

## **ENGINEERING EXHIBIT**

### **Incentive Auction Channel Reassignment**

### **Application for Digital Television Station Auxiliary Antenna Construction Permit**

prepared for

#### **Gray Television Licensee, LLC**

WTAP-TV Parkersburg, WV

Facility ID 4685

Ch. 35 285 kW 170 m

*Gray Television Licensee, LLC (“Gray”)* is the licensee of digital television station WTAP-TV, Facility ID 4685, Parkersburg WV. Reassignment of WTAP-TV from Channel 49 to Channel 35 was specified in the *Incentive Auction Closing and Channel Reassignment Public Notice* (DA 17-317, released April 13, 2017). The WTAP-TV reassignment facility was recently constructed, and WTAP-TV is now licensed (file# 0000105709) to operate on Channel 35 at 350 kW effective radiated power (“ERP”) with a nondirectional antenna at 202 meters height above average terrain (“HAAT”). *Gray* herein seeks authorization for an auxiliary antenna for WTAP-TV on its post-auction Channel 35.

The proposed auxiliary antenna is side-mounted on the same tower structure as the licensed main antenna, and will operate on Channel 35 at 285 kW ERP (directional) and an antenna HAAT of 170 meters. The subject antenna was previously authorized for use as an interim facility on WTAP-TV’s pre-auction Channel 49 (see STA file# 0000081284).

The WTAP-TV tower structure is associated with FCC Antenna Structure Registration number 1239800. No change to the overall structure height will result from this proposal.

The proposed antenna is a horizontally polarized directional RFS model SBB-8C170. The directional antenna’s azimuthal and elevation patterns are depicted in Figures 1 and 2, respectively.

Figure 3 shows that the 41 dBμ noise limited service contour of the proposed auxiliary facility does not extend beyond that of the authorized main facility. Thus, the proposal complies with §73.1675(a).

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

The proposed auxiliary antenna 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 the antenna relative field in downward elevations, the graph in Figure 4 depicts calculated power density levels attributable to the proposed facility at locations near the site at a height of two meters above ground level. The maximum calculated RF electromagnetic field attributable to the proposed facility is 20.4 percent of the general population / uncontrolled MPE limit at any location two meters above ground level, which occurs within 85 meters of the tower’s base.

Four Low Power Television facilities are authorized for post-auction operation at the WTAP-TV tower. The following table supplies a summary of RF signal density calculations for the proposed auxiliary antenna and the other facilities at this site. No other authorized broadcast facilities are near enough to the site to contribute significant RF levels.

**Summary of Radiofrequency Electromagnetic Field Calculations**

Facility	Channel	ERP (kW)	Polarization	Relative Field	Height (meters)	S - Calculated (μW/cm <sup>2</sup> )	S - Limit (μW/cm <sup>2</sup> )	Percent of Limit
WTAP-TV Parkersburg, WV Proposed Auxiliary	35	285	H	See Graph	103.6	82.3	399.3	20.4%
WOVA-LD Parkersburg, WV CP 0000074781	20	15	E	0.1	124.3	0.4	339.3	0.1%
WIYE-LD Parkersburg, WV Lic 0000074793	26	15	E	0.1	124.4	0.4	363.3	0.1%
W14CV-D Parkersburg, WV CP 0000064461	14	0.5	E	0.1	90.0	0.03	315.3	0.01%
W21EA-D Parkersburg, WV CP 0000051781	21	1.0	E	0.1	90.0	0.06	343.3	0.02%
<b>Total Calculated Signal Density:</b>								<b>20.63%</b>

- ERP: Effective Radiated Power
- Polarization: H - Horizontal; E- Elliptical
- Field: Elevation Pattern Relative Field Value
- Height: Height of radiation center above ground level
- S-Calc: OET Bulletin 65 calculated value of signal density at two meters above ground level
- S-Limit §1.1310 uncontrolled/general population limit for signal density

Based on this analysis and considering all broadcast facilities, the total maximum calculated RF density at two meters above ground level near the proposed auxiliary site will be 20.6 percent of the FCC's uncontrolled / general population maximum permissible exposure limit. No other television broadcast, radio broadcast, or other nonexcluded facilities are known to be within sufficient distance to be a significant contributor to RF exposure at this location.

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.

List of Attachments

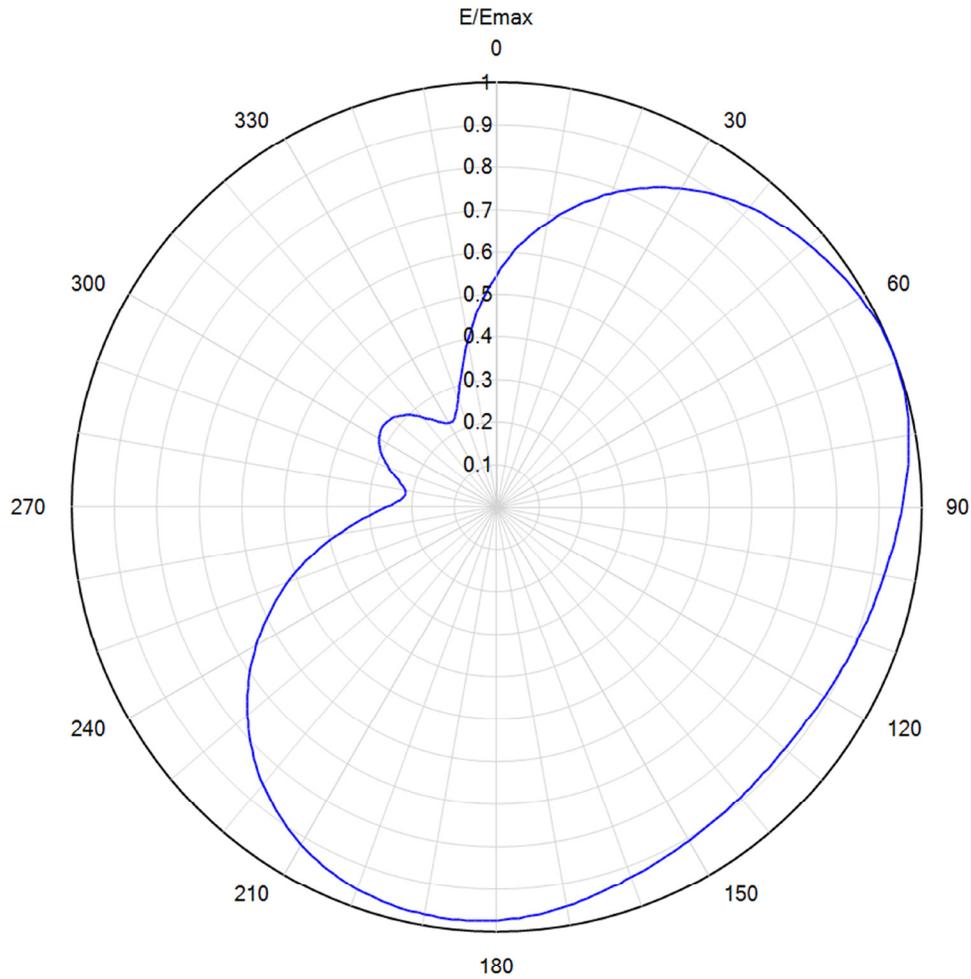
Figure 1	Antenna Azimuthal Pattern
Figure 2, 2A	Antenna Elevation Pattern
Figure 3	Proposed Auxiliary Contours
Figure 4	Calculated RF Electromagnetic Field

**Chesapeake RF Consultants, LLC**

Joseph M. Davis, P.E.      June 15, 2020  
207 Old Dominion Road      Yorktown, VA 23692      703-650-9600



## Azimuth Pattern



Model: SBB-8C170  
Location:  
Customer:  
Date: September 11, 2019  
Rotation Angle: 125 degrees

Note: Pattern Tolerance +/-5% of Emax

Polarization: Horizontal  
Frequency: 599.00 MHz  
Directivity: 1.7 (2.35 dB)  
Elevation Angle: 1.00 degrees  
Horizontal Unit Pattern:  
File = SBB-C170-605.pat



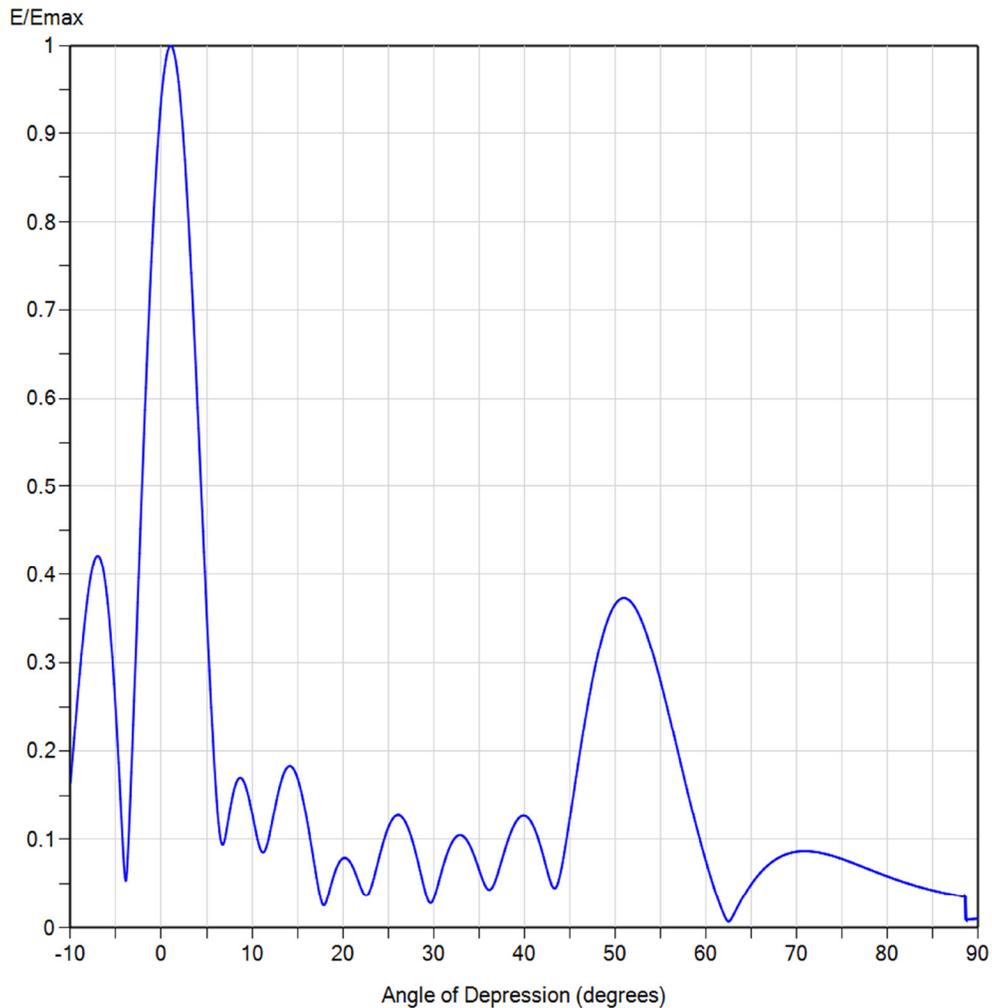
**Figure 1**  
**Auxiliary Antenna Azimuthal Pattern**  
**WTAP-TV Parkersburg, WV**  
**Facility ID 4685**  
**Ch. 35 285 kW 170 m**

prepared for  
**Gray Television Licensee, LLC**

June, 2020



## Elevation Pattern



Model: SBB-8C170  
Polarization: Horizontal  
Location:  
Customer:  
Date: September 11, 2019

Frequency: 599.00 MHz  
Directivity (Main Lobe): 9.0 (9.55 dBd)  
Directivity (At Horizon): 8.0 (9.02 dBd)  
Beam Tilt: 1.00 degrees  
Azimuth Angle: 69 degrees



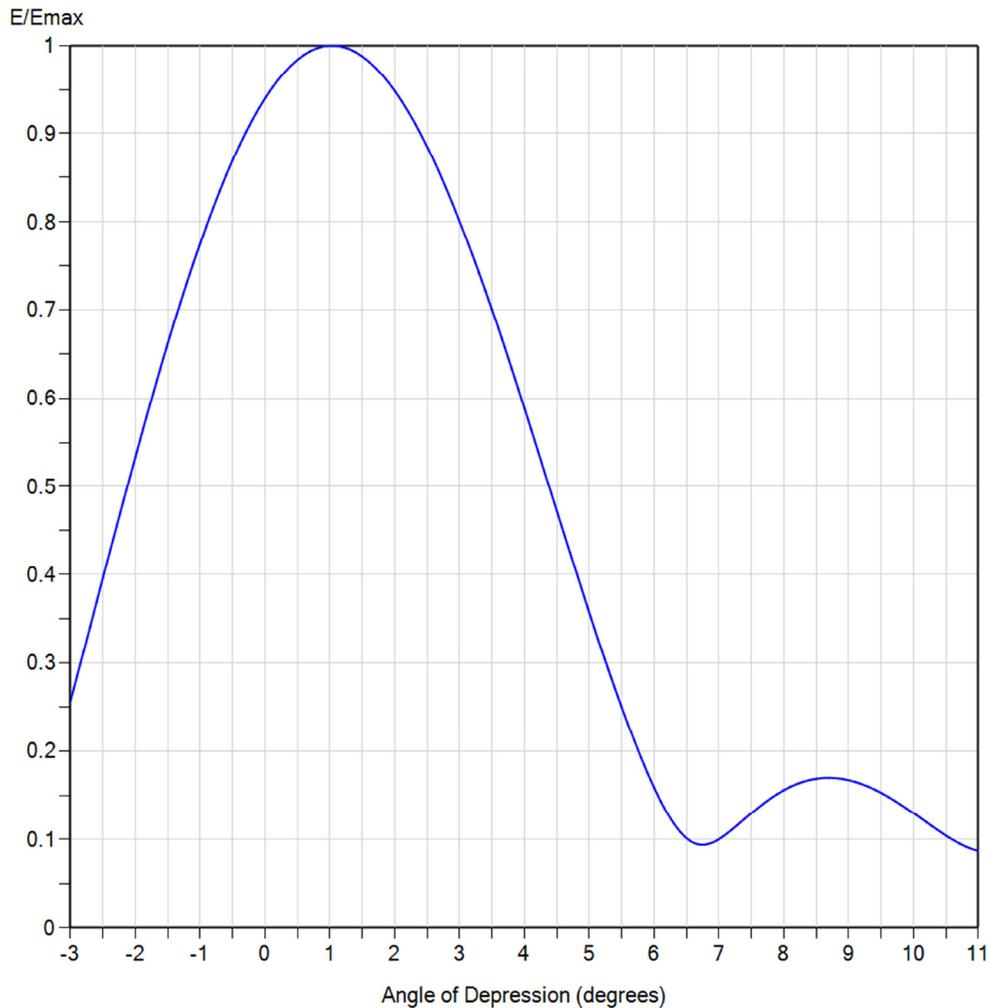
**Figure 2**  
**Auxiliary Antenna Elevation Pattern**  
**WTAP-TV Parkersburg, WV**  
**Facility ID 4685**  
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## Elevation Pattern



Model: SBB-8C170  
Polarization: Horizontal  
Location:  
Customer:  
Date: September 11, 2019

Frequency: 599.00 MHz  
Directivity (Main Lobe): 9.0 (9.55 dBd)  
Directivity (At Horizon): 8.0 (9.02 dBd)  
Beam Tilt: 1.00 degrees  
Azimuth Angle: 69 degrees



**Figure 2A - Detail  
Auxiliary Antenna Elevation Pattern  
WTAP-TV Parkersburg, WV  
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**Figure 4**  
**Calculated RF Electromagnetic Field**  
**Auxiliary Antenna**  
**WTAP-TV Parkersburg, WV**  
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