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**MARANATHA BROADCASTING COMPANY, INCORPORATED**

**LICENSEE OF**

**WFMZ-DT CHANNEL 46**

**ALLENTOWN, PENNSYLVANIA**

**FCC FACILITY ID # 39884**

**BLCDT-20060621AAU – REF DATA & SITE 1**
**BLCDT-20100126ABW**
**BPCDT-20080619AKZ**
**NEW DTS – SITE 2**

# APPLICATION FOR AUTHORITY TO CONSTRUCT DIGITAL TRANSMISSION SYSTEM (DTS) AND WAIVER REQUEST FOR "MINIMAL" COVERAGE EXTENSION UNDER 73.626

**FOR WFMZ-DT**

**AMENDED CONSOLITDATED ENGINEERING EXHIBIT 50**

**December 17, 2010**

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**LICENSEE OF**

**WFMZ-DT CHANNEL 46**

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**FOR WFMZ-DT**

## AMENDED CONSOLIDATED ENGINEERING EXHIBIT 50

## INTRODUCTION, BACKGROUND, NEED, AND PUBLIC INTEREST SHOWING

Maranatha Broadcasting Company Incorporated ("MARANATHA)" is filing this application for authority to construct a two-site digital transmission system (DTS) for serving both the Allentown[1]-Bethlehem-Easton, PA area (Site 1) and the Area of the principal satellite and CATV headends (Site 2) for the WFMZ-DT television market. Site 2 will serve to act as a "fill-in" to provide adequate coverage with respect to 47 CFR 76.55(c)(3) in the area of the existing satellite and CATV headends for the WFMZ-DT market[2].

[1] Allentown is the WFMZ-DT City of License.

[2] MARANATHA's WFMZ-TV on Channel 69 with an ERP of 5,000 kilowatts had successfully provided adequate signals to the headends discussed herein for many years. Even though WFMZ-DT is now operating at 800 kilowatts ERP from

The reference data for this proposal is the currently licensed WFMZ-DT, Channel 46 (BLCDT-20060621AAY) facility located on a mountain just south of the City of Allentown, PA.

**The Site 1 or main station of the DTS system will be the currently authorized facilities of BPCDT-20080619AKZ. This facility is operating under automatic Program Test Authority and has a covering License application pending (BLCDT-20100126ABW).**

Figure 1 attached hereto shows that the proposed DTS Site 2 facilities extend slightly outside the Table of Distances for a UHF DTV station in 73.626(c). Site 1 is not re-locating, therefore full coverage of the City of License, Allentown will continue as now while Site 2, as discussed below, would provide an adequate stable signal to the various satellite and CATV headends to insure reliable reception to WFMZ-DT viewers, who, before analog shutdown, received adequate signals via these providers and who now have been disenfranchised in various degrees since June 12, 2009[3]. The radio paths to all three CATV/Satellite systems receive locations are occluded by a combination of 35-50+ story skyscrapers in downtown Philadelphia (VERIZON) and over the radio horizon terrain blockage because relatively low receive antenna heights at both DirecTV (~35 feet AG/ 41 feet AMSL) and Echo Star (~30 feet AG/46 feet AMSL). In addition, having elevated (i.e. City Grade" digital signals in this densely populated region would facilitate reliable indoor DTV and mobile DTV reception[4].

**PROVIDING THE REQUIRED SIGNAL LEVEL OF –61 dBm per 47 CFR 76.55(c)(3).**

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essentially the same location and HAAT as analog, MARANATHA has been unsuccessful in provided adequate signals to these same headend sites since analog operations ceased on June 12, 2009 even with the lower permitted received signal strength with digital operation.

[3] The affected headends are Verizon VHO, DirecTV, and Dish Network.

[4] Recent industry reports indicate that significantly more than a 41 dBu field strength is required for reliable indoor reception.

Calculations by this office indicate that an ERP of less than 3.6 kW proposed might be insufficient to fully provide a stable long-term signal level of –61 dBm to all three headends mentioned herein. This is particularly true with respect to Verizon who has been unwilling neither to allow any station technical representative witness the company's testing procedure nor to directly question the results. A game of delay - delay - delay has continued for some time now which MARNATHA believes is not in the Public Interest.

**FACILITIES PROPOSED HEREIN**

Pursuant to the final Rules regarding DTS systems, this office, with assistance from MSW, Inc., has completed a Longley-Rice analysis of the proposed DTS operation on TV Channel 46 with the Site 1 facilities of BPEDT-20080619AKZ and the Site 2 facilities with an ERP of 3.6 kW directional (HAAT 281 meters) at 90 degrees True and with 3.5 degrees of electrical beamtilt, a "Stringent" channel filter per 74.794, and that study shows that no prohibited interference will occur to any other authorized or pending full service and LPTV analog or digital station as required by 74.792 and 74.793 except as noted below[5]. The study confirmed that there would not be any impermissible interference to the reception of Site 1 in the City of License, Allentown, PA. Synchronizing equipment will be installed as needed[6]. The results of the Longley-Rice Study can be supplied to the staff if needed. As shown in Figure 1,

[5] Maranatha has an interference Agreement, a copy of which is attached hereto, with WOLF-TV with respect to calculated adjacent channel interference caused to WOLF-DT. The instant Longley-Rice study showed that the addition of the Site 2 transmitter radiating less than 5 watts towards WOLF-DT caused no increase in interference thereto. In addition, there is an outstanding STA in place for WMBQ-CA, facility ID 14322 (BSTA-20071228ACB). We note that staff policy is and continues to be that STA operations are not protected. In this case the station is now licensed in New York City and the instant L-R study revealed no prohibited overlap from this proposal. BSTA-20071228ACB appears to be moot.

[6] We note the commission now permitting any suitable means of synchronization of the DTS facilities over and above those already demonstrated. MARANATHA expects that new and possibly more advanced equipment will soon be available for this purpose and has a separate dedicated program stream feed available for that purpose.

the 41.7 dBu F(50,90) DTS transmitter proposed on CH 46 does extend beyond the 41.7 dBu F(50,90) Channel 46 Site One 41.7 dBu F(50,90) DTV service contour.

**WAIVER OF 47 CFR 73.626 REQUESTED**

To the extent necessary to provide strong reliable service to the above-mentioned CATV/Satellite headends, MARANATHA requests a waiver of 73.626 and any other Rule the Commission deems necessary to grant this application. To support the request for waiver, the following calculations and Figures 1 and 2 by this office and included herein indicate:

a) The area of the contour extension is 239.1 $km^2$. The 41.7 dBu service area of the main station coverage at 800 kW is 21, 923.6 $km^2$. The area within the allowable 103 km radius circle is 33,329.2 $km^2$. 239.1 $km^2$ is 1.09% of the total 41.7 dBu service area of WFMZ-DT and 0.72% of the total 103 km radius 73.626(c) UHF Table service area. We believe this amount of encroachment is di-minimis.
b) The only practical location for the proposed DTS Site 2 is on a tower in the Philadelphia Boxborough "antenna farm"[7].
c) Practical UHF azimuth pattern narrow beamwidths are limited to about +/- 36 degrees limiting any ability to control pattern spill off axis. This proposal utilizes the best antenna that could be found with respect to azimuth beamwidth coupled with minimizing self-interference to the Site 1 signal.
d) The proposed Site 2 antenna is a 6 bay collinear with 3.5 degrees of electrical beam tilt. As shown in the Site 2 XML elevation pattern file, the power radiated on the

[7] The "antenna farm" designation is not formalized, however there are 9 tall towers in an immediate cluster that provide most of the television and FM coverage for the region. This location is where virtually all receiving antennas point. The proposed Site 2 facility has access to a WFMZ-DT Part 74 microwave link to provide a high quality digital stream for transmission.

horizon is reduced to a nominal 0.9 kilowatts (field = 0.631) or less from the main lobe power of 3.6 kW Max-DA). This further limits coverage on the horizon beyond that calculated without beam tilt. As shown in Figure 2, using horizontal plane ERP data, the proposed 0.9 kW results in no extension of the signal beyond the 103 km limit of the Table of Distances but allows an additional 3-4 dB of signal towards the actual headend antenna locations given their low height.

e) The proposed Site 2 transmitting antenna is mounted high on the tower (272 meters AMSL) and coupled with the 3.5 degrees of electrical beam tilt requested concentrates the energy down close-in where it is needed and minimizes actual pattern spill beyond the 103 km limit of the Table of Distances.

f) The chosen Site 2 transmitter location can be fed programming by a separate digital STL link through existing Part 74 facilities owned by the applicant further reducing system installation costs.

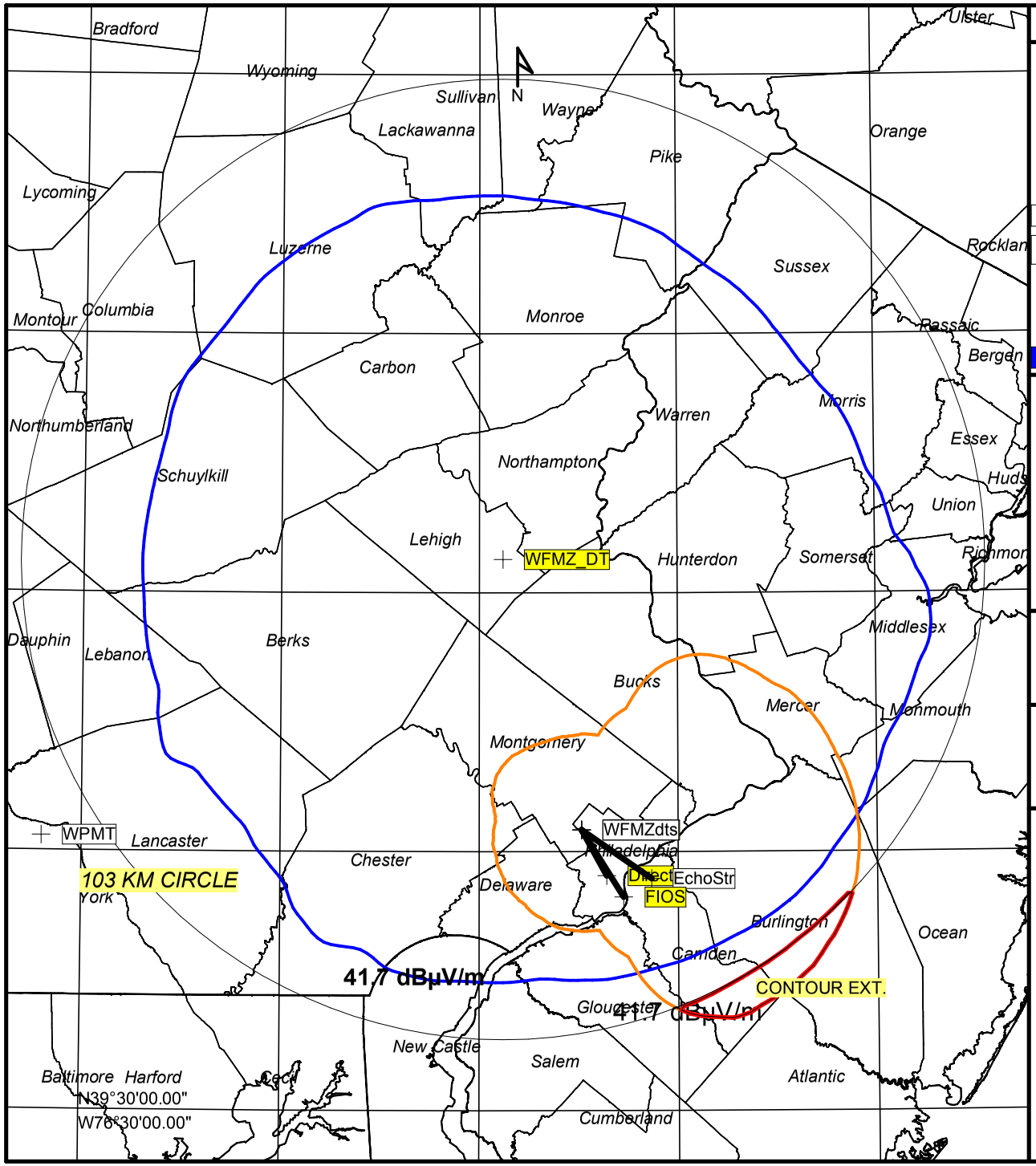
g) With respect to meeting the requirements of 47 CFR 73.626(f)(1), Figure 1 shows that the Site 1 facilities of WFMZ-DT at 800 kW ERP and 331 meters HAAT in no way encompasses the completely allowable service area of the Table of Distances for UHF stations. Longley-Rice studies revealed that any further power increase in virtually any direction of Site 1 would require up to an additional three interference agreements. Based on initial conversations, the probably of achieving these arrangements appears to be impossible.

**UNCONDITIONAL MUTUAL INTERFERENCE STATEMENT**

A copy of the Unconditional Acceptance of and Non-Objection to Predicted Interference From and to Co-Owned Facilities is attached to this Exhibit.

**PUBLIC INTEREST SHOWING**

**MARANATHA** has had a long history of service the people of the Philadelphia ADI who receive local channels via satellite "local in local" from DirecTV and Echo Star or by CATV systems operated by COMCAST and VERIZON. Even though WFMZ-DT is operating with a digital transmitted signal level well in excess of that needed to replicate its NTSC coverage area, real world reception utilizing state of the art antenna systems has not and can not operate satisfactorily with the signal levels predicted by Longley-Rice. There is an urgent need to continue to provide state of the art television service to these distribution systems and also to documented area off-air viewers who can no longer receive an adequate signal from WFMZ-DT and MARANATHA believes this fact alone, is a sufficient public service showing to warrant an immediate Grant of this proposal so as to allow MARANATA to proceed with this installation as soon as practical. MARANATHA will proceed expeditiously with this project upon Commission approval.




SIGNAL™: WFMZDT_DTS_CP_AREA_FIG_1a.map

Sites

Site: ALLENTOWN
N40°33'52.00" W75°26'24.00" 259.7 m
WFMZ_DT Tx.Ht.AGL: 222.3 m Total ERPd: 29.03dBkW
Grp: 1 directional-horizontal/0.0° 663.2500 MHz

WFMZ_DTS_min2

quick contours

Interference contour study

Propagation methods:
service contour : FCC-FCC 90.0%

**= 41.7 dBµV/m service contour**

Notes

Plot of FCC F(50,90) service contour,
proposed DTS 46.
Plot of Site 1 and Site 2 CH 46 41.7 dBu
contours with 3.6 kW ERP at 3.5 degrees
beam tilt - Main lobe ERP plotted.
See narritive.
prepared by
Larry H. Will, P.E.
Glen Mills, PA 19342

KILOMETERS

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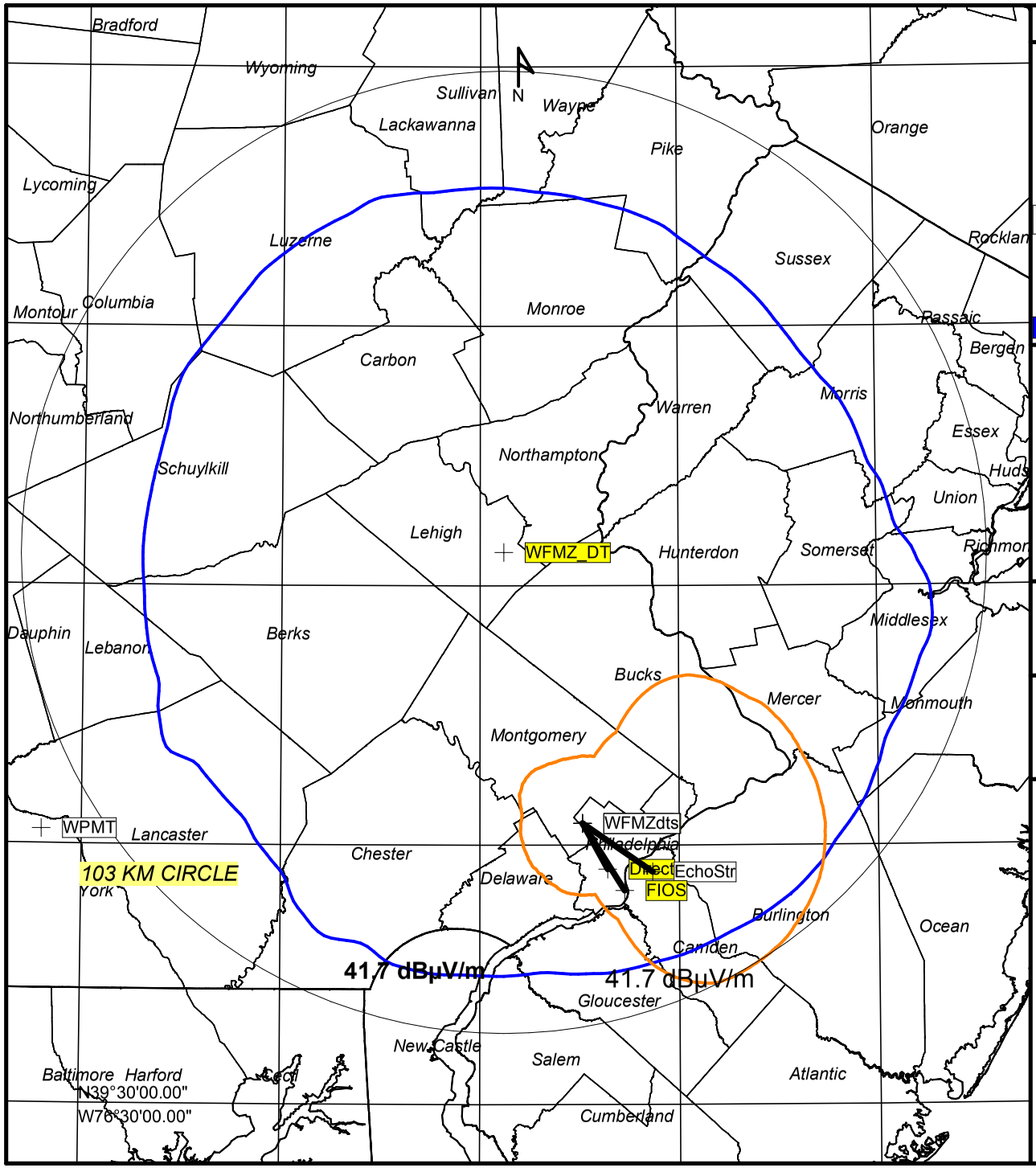
# COVERAGE STUDY

WFMZDT DTS - 3.6 kW

Figure 1A 12/17/2010




SIGNAL™: WFMZDT_DTS_CP_AREA_FIG_2a.map

Sites

Site: ALLENTOWN
N40°33'52.00" W75°26'24.00" 259.7 m
WFMZ_DT Tx.Ht.AGL: 222.3 m Total ERPd: 29.03dBk
Grp: 1 directional-horizontal/0.0° 663.2500 MHz

quick contours

Interference contour study

Propagation methods:
service contour : FCC-FCC 90.0%

**= 41.7 dBµV/m service contour**

Notes

Plot of FCC F(50,90) service contour,
proposed DTS 46.
Plot of Site 1 and Site 2 CH 46 41.7 dBu
contours with 3.6 kW ERP at 3.5 degrees
beam tilt and 0.9 kW ERP on horizon.
Horizon ERP plotted. See narritive.
prepared by
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# COVERAGE STUDY

WFMZDT DTS - 3.6 kW BT

Figure 2A 12/17/2010

# MARANATHA BROADCASTING CORP

### WFMZ-DT ALLENTOWN PA

## EXHIBIT 60 - TABLE 1 SITE 1

PSI PSIMPTD-10-DCPA-46
AZIMUTH PATTERN

**10 Degree**

| Angle | Field | ERP (kW) | ERP (dBk) |
|---|---|---|---|
| 0 | 0.239 | 45.70 | 16.599 |
| 10 | 0.232 | 43.06 | 16.341 |
| 20 | 0.223 | 39.78 | 15.997 |
| 30 | 0.217 | 37.67 | 15.760 |
| 40 | 0.216 | 37.32 | 15.720 |
| 50 | 0.226 | 40.86 | 16.113 |
| 60 | 0.260 | 54.08 | 17.330 |
| 70 | 0.298 | 71.04 | 18.515 |
| 80 | 0.404 | 130.57 | 21.159 |
| 90 | 0.551 | 242.88 | 23.854 |
| 100 | 0.711 | 404.42 | 26.068 |
| 110 | 0.841 | 565.82 | 27.527 |
| 120 | 0.895 | 640.82 | 28.067 |
| 130 | 0.940 | 706.88 | 28.493 |
| 140 | 0.973 | 757.38 | 28.793 |
| 150 | 0.993 | 788.84 | 28.970 |
| 160 | 1.000 | 800.00 | 29.031 |
| 170 | 0.992 | 787.25 | 28.961 |
| 180 | 0.971 | 754.27 | 28.775 |
| 190 | 0.937 | 702.38 | 28.466 |
| 200 | 0.837 | 560.46 | 27.485 |
| 210 | 0.736 | 433.36 | 26.368 |
| 220 | 0.635 | 322.58 | 25.086 |
| 230 | 0.534 | 228.12 | 23.582 |
| 240 | 0.404 | 130.57 | 21.159 |
| 250 | 0.251 | 50.40 | 17.024 |
| 260 | 0.233 | 43.43 | 16.378 |
| 270 | 0.222 | 39.43 | 15.958 |
| 280 | 0.218 | 38.02 | 15.800 |
| 290 | 0.221 | 39.07 | 15.919 |
| 300 | 0.237 | 44.94 | 16.526 |
| 310 | 0.235 | 44.18 | 16.452 |
| 320 | 0.241 | 46.46 | 16.671 |
| 330 | 0.246 | 48.41 | 16.850 |
| 340 | 0.247 | 48.81 | 16.885 |
| 350 | 0.227 | 41.22 | 16.151 |

**Cardinal**

| Angle | Field | ERP (kW) | ERP (dBk) |
|---|---|---|---|
| 0 | 0.24 | 46.08 | 16.635 |
| 45 | 0.221 | 39.07 | 15.919 |
| 90 | 0.551 | 242.88 | 23.854 |
| 135 | 0.952 | 725.04 | 28.604 |
| 180 | 0.971 | 754.27 | 28.775 |
| 225 | 0.585 | 273.78 | 24.374 |
| 270 | 0.222 | 39.43 | 15.958 |
| 315 | 0.238 | 45.32 | 16.562 |

**Maxima**

| Angle | Field | ERP (kW) | ERP (dBk) |
|---|---|---|---|
| 157 | 1.000 | 800.00 | 29.031 |
| 160 | 1.000 | 800.00 | 29.031 |
| | | | |
| | | | |

**Minima**

| Angle | Field | ERP (kW) | ERP (dBk) |
|---|---|---|---|
| 40 | 0.216 | 37.32 | 15.720 |
| 280 | 0.218 | 38.02 | 15.800 |
| | | | |
| | | | |
| | | | |

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## MARANATHA BROADCASTING CORP

### WFMZ-DT ALLENTOWN PA

## EXHIBIT 60 - TABLE 1 SITE 2

PSI PSILPAD-6-46-Special
AZIMUTH PATTERN

SHOWN WITHOUT 90 DEGREE ROTATION

**10 Degree**

| Angle | Field | ERP (kW) | ERP (dBk) |
|---|---|---|---|
| 0 | 1.000 | 3.60 | 5.563 |
| 10 | 0.97 | 3.39 | 5.298 |
| 20 | 0.880 | 2.79 | 4.453 |
| 30 | 0.760 | 2.08 | 3.179 |
| 40 | 0.600 | 1.30 | 1.126 |
| 50 | 0.460 | 0.76 | -1.182 |
| 60 | 0.250 | 0.23 | -6.478 |
| 70 | 0.060 | 0.01 | -18.874 |
| 80 | 0.030 | 0.003 | -24.895 |
| 90 | 0.030 | 0.003 | -24.895 |
| 100 | 0.030 | 0.003 | -24.895 |
| 110 | 0.030 | 0.003 | -24.895 |
| 120 | 0.030 | 0.003 | -24.895 |
| 130 | 0.030 | 0.003 | -24.895 |
| 140 | 0.030 | 0.003 | -24.895 |
| 150 | 0.030 | 0.003 | -24.895 |
| 160 | 0.030 | 0.003 | -24.895 |
| 170 | 0.030 | 0.003 | -24.895 |
| 180 | 0.030 | 0.003 | -24.895 |
| 190 | 0.030 | 0.003 | -24.895 |
| 200 | 0.030 | 0.003 | -24.895 |
| 210 | 0.030 | 0.003 | -24.895 |
| 220 | 0.030 | 0.003 | -24.895 |
| 230 | 0.030 | 0.003 | -24.895 |
| 240 | 0.030 | 0.003 | -24.895 |
| 250 | 0.030 | 0.003 | -24.895 |
| 260 | 0.030 | 0.003 | -24.895 |
| 270 | 0.030 | 0.003 | -24.895 |
| 280 | 0.030 | 0.003 | -24.895 |
| 290 | 0.060 | 0.01 | -18.874 |
| 300 | 0.25 | 0.23 | -6.478 |
| 310 | 0.460 | 0.76 | -1.182 |
| 320 | 0.6 | 1.30 | 1.126 |
| 330 | 0.76 | 2.08 | 3.179 |
| 340 | 0.88 | 2.79 | 4.453 |

**Cardinal**

| Angle | Field | ERP (kW) | ERP (dBk) |
|---|---|---|---|
| 0 | 1.00 | 3.60 | 5.563 |
| 45 | 0.530 | 1.01 | 0.049 |
| 90 | 0.030 | 0.003 | -24.895 |
| 135 | 0.030 | 0.003 | -24.895 |
| 180 | 0.030 | 0.003 | -24.895 |
| 225 | 0.030 | 0.003 | -24.895 |
| 270 | 0.030 | 0.003 | -24.895 |
| 315 | 0.530 | 1.01 | 0.049 |

**Maxima**

| Angle | Field | ERP (kW) | ERP (dBk) |
|---|---|---|---|
| 157 | 1.000 | 3.60 | 5.563 |
| 160 | 1.000 | 3.60 | 5.563 |
| | | | |
| | | | |

**Minima**

| Angle | Field | ERP (kW) | ERP (dBk) |
|---|---|---|---|
| 80 | 0.030 | 0.003 | -24.895 |
| 90 | 0.030 | 0.003 | -24.895 |
| 180 | 0.030 | 0.003 | -24.895 |
| 270 | 0.030 | 0.003 | -24.895 |
| 280 | 0.030 | 0.003 | -24.895 |

prepared by
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Exhibit 11 - Attachment II
WFMZ-TV - WOLF-TV

Agreement dated June 25, 2009, between WOLF- TV, Wilkes-Barre Scranton, and WFMZ-TV, Allentown, PA, to allow each station to increase its transmission power by 3 db towards each other from their current power levels as of the date of this agreement.

WOLF-TV currently operates on Channel 45 at 420 KW ERP at 153 degrees towards WFMZ-TVs transmission tower. WFMZ-TV currently operates on Channel 46 at 25 KW ERP at 333 degrees towards WOLF-TV's tower. Each station hereby agrees to allow the other to increase its currently licensed ERP to the maximum permitted by the FCC except that any increase shall be limited to a maximum of 3 db in the direction of the other station's tower and plus or minus 22 degrees from the azimuth toward each tower.

This agreement assumes the respective tower locations and elevations will remain at the present locations and, in the case of WOLF-TV, the shall not be permitted to move its antenna south of its current location,and WFMZ-TV shall not be permitted to move its tower north of its current location without mutually agreement to accept the increased inference generated by such a move of tower locations or a corresponding reduction in ERP to maintain the predicted interference to each station as if the stations had remained at their present tower locations. Both stations agree to not increase the center of radiation or HAAT without a corresponding reduction in power to compensate for the increased antenna height in the direction of the other station's tower as described defined above.

This agreement shall remain in force until such time as both parties agree to terminate this agreement in writing or at such time as one station moves to another TV channel.

Agreed by WOLF-TV

_____ Date 6.30.09

Agreed by WFMZ-TV

_____ Date 6/30/09

**Exhibit 11 Attachment**

**Unconditional Acceptance of and Nom-Objection to Predicted Interference From and to Co-Owned Facilities, Pursuant to Section 74.703(a)**

Pursuant to FCC Rule section 74.703(a), Maranatha Broadcasting Company, Incorporated {"MARANATHA") hereby consents unconditionally to any excess interference that might occur between or among the following TV Translator facilities and proposed DTS operation as a result of the instant application and other applications filed contemporaneously with the instant application. A1l of the following facilities are owned and operated by MARANATHA:

- WFMZ-DT (File No. BPCDT-20080619AKZ) and the pending application for a covering License (BLCDT-20100126ABW).
- W47DO-D (File No. BDRTCT-20090604ABI and its pending application as amended for a proposed replacement channel 45, which includes a copy of this Unconditional Acceptance of and Non-objection to predicted Interference from and to Co-owned Facilities, Pursuant to Section 74.703(a)). This application is being filed contemporaneously with the new application for a DTS facility for WFMZ-DT.
- NEW DTS facility on Channel 46 for Philadelphia, PA, (File No. to be determined), which includes a copy of this Unconditional Acceptance of and Non-Objection to Predicted Interference from and to Co-owned Facilities, Pursuant to Section 74.703(a)). This application is being filed contemporaneously with the amendment to BDRTCT-20090604ABI.

As discussed in the technical exhibit to the instant applications, Longley-Rice coverage studies show that interference between and among the above-referenced stations is likely

in excess of the de minimis amounts allowed by Rule Section 74.793[1]. Each of these stations does not receive interference from all others but, in the aggregate, mutual interference is possible between some stations. The proposed interference is acceptable to MARANATHA and the instant application does not cause prohibited interference within the principal service community of WFMZ-DT, Allentown, Pennsylvania.

[1] We note that the FCC's TV Process software does not account for interference abatement by use of precision timing for DTV DTS systems.