIC	PITTSFIELD, MA	BLDTT20090604ABU	81.5
No	WWOO-LD	D28	LD	LIC	WESTMORELAND, NH	BLANK0000164496	157.9
No	WNYT	D28	LD	LIC	ALBANY, NY	BLANK0000151254	186.9
No	W25FA-D	D28	LD	CP	New york, NY	BLANK0000127436	129.9
No	WNYJ-LD	D28-	LD	LIC	New York, NY	BLANK0000164080	90.2
No	WNYJ-LD	D28-	LD	APP	New York, NY	BLANK0000168079	99.0
No	WEPT-CD	D28	DC	LIC	NEWBURGH, NY	BLANK0000100341	99.0
No	WEPT-CD	D28	DC	APP	NEWBURGH, NY	BLANK0000164913	90.2
No	WHTV-LD	N34+	TX	LIC	New York, NY	BLTTL20070223AHK	162.3

No non-directional AM stations found within 0.8 km

Directional AM stations within 3.2 km:
WTIC 1080 L DAN D HARTFORD, CT BMML20101117BHX
WTIC 1080 L DAN N HARTFORD, CT BMML20101117BHX

Record parameters as studied:

Channel: D27
Mask: Full Service
Latitude: 41 46 30.00 N (NAD83)
Longitude: 72 48 18.30 W
Height AMSL: 358.1 m
HAAT: 0.0 m
Peak ERP: 15.0 kW
Antenna: Omnidirectional

Table 1 WWAX-LD TV Study Analysis of Proposal
(page 2 of 4)



Elev Pattn: Generic
Elec Tilt: 1.00

50.0 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	15.0 kW	278.9 m	55.4 km
45.0	15.0	311.1	57.2
90.0	15.0	336.4	58.5
135.0	15.0	309.2	57.1
180.0	15.0	256.3	54.1
225.0	15.0	270.3	54.9
270.0	15.0	200.2	50.9
315.0	15.0	204.4	51.1

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 271 m

Distance to Canadian border: 359.9 km

Distance to Mexican border: 2818.0 km

Conditions at FCC monitoring station: Canandaigua NY
Bearing: 290.5 degrees Distance: 387.7 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 277.1 degrees Distance: 2710.9 km

Study cell size: 1.00 km
Profile point spacing: 0.10 km

Maximum new IX to full-service and Class A: 0.50%
Maximum new IX to LPTV: 2.00%

Interference to BLANK0000083684 LIC scenario 1

****IX: 2.90% interference caused**

Note: WGGB-TV is accepting 2.90% interference – see text

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WGGB-TV	D26	DT	LIC	SPRINGFIELD, MA	BLANK0000083684	
Undesireds:	WWAX-LD	D27	LD	APP	WESTMORELAND, NH	WWAX-LD 1046016 468ft	53.5 km
	WMHT	D25	DT	LIC	SCHENECTADY, NY	BLANK0000184994	119.6
	WJAR	D25	DT	LIC	PROVIDENCE, RI	BLANK0000087546	119.9
	WQAV-CD	D26	DC	LIC	GLASSBORO, NJ	BLANK0000079835	333.9
	WFUT-DT	D26	DT	LIC	NEWARK, NJ	BLANK0000177210	199.9
	WPBS-TV	D26	DT	LIC	WATERTOWN, NY	BLANK0000081158	308.2
	WUNI	D27	DT	LIC	MARLBOROUGH, MA	BLANK0000030092	96.3

	Service area	Terrain-limited		IX-free, before		IX-free, after	Percent New IX
	22120.7 3,446,503	20127.4	3,133,175	19314.3	2,976,324	19095.4 2,890,130	1.13 2.90
Undesired			Total IX	Unique IX, before		Unique IX, after	
WWAX-LD D27 LD APP	246.0		93,842	218.9		86,194	
WMHT D25 DT LIC	27.1		424	22.1		420	
WJAR D25 DT LIC	179.7		42,156	66.9		7,402	
WFUT-DT D26 DT LIC	505.7		64,355	461.6		57,261	
WPBS-TV D26 DT LIC	3.0		0	2.0		0	
WUNI D27 DT LIC	243.6		91,288	126.6		51,931	

Interference to BLANK0000030092 LIC scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WUNI	D27	DT	LIC	MARLBOROUGH, MA	BLANK0000030092	
Undesireds:	WWAX-LD	D27	LD	APP	WESTMORELAND, NH	WWAX-LD 1046016 468ft	127.7 km
	WGGB-TV	D26	DT	LIC	SPRINGFIELD, MA	BLANK0000083684	96.3
	WNYW	D27	DT	LIC	NEW YORK, NY	BLANK0000079881	280.1

Table 1 WWAX-LD TVStudy Analysis of Proposal
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WHPX-TV		D28	DT	LIC	NEW LONDON, CT		BLANK0000080171		133.9		
Service area			Terrain-limited		IX-free, before		IX-free, after		Percent New IX		
25457.5	7,202,196		24302.6	7,101,380		24227.7	7,094,051		24050.7	7,083,278	
									0.73	0.15	
Undesired				Total IX		Unique IX, before		Unique IX, after			
WWAX-LD	D27	LD APP	235.9		16,602		177.0		10,773		
WGGB-TV	D26	DT LIC	38.9		5,231		19.9		2,907		
WNYW	D27	DT LIC	22.0		2,364		11.0		880		
WHPX-TV	D28	DT LIC	42.9		3,486		18.0		694		
							1.0		0		

Interference to BLANK0000155446 LIC scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance		
Desired:	WNYT	D27	LD	LIC	ALBANY, NY	BLANK0000155446			
Undesireds:	WWAX-LD	D27	LD	APP	WESTMORELAND, NH	WWAX-LD 1046016 468ft	131.2 km		
	WYBN-LD	D26	LD	LIC	COBLESKILL, NY	BLANK0000123807	35.8		
	WUNI	D27	DT	LIC	MARLBOROUGH, MA	BLANK0000030092	180.3		
	WIVT	D27	DT	LIC	BINGHAMTON, NY	BLANK0000090477	206.3		
	WNYW	D27	DT	LIC	NEW YORK, NY	BLANK0000079881	232.6		
	WYJH-LD	D27	LD	LIC	WHITE LAKE, NY	BLANK0000193917	123.1		
	W28DA-D	D28	LD	LIC	PITTSFIELD, MA	BLDTT20090604ABU	50.0		
	WNYT	D28	LD	LIC	ALBANY, NY	BLANK0000151254	58.5		
	WNYJ-LD	D28-	LD	LIC	New York, NY	BLANK0000164080	157.8		
	WEPT-CD	D28	DC	LIC	NEWBURGH, NY	BLANK0000100341	122.4		
	WWDG-CD	D28	DC	LIC	UTICA, NY	BLANK0000001609	132.0		
	Service area	Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
10958.4	1,145,483	9519.0	1,033,096	9391.2	1,028,770	9390.2	1,028,742	0.01	0.00

Interference to BLANK0000079881 LIC scenario 1

Desired:	Call WNYW	Chan D27	Svc DT	Status LIC	City, State NEW YORK, NY	File Number BLANK0000079881	Distance		
Undesireds:	WWAX-LD	D27	LD	APP	WESTMORELAND, NH	WWAX-LD 1046016 468ft	155.3 km		
	WQAV-CD	D26	DC	LIC	GLASSBORO, NJ	BLANK0000079835	129.5		
	WFUT-DT	D26	DT	LIC	NEWARK, NJ	BLANK0000177210	4.6		
	WUNI	D27	DT	LIC	MARLBOROUGH, MA	BLANK0000030092	280.1		
	WMAR-TV	D27	DT	LIC	BALTIMORE, MD	BLANK0000136334	271.8		
	WPSJ-CD	D27	DC	LIC	HAMMONTON, NJ	BLANK0000194450	127.9		
	WIVT	D27	DT	LIC	BINGHAMTON, NY	BLANK0000090477	219.9		
	WHPX-TV	D28	DT	LIC	NEW LONDON, CT	BLANK0000080171	147.9		
	WEPT-CD	D28	DC	LIC	NEWBURGH, NY	BLANK0000100341	111.8		
	WCAU	D28	DT	LIC	PHILADELPHIA, PA	BLANK0000079825	127.6		
Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
26438.4	20,065,032	25047.3	19,770,351	24122.6	19,538,486	24066.6	19,518,980	0.23	0.10
Undesired				Total IX		Unique IX, before		Unique IX, after	
WWAX-LD	D27	LD	APP	90.9	31,098	56.0	19,506		
WFUT-DT	D26	DT	LIC	31.1	13,936	31.1	13,936		
WUNI	D27	DT	LIC	5.0	1,365	1.0	0		0
WMAR-TV	D27	DT	LIC	271.2	26,182	103.1	12,724		12,450
WPSJ-CD	D27	DC	LIC	585.2	167,499	99.3	85,154		85,154
WIVT	D27	DT	LIC	49.1	6,263	14.0	1,414		1,372
WHPX-TV	D28	DT	LIC	20.8	9,849	19.8	8,899		522
WEPT-CD	D28	DC	LIC	62.4	13,231	46.3	10,561		9,923
WCAU	D28	DT	LIC	573.9	93,379	75.0	10,941		10,941

Table 1 WWAX-LD TVStudy Analysis of Proposal
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Interference to BLANK0000079881 LIC scenario 2

	Call	Chan	Svc	Status	City, State	File Number	Distance		
Desired:	WNYW	D27	DT	LIC	NEW YORK, NY	BLANK0000079881			
Undesireds:	WWAX-LD	D27	LD	APP	WESTMORELAND, NH	WWAX-LD 1046016 468ft	155.3 km		
	WQAV-CD	D26	DC	LIC	GLASSBORO, NJ	BLANK0000079835	129.5		
	WFUT-DT	D26	DT	LIC	NEWARK, NJ	BLANK0000177210	4.6		
	WUNI	D27	DT	LIC	MARLBOROUGH, MA	BLANK0000030092	280.1		
	WMAR-TV	D27	DT	LIC	BALTIMORE, MD	BLANK0000136334	271.8		
	WPSJ-CD	D27	DC	LIC	HAMMONTON, NJ	BLANK0000194450	127.9		
	WIVT	D27	DT	LIC	BINGHAMTON, NY	BLANK0000090477	219.9		
	WHPX-TV	D28	DT	LIC	NEW LONDON, CT	BLANK0000080171	147.9		
	WEPT-CD	D28	DC	APP	NEWBURGH, NY	BLANK0000164913	76.3		
	WCAU	D28	DT	LIC	PHILADELPHIA, PA	BLANK0000079825	127.6		
Service area		Terrain-limited		IX-free, before		IX-free, after	Percent New IX		
26438.4	20,065,032	25047.3	19,770,351	24160.8	19,545,222	24100.8 19,525,078	0.25 0.10		
Undesired				Total IX		Unique IX, before		Unique IX, after	
WWAX-LD	D27	LD	APP	90.9	31,098	60.0	20,144		
WFUT-DT	D26	DT	LIC	31.1	13,936	31.1	13,936		
WUNI	D27	DT	LIC	5.0	1,365	2.0	346	0.0	0
WMAR-TV	D27	DT	LIC	271.2	26,182	108.1	13,054	102.1	12,654
WPSJ-CD	D27	DC	LIC	585.2	167,499	99.3	85,154	99.3	85,154
WIVT	D27	DT	LIC	49.1	6,263	22.1	3,037	19.1	2,939
WHPX-TV	D28	DT	LIC	20.8	9,849	19.8	8,899	6.9	522
WEPT-CD	D28	DC	APP	8.1	3,825	8.1	3,825	8.1	3,825
WCAU	D28	DT	LIC	573.9	93,379	75.0	10,941	75.0	10,941

Interference to proposal scenario 1
14.51% interference received

	Call	Chan	Svc	Status	City, State	File Number	Distance		
Desired:	WWAX-LD	D27	LD	APP	WESTMORELAND, NH	WWAX-LD 1046016 468ft			
Undesireds:	WGGB-TV	D26	DT	LIC	SPRINGFIELD, MA	BLANK0000083684	53.5 km		
	WUNI	D27	DT	LIC	MARLBOROUGH, MA	BLANK0000030092	127.7		
	WNYT	D27	LD	LIC	ALBANY, NY	BLANK0000155446	131.2		
	WNYW	D27	DT	LIC	NEW YORK, NY	BLANK0000079881	155.3		
	WHPX-TV	D28	DT	LIC	NEW LONDON, CT	BLANK0000080171	8.2		
	WNYJ-LD	D28-	LD	LIC	New York, NY	BLANK0000164080	90.2		
	WEPT-CD	D28	DC	LIC	NEWBURGH, NY	BLANK0000100341	99.0		
<hr/>									
Service area		Terrain-limited		IX-free		Percent IX			
9525.7	2,545,128	8558.0	2,329,574	7386.8	1,991,460	13.69	14.51		
<hr/>									
Undesired				Total IX	Unique IX	Prct Unique IX			
WGGB-TV	D26	DT	LIC	120.5	42,861	49.8	16,899	0.58	0.73
WUNI	D27	DT	LIC	68.1	24,913	24.0	5,311	0.28	0.23
WNYT	D27	LD	LIC	1.0	61	1.0	61	0.01	0.00
WNYW	D27	DT	LIC	151.8	44,835	32.1	5,017	0.37	0.22
WHPX-TV	D28	DT	LIC	1047.3	308,791	853.8	228,444	9.98	9.81

**Channel and
Facility
Information**

Section	Question	Response
Facility ID	186687	
State	New Hampshire	
City	WESTMORELAND	
LPD Channel	27	

**Antenna Location
Data**

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1046016
Coordinates (NAD83)	Latitude	41° 46' 30.0" N+
	Longitude	072° 48' 18.3" W-
	Structure Type	LTOWER-Lattice Tower
	Overall Structure Height	168.9 meters
	Support Structure Height	132.7 meters
	Ground Elevation (AMSL)	215.5 meters
Antenna Data	Height of Radiation Center Above Ground Level	142.6 meters
	Height of Radiation Center Above Mean Sea Level	358.1 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	TLP-12A/VP-R
	Rotation	
	Electrical Beam Tilt	1.0
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Elliptical
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