Report on a Study Performed for

Gray Television Licensee, LLC, regarding Relocation of Low-Power Television Station WECX-LD, Channel 14, Eau Claire, WI

Concerning Potential Out-of-Band-Emissions and Receiver Desensitization for Land Mobile Operations in the lower adjacent band to TV channel 14

May 12, 2022

Prepared by:

Joseph L. Snelson, Jr CPBE

Meintel, Sgrignoli, & Wallace

Meintel, Sgrignoli, & Wallace, LLC
1282 Smallwood Drive
Suite 372
Waldorf, Maryland 20603
(202) 251-7589

INTRODUCTION and BACKGROUND

This study has been prepared for Gray Television Licensee, LLC, the licensee of low-power digital television station WECX-LD ("WECX"), Eau Claire, WI. WECX has been granted a construction permit, FCC File Number 0000189634, to modify the current authorized facility. Modifications include a change in location, Effective Radiated Power and antenna make/model and antenna height.

In the construction permit authorization that was granted the following condition must be met: *"During equipment tests, authorized by Section 73.1610 of the Commissions Rules, the permittee shall take adequate measures to identify and substantially eliminate objectionable interference which may be caused to existing land mobile radio facilities in the 460 to 470 MHz band. Documentation that objectionable interference will not be caused to existing land mobile radio facilities shall be submitted along with the request for Program Test Authority..."*

To meet the condition placed in the construction permit MSW was requested to study the potential impact that the modified WECX facility may have on active and authorized Land Mobile ("LM") facilities operating below channel 14.

MSW performed its study based on the parameters shown in the construction permit to determine if the combined as-built post-transmitter filter added to a typical transmitter response would protect LM facilities from Out-of-Band Emissions ("OOBE") and receiver desensitization from WECX operating with the modified facility on TV channel 14.

The study focused on a circular area with a radius of 160 km and a center point being the transmitter site coordinates as stated in the WECX construction permit. The area studied is shown in Appendix 1 of this report.

EXECUTIVE SUMMARY

MSW studied the predicted OOBE interference from the modified WECX facility into authorized LM stations operating below TV channel 14. The potential impact that WECX might have on LM receiver desensitization was also studied.

Based on the results of this study the following conclusions were reached.

1. Continued utilization of two 8-Section cascaded post-transmitter filters was found to be effective in significantly reducing OOBE and protecting currently authorized LM stations.

2. There were no cases of OOBE interference into Land Mobile operations reported in this study with the use of a cascaded filter.

3. There were no cases of potential LM receiver desensitization reported in this study.

Considering the foregoing, WECX meets the requirement of the construction permit by demonstrating with this study that objectionable interference is not predicted to be caused into Land Mobile operations. The remainder of this report gives the parameters and methodology used in conducting the study along with an analysis of the results.

SCOPE OF STUDY AND METHODOLOGY

The scope of this study consists of two parts with each part analyzing the impact of potential channel 14 OOBE interference from WECX into a LM receiver and LM receiver desensitization due to WECX operating on an adjacent channel at a power level either equal to or higher than that of LM base or mobile stations.

The first part of this study consisted of an overall area study based on a hypothetical LM station, both fixed and mobile, operating on a frequency close to the channel 14 band edge with default operating parameters (i.e. antenna height, bandwidth, etc.). This serves as an indicator of the effectiveness of post-transmitter filtering and antenna radiation characteristics in protecting LM operations close to the band edge and shows the approximate extent of interference and desensitization in terms of distance from the TV transmitter site. The parameters used for WECX are found in Table 1 and the generic parameters used for both fixed and mobile LM operations are found in Table 2 of this report.

This area based interference study was performed using the Longley-Rice Irregular Terrain Model ("ITM") to predict interference caused by OOBE from WECX into both fixed and mobile LM operations using the generic parameters. The study focused on a circular area with a radius of 160 km from a center point with coordinates being the relocated WECX transmitter site.

The circular area was divided into cells with a size of approximately 1 km per side. The assumed LM receiver location was considered to be at the geographic center of the cell. A path profile was created between the television transmitter site and the cell center followed by the ITM analysis. The OOBE loss of the post-transmitter filter, at the LM station frequency, was added to the coupling factor, calculated from the bandwidth of the LM station and the 500 kHz measurement bandwidth used for digital television stations, to the received field strength. LM antenna gain and line loss were then added to the received field strength to obtain the final value used for interference prediction. The reference value used for interference prediction is 17 dBu[1].

Desensitization calculations were performed by using the free space loss from the television transmit antenna to the cell center point. The received power level in the direction of the cell included calculated losses due to terrain, calculated antenna azimuth and elevation discrimination and coupling losses based on the bandwidth of the LM station and the 3 dB half-power bandwidth of the television station (approximately 5.38 MHz). LM antenna gain and assumed transmission line loss for fixed base stations was also considered. The reference value used for desensitization prediction is around 80 dB which is a typical receiver off-

[1] See §73.687 (e)(4)(ii) of the Rules

frequency rejection characteristic[2] near the television station's band edge. Rejection typically increases as the LM frequency moves further away from the band edge and was considered in this study.

The second part of the study consisted of analyzing interference and receiver desensitization into currently authorized fixed and mobile LM facilities. A list of potentially impacted LM facilities was created from the FCC's Universal Licensing System ("ULS") database by searching for all active and licensed LM facilities within a culling distance of 160 km from the relocated WECX transmitter site. The entire area studied is shown in Appendix 1 of this report.

Interference and desensitization calculations were performed similar to the cell analysis described for the first part of the study except the authorized LM facilities (e.g. frequency, antenna height, etc.) were utilized. Other study parameters utilized in the study, including ITM parameters, are shown in Table 3.

Tables 4 and 5 are example calculations for both the interference and receiver desensitization for one of the fixed base stations studied. The purpose of these examples is to show in more detail how the study calculations were performed.

For authorized mobile LM operations a study was conducted similar to the general cell area study discussed earlier. A circular area was defined using the radius of operation for the mobile LM facility as authorized. If no radius was defined then a default radius of 48 km was used. The center point used was the coordinates of the mobile LM operation as authorized. The circular area was divided into 1 km/side cells and calculations were made at the geographic center of each cell. A pass/fail determination was made for each cell for both interference and receiver desensitization as calculated from the received signal of WECX. After analyzing all cells within the circular area the number of failures was compared to the total number of cells analyzed. If the total number of failures was at or under 2% of the total area the amount of interference or receiver desensitization was considered de minimis and the facility was considered to have passed.

Land Use/Land Clutter losses were not considered in this study for either OOBE interference or receiver desensitization calculations for both study parts.

For OOBE interference calculations the transmitter 500 kHz bandwidth lower adjacent channel sideband pre-filter response was added to the proposed cascaded post-transmitter filter to obtain the total OOBE rejection of the proposed transmission system (See Figure 2).

Most all LM operations use vertical antenna polarization. With WECX utilizing horizontal polarization the total received power at an LM station would be dependent on the polarization of the LM received antenna. A conservative value of 6 dB was used in this study when considering antenna cross polarization discrimination. Received power was calculated based on the total power radiated from WECX in the horizontal plane and then applying the applicable cross polarization factor based on the polarization of the LM facility.

[2] Value obtained by researching desensitization characteristic values from various receiver manufacturers

STUDY PARAMETERS

The parameters used for WECX operating on channel 14 and LM operations below channel 14 are shown in Tables 1 and 2, respectively. Table 2 shows the general LM analysis parameters for the area cell study. For the individual studies to each LM facility the authorized parameters were used as shown in the LM station's authorization.

Table 1 - Parameters proposed for WECX

Parameter	Value
Analyzed TV Station	WECX-LD
TV Channel	14 (470-476 MHz)
Latitude (NAD83)	44-39-50.0
Longitude (NAD83)	90-57-41.0
Height of Antenna Center of radiation (AMSL)	809.2 m
ERP	10.1 kW
Antenna Type	Directional
Polarization	Horizontal
Elevation Pattern	Real
Electrical Tilt	0.50 degrees
Antenna Mechanical Tilt Amount	N/A
Antenna Mechanical Tilt Orientation	N/A
Antenna Pattern Relative Field per Azimuth and Depression Angle	Calculated
Post-transmitter Filter Type	Dual Cascaded 8-Section

Table 2 - Parameters for Land Mobile Stations

Parameter	Value
Antenna Type	Omni-directional
Frequency (MHz)* (Lower Adjacent TV channel 14)	469.75
Bandwidth*	30 kHz
Height of Antenna Center of radiation (AGL)*	10.0m FB, 3.0m MO
Polarization*	Vertical
Receive Antenna Gain*	11.0 dBd FB, 0.0 dBd MO
Antenna Pattern Relative Field per Azimuth Bearing	1.0
Antenna Pattern Relative Field per Depression Angle	1.0
Receive Line Loss for Fixed Base stations	2.0 dB
Receiver Threshold	-120.0 dB
Receiver Out of Band Rejection (Fixed value used for cell study)	Approx. 80.0 dB**

* Value assumed for cell analysis. The authorized parameter was used for individual LM station studies
** Calculated based on LM frequency separation from the television station band edge frequency

Table 3 below shows the parameters used for the Irregular Terrain Model in deriving the proposed WECX channel 14 station OOBE field intensities inside a circular area with a 160 km radius for the area cell study. These parameters were also used for determining the signal strength of WECX OOBE into each LM station found inside the circular area (see Appendix 1).

Since the FCC Rules do not specify a defined distance to be studied for LM operations operating below channel 14 a study radius of 160km was utilized for this study. This distance is based on the typical distance (130 km) stated in § 74.709 (b) of the Rules to the protected LM contour from a defined center point for LM operations. This distance is added to the distance from the LPTV transmitter to the edge of its 76 dBu, F50,10 contour, which is approximately 30 km for WECX.

Table 3 – Parameter settings utilized in Land Mobile Study

Parameter	Value
Study Radius	160.00 km
Study Centerpoint Latitude (NAD 83)	44-39-50.0 N
Study Centerpoint Longitude (NAD 83)	90-57-41.0 W
Cross Polarization Discrimination Factor	6.0 dB
Target Study cell size	1.0 km/side
Study Path Distance Increment	0.1 km
Terrain Database	1 arc second
Location Variability	50 %
Time Variability	10 %
Confidence	50 %
Ground Permittivity	15.0
Ground Conductivity	0.005 S/m
Surface Refractivity	301.0 N-units PPM
Longley-Rice Mode ‡	1 or 3
Climate Code	5 Continental Temperate
Utilize Land Use/Land Clutter in analysis	False
Interference criteria utilized (typical LM Receiver Sensitivity)	17.0 dBuV/m
Number of cells analyzed	79865
Area analyzed	80432.64 sq km
Area predicted to receive field strength => 17 dBu Fixed Base	0.00 sq km
Area predicted to experience receiver desensitization Fixed Base	0.00 sq km
Area predicted to receive field strength => 17 dBu Mobile	0.00 sq km
Area predicted to experience receiver desensitization Mobile	0.00 sq km

‡ 1 - Individual mode used for LM station analysis, 3 – Broadcast mode used for cell analysis

STUDY METHODOLOGY AND EXAMPLE

Tables 4 and 5 show the methodology that was used for calculating interference and receiver desensitization, respectively, into the LM Base Station shown below.

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dB	BW khz
464.9750	KNJG504	IG	FB2	40.9	292.4	V	13.3	23.0	3.5	11.2

Table 4 - Methodology for Predicting Interference into a Land Mobile receiver from a DTV Station

Parameter	Value
Land Mobile Station Frequency *	469.9750 MHz
Longley-Rice Calculated Received Field Strength [F50,10]TV Station	84.7 dBuV/m
Transmitter + Filter loss at frequency	91.6 dB
Transmitting and receiving antenna discrimination, combined†	0.6 dB
DTV coupling into LM (Bandwidth: DTV=500 kHz, LM=11.2 kHz)	16.5 dB
Cross-polarization discrimination	6.0 dB
LM antenna gain	3.5 dB
LM line loss	2.0 dB
Calculated equivalent field strength	-28.4 dBuV/m
Interference criteria utilized (typical LM Receiver Sensitivity)	17.0 dBuV/m
Margin to interference	45.4 dB
Analysis result**	Pass

Table 5 - Methodology for Predicting Desensitization Margin into a Land Mobile receiver from a DTV Station

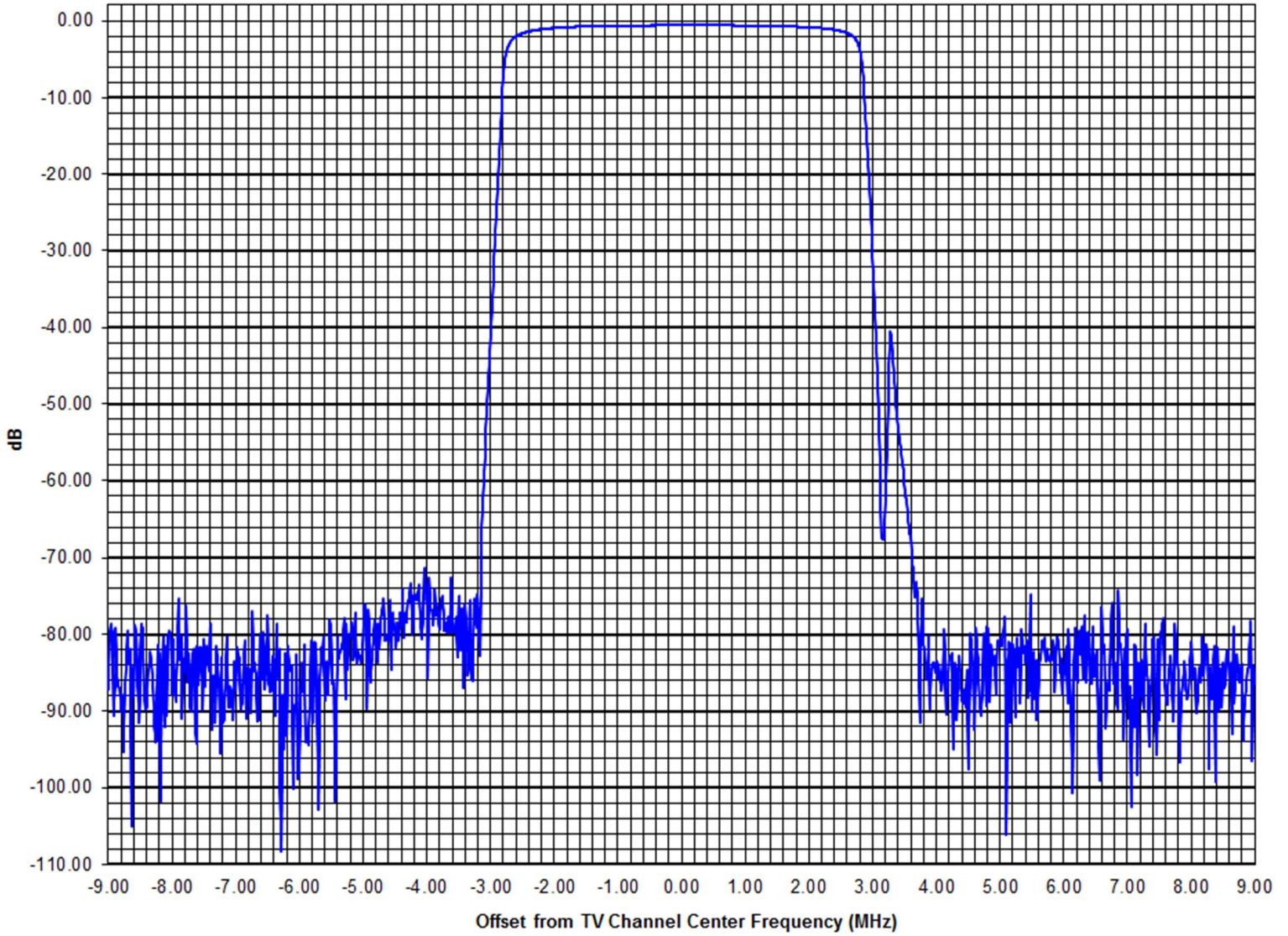
Parameter	Value
Lower Band Edge Frequency of TV Station (Ch. 14)	470.3344 MHz
Transmit ERP (10.1 kW)	70.0 dbm
Free Space Path Loss for dipole antenna at frequency and distance	113.9 dB
Terrain Loss	0.0 dB
Transmitting and receiving antenna discrimination†	0.6 dB
DTV coupling into LM (Bandwidth: DTV=5.38 MHz, LM=11.2 kHz)	26.8 dB
Cross-polarization discrimination	6.0 dB
LM antenna gain	3.5 dB
LM line loss	2.0 dB
LM receiver out-of-band rejection	85.6 dB
Effective received DTV station interference power	-161.3 dBm
LM receiver sensitivity	-120.0 dBm
Margin for receiver desensitization	41.3 dB
Analysis result	Pass

* Assumed repeater input frequency
† Only transmit antenna azimuth and elevation discrimination factors are considered
** If analysis fails additional Post-transmitter filtering would be required.

DTV POST-TRANSMITTER FILTER

The plot below in Figure 1 shows the OOBE response of two cascaded 8-Section filters for WECX operating on channel 14. The filter response was provided by the filter manufacturer.

Figure 1
Post-Transmitter Filter Response

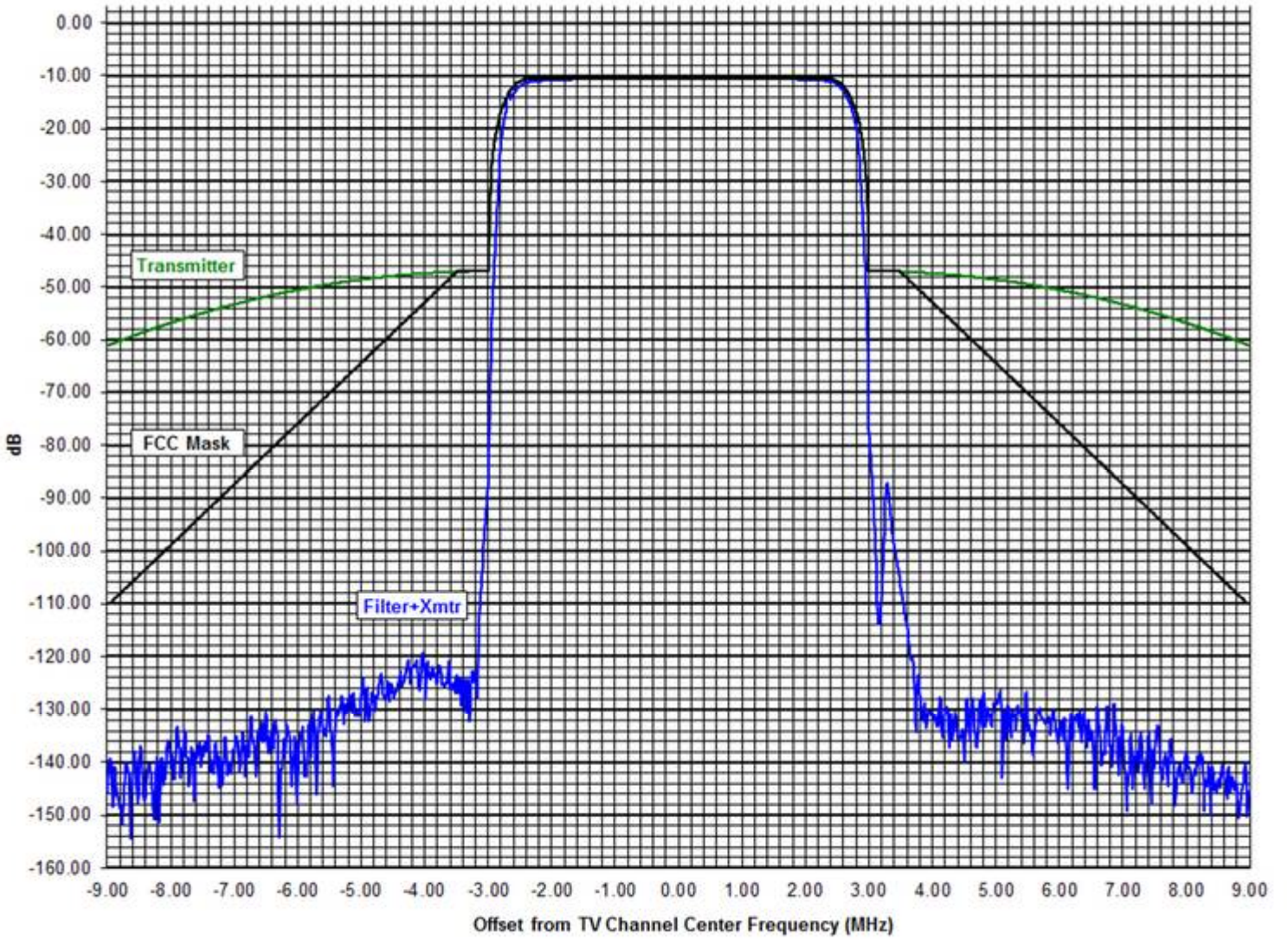


As shown above, this cascaded filter adds significant attenuation to OOBE, particularly near the band edge (-3.0 MHz). Combined with the transmitter pre-filter response, very effective filtering of OOBE is provided.

TOTAL DTV TRANSMITTER PLUS POST-TRANSMITTER FILTER RESPONSE

Shown below in Figure 2 is a typical transmitter OOBE pre-filter response (green plot). Total response of both the two cascaded 8-Section post-transmitter filters plus the transmitter response is also shown (blue plot). The full-service FCC mask response is shown for reference (black plot) to show the effectiveness of the filtering.

Figure 2
Response of Transmitter plus Two Cascaded 8-Section Post-Transmitter Filters



As shown above, the cascaded filter adds significant attenuation to OOBE beginning at -3 Mhz which is the lower end of TV channel 14. Combined with a typical transmitter pre-filter response, very effective filtering of OOBE is provided and surpasses that of the full-service FCC mask.

The response of the post-transmitter filter was obtained from the filter manufacturer.

ANALYSIS RESULTS

This study was performed in response to a condition placed in construction permit, FCC File Number 0000189634, to relocate the transmission facility of WECX-LD, channel 14, Eau Claire, WI. Specifically, the condition states that WECX must not cause objectionable interference into Land Mobile operations operating in the 460-470 MHz band below channel 14.

The map in Appendix 1 shows the WECX 51 dBuV/m protected contour along with all LM facilities located within a radius of 160 km from the transmitter site and operating in the band from 460 to 470 MHz which is below TV channel 14.

The area study that was conducted using the parameters found in Tables 1 and 2 of this report did not show any of the 79,865 cells studied to receive either interference or receiver desensitization.

There were 6,101 authorized LM facilities studied, consisting of both fixed base and mobile. There were no cases of interference or receiver desensitization reported into any LM facility.

There were 1,846 Fixed Base LM facilities studied. Appendix 2 is a list, stacked in ascending order, of 30 of the fixed base stations with the lowest interference margin, with the lowest margin being 45.4 dB. The list in Appendix 3 is similar to Appendix 2 but for receiver desensitization, with the lowest margin being 35.3 dB.

There were 4,255 Mobile LM facilities studied. Appendix 4 is a list of 30, stacked in ascending order, of the mobile stations with the lowest interference margin, with the lowest margin being 50.4dB. The list in Appendix 5 is similar to Appendix 4 but for receiver desensitization, with the lowest margin being 44.1 dB.

Due to the large number of LM facilities studied a full list was not included with this report. The full list is available and can be provided upon request.

Regarding LM receiver desensitization, rejection characteristics may vary based on the frequency separation of the desired LM channel from the band edge of the higher power station. Rejection could increase from 80 to 90 dB or more depending on the frequency separation. Rejection also depends on the front end architecture of the LM radio as designed by the manufacturer. Desensitization prediction is not dependent on the type of post-transmitter filter used since it is not an OOBE issue but rather that of a sensitive LM radio being in close proximity to a higher power facility, like that of a television station. As stated earlier in this report, no cases of receiver desensitization were predicted in the area cell study or into authorized LM operations.

Table 7 below shows a high level summary of the results for current authorized LM stations studied within a 160 km radius of the relocated transmitter site.

Table 7 – Statistics from the Analysis of Current Licensed LM facilities

Item	Value	Comment
LM Authorizations Found	1142	-
Individual LM Locations Studied	6,101	-
Closest LM Frequency to Band Edge	469.9750 MHz	WRMM848
Closest Fixed Base Land Mobile Location	1.1 km	17 found
Fixed Base Stations:		
Lowest Predicted IX Margin	45.4 dB	KNJG504
Number Predicted to Receive IX	0	-
Lowest Predicted OL Margin	35.3 dB	WQAF680
Stations Potentially Affected by OL	0	-
Mobile LM Operations:		
Lowest Predicted IX Margin	50.4 dB	WPNZ964
Number Predicted to Receive IX	0	-
Lowest Predicted OL Margin	44.1 dB	WPNZ964
Stations Potentially Affected by OL	0	-

CONCLUSION

MSW studied the predicted OOBE interference into authorized LM stations operating within a radius of 160 km from a center point defined by the relocated WECX transmitter site coordinates with WECX operating on channel 14 as defined in its construction permit. The potential impact that WECX might have on LM receiver desensitization was also studied.

Based on the results of the study the following conclusions were reached.

1. Continued utilization of two 8-Section cascaded post-transmitter filters was found to be effective in significantly reducing OOBE and protecting currently authorized LM stations.

2. There were no cases of OOBE interference into Land Mobile operations reported in this study with the use of a cascaded filter.

3. There were no cases of potential LM receiver desensitization reported in this study.

Considering the above, WECX meets the requirement of the construction permit by demonstrating with this study that objectionable interference will not be caused into Land Mobile operations.

This study conducted by MSW is based on the ITM prediction model. Actual field conditions including, but not limited to, propagation conditions, errors and omissions in the FCC database, active and passive intermodulation products and LM receiver characteristics may affect the actual results in the field and are considered outside the control of MSW.

This study was performed using defined locations extracted from the FCC ULS database (e.g. geographical coordinates and well defined boundaries, such as radius and center point) as granted for both fixed base and mobile LM operations. The FCC database base contains hundreds of authorizations for itinerant users that are authorized over the entire country, states and other wide areas. It is impractical to attempt to analyze those operations without knowing the specific location of a LM receiver if and when they are deployed in the area studied.

MSW stands ready to answer any questions regarding this report and to assist WECX in responding to any issues that may be reported from LM operators.

CERTIFICATION

The undersigned author of this report, Joseph L. Snelson, Jr., is a Certified Professional Broadcast Engineer (CPBE) as recognized by the Society of Broadcast Engineers and possesses over 50 years of experience in Broadcast Engineering including Television signal analysis, propagation, coverage and interference prediction. He is a contract employee of Meintel, Sgrignoli and Wallace, LLC, Broadcast Television & Radio Engineers, and was assigned to identify the impact that the granted facility for WECX would have on authorized Land Mobile facilities operating on the lower adjacent TV channel 14 (460-470 MHz).

The undersigned hereby certifies that all statements made in this report are true and correct to the best of his own knowledge except, where noted, when data or information has been supplied by others, which he believes to be correct.

Joseph L. Snelson, Jr. CPBE
Email: joe.snelson@mswdtv.com
Phone: 702-610-9081

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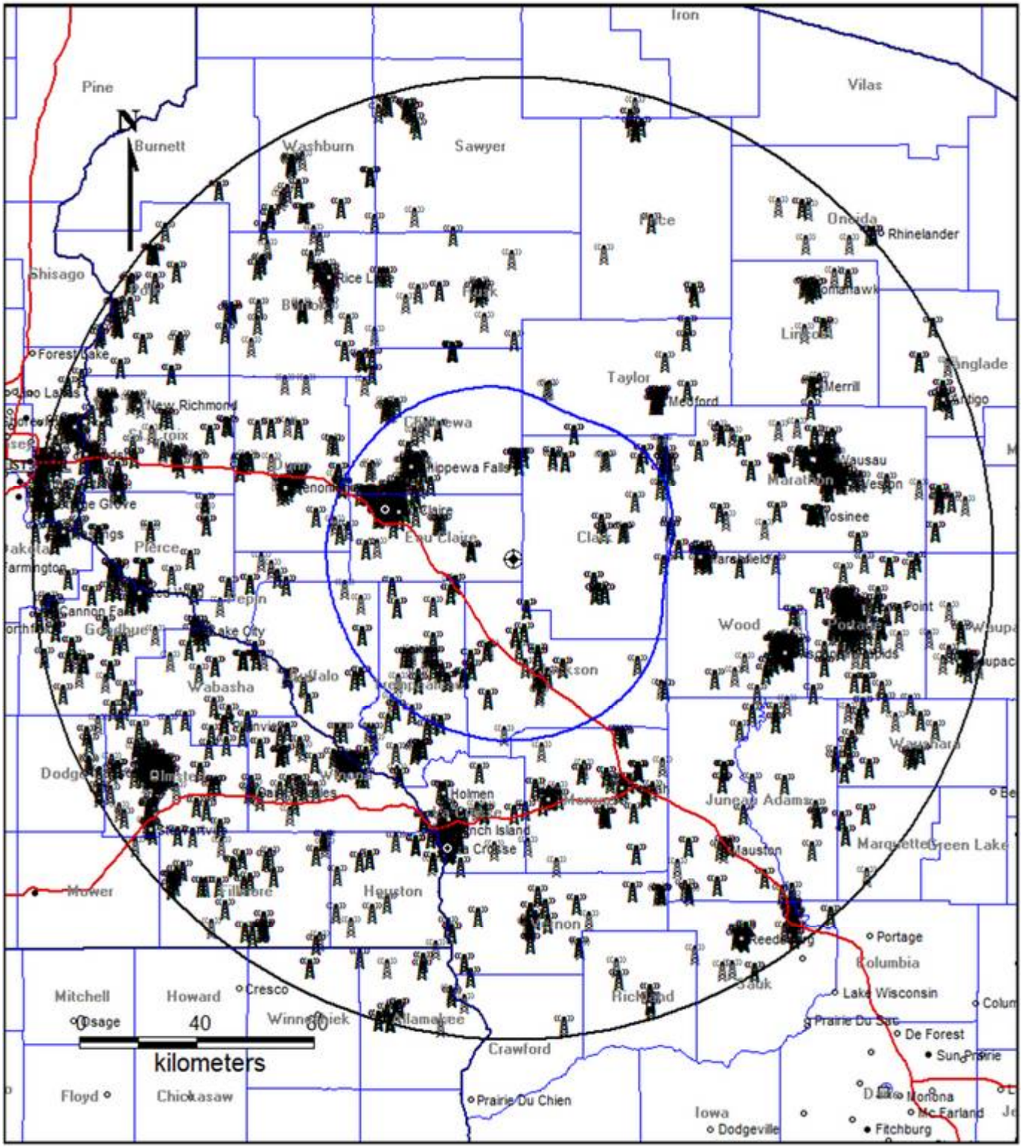
APPENDIX 1
WECX-LD, Channel 14, Eau Claire, WI
Land Mobile Facilities, 460-470 MHz, within 160 km of the relocated WECX-LD Transmitter Site
WECX-LD 51 dBu Protected Contour Shown in Blue



APPENDIX 2
Land Mobile Fixed Base Stations with the Lowest Interference Margins
Listing of the Lowest 30 out of 1,846 Fixed Base LM Facilities

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dBd	BW khz	IX Mgn dB	OL Mgn dB
464.9750	KNJG504	IG	FB2*	40.9	292.4		13.3	23.0	3.5	11.2	45.4	41.3
464.9750	WQPC952	IG	FB6*	72.1	0.2		43.3	51.8	6.0	11.2	51.7	47.5
464.9500	WPVS243	IG	FB2*	32.8	0.1		27.3	33.0	3.0	11.0	52.3	44.3
464.8875	WQAF680	YG	FB8*	24.2	239.6		82.1	61.0	6.0	11.2	54.2	35.3
464.9500	WQZZ649	IG	FB2*	43.7	202.4		69.0	46.0		8.3	54.7	46.6
464.8625	WRAW633	YK	FB8C*	33.1	165.7		136.0	49.0	4.5	11.2	63.5	39.7
464.9000	WRAW633	YK	FB8C*	96.0	190.9		184.0	55.0	5.4	11.2	64.5	47.7
464.8750	WQZC645	YG	FB6*	28.2	106.4		188.0	151.0	4.5	11.2	64.8	43.8
464.8750	WRAW633	YK	FB8C*	28.2	106.4		188.0	151.0	4.5	11.2	64.8	43.8
464.9000	WRCC824	YG	FB2C*	31.6	68.6		46.0	47.2		7.6	65.4	48.7
464.9375	WPSK417	YG	FB8*	104.2	73.7		161.0	42.0	1.5	11.2	67.2	57.1
464.9625	WPZQ391	IG	FB6*	50.3	292.6		10.3	15.2	1.8	7.6	67.8	61.6
463.8375	WQAF680	YG	FB8*	24.2	239.6		82.1	61.0	6.0	11.2	69.3	38.3
464.6125	WQAF680	YG	FB8*	24.2	239.6		82.1	61.0	6.0	11.2	71.7	36.3
463.5750	WNMQ723	IG	FB2*	13.8	277.8		30.0	54.9	7.9	7.6	72.2	38.6
463.7625	WQWD898	IG	FB2*	17.6	164.9		30.8	18.3	3.0	11.2	72.3	41.3
464.9000	WRR376	IG	FB2*	86.7	328.4		27.0	24.0		11.2	72.6	55.8
463.9125	WQAF680	YG	FB8*	24.2	239.6		82.1	61.0	6.0	11.2	73.0	38.1
464.8500	WQTD710	IG	FB2*	92.1	198.9	V	170.5	50.2	8.3	8.3	73.2	45.1
463.8875	WRAW633	YK	FB8C*	33.1	165.7		136.0	49.0	4.5	11.2	73.3	42.5
464.2500	WQZC645	YG	FB6*	33.1	165.7		136.0	49.0	4.5	11.2	74.1	41.5
464.2250	WNNA284	IG	FB4*	34.3	165.5			60.0	4.3	11.2	74.2	42.0
464.2250	WPOY499	IG	FB4*	34.3	165.5		0.0	60.0	4.3	11.0	74.3	42.1
463.9375	WQWD898	IG	FB2*	17.6	164.9		30.8	18.3	3.0	11.2	74.4	40.8
463.7625	WQWD898	IG	FB2T*	3.6	209.8			0.0	3.0	11.2	74.8	43.9
464.8875	WPSR985	YK	FB8C*	104.2	73.7	V	235.2	42.0	3.0	11.2	74.8	55.9
463.6000	WRAW633	YK	FB8C*	33.1	165.7		136.0	49.0	5.4	11.2	75.3	42.4
464.9500	WPGY631	IG	FB6*	124.8	100.2		95.0	100.0	6.0	11.0	75.4	67.3
463.9750	WPQD554	YG	FB2*	42.0	294.6		15.1	30.5	3.4	7.6	76.0	46.6
463.9625	WPVS243	IG	FB2*	32.8	0.1		26.7	33.0	2.5	11.2	76.5	47.8

Note: Asterisk after Service Class indicates frequency is the output. Input frequency used for study

APPENDIX 3
Land Mobile Fixed Base Stations with the Lowest Receiver Desensitization Margins
Listing of the Lowest 30 out of 1,846 Fixed Base LM Facilities

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dBd	BW khz	IX Mgn dB	OL Mgn dB
464.8875	WQAF680	YG	FB8*	24.2	239.6		82.1	61.0	6.0	11.2	54.2	35.3
464.7125	WQAF680	YG	FB8*	24.2	239.6		82.1	61.0	6.0	11.2	78.8	35.9
464.6125	WQAF680	YG	FB8*	24.2	239.6		82.1	61.0	6.0	11.2	71.7	36.3
463.9125	WQAF680	YG	FB8*	24.2	239.6		82.1	61.0	6.0	11.2	73.0	38.1
463.8375	WQAF680	YG	FB8*	24.2	239.6		82.1	61.0	6.0	11.2	69.3	38.3
463.5750	WNMQ723	IG	FB2*	13.8	277.8		30.0	54.9	7.9	7.6	72.2	38.6
464.8625	WRAW633	YK	FB8C*	33.1	165.7		136.0	49.0	4.5	11.2	63.5	39.7
463.9375	WQWD898	IG	FB2*	17.6	164.9		30.8	18.3	3.0	11.2	74.4	40.8
464.9750	KNJG504	IG	FB2*	40.9	292.4		13.3	23.0	3.5	11.2	45.4	41.3
463.7625	WQWD898	IG	FB2*	17.6	164.9		30.8	18.3	3.0	11.2	72.3	41.3
464.2500	WQZC645	YG	FB6*	33.1	165.7		136.0	49.0	4.5	11.2	74.1	41.5
464.2250	WNNA284	IG	FB4*	34.3	165.5			60.0	4.3	11.2	74.2	42.0
464.2250	WPOY499	IG	FB4*	34.3	165.5		0.0	60.0	4.3	11.0	74.3	42.1
463.6000	WRAW633	YK	FB8C*	33.1	165.7		136.0	49.0	5.4	11.2	75.3	42.4
464.3000	WQWD898	IG	FB2T*	3.6	209.8			0.0	3.0	11.2	77.8	42.4
463.8875	WRAW633	YK	FB8C*	33.1	165.7		136.0	49.0	4.5	11.2	73.3	42.5
464.2750	WPPG287	IG	FB6*	38.8	302.8		8.0	146.0	3.6	11.2	78.3	43.1
464.4500	WQZI446	IG	FB2*	44.8	65.3	V	87.0	30.0	8.0	11.2	78.7	43.1
463.9375	WQWD898	IG	FB2T*	3.6	209.8			0.0	3.0	11.2	77.0	43.4
464.8750	WQZC645	YG	FB6*	28.2	106.4		188.0	151.0	4.5	11.2	64.8	43.8
464.8750	WRAW633	YK	FB8C*	28.2	106.4		188.0	151.0	4.5	11.2	64.8	43.8
463.7625	WQWD898	IG	FB2T*	3.6	209.8			0.0	3.0	11.2	74.8	43.9
463.3500	WQZC645	YG	FB6*	33.1	165.7		136.0	49.0	4.5	11.2	79.3	43.9
464.9500	WPVS243	IG	FB2*	32.8	0.1		27.3	33.0	3.0	11.0	52.3	44.3
464.0250	WQOU629	IG	FB2*	45.8	288.8		47.0	54.0	4.2	11.2	79.3	44.5
464.7375	WPQD554	YG	FB2*	42.0	294.6		15.1	30.5	3.4	7.6	79.6	44.5
463.9250	KNJG504	IG	FB2*	39.1	293.4		-0.2	14.1	3.4	11.2	79.9	44.5
463.5375	WPPA462	YG	FB8*	34.3	165.5		139.0	60.0	3.6	11.2	79.3	44.6
463.4125	WQWD898	IG	FB2T*	3.6	209.8			0.0	3.0	11.2	77.4	44.8
463.6750	WPNU298	IG	FB6*	38.8	302.8		124.0	59.0	3.6	11.2	78.1	44.9

Note: Asterisk after Service Class indicates frequency is the output. Input frequency used for study

APPENDIX 4
Mobile Operations with the Lowest Interference Margins
Listing of the Lowest 30 out of 4,255 Mobile LM Facilities

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dBd	BW khz	IX Mgn dB	OL Mgn dB
461.4063	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	50.4	46.3
461.4063	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	53.4	49.3
461.4063	WPNZ964	YK	MOC	125.8	261.4			0.0		11.0	54.1	46.1
461.4313	WPNZ964	YK	MOC	120.1	273.7			0.0		7.6	56.5	50.4
461.4313	WPNZ964	YK	MOC	120.1	273.7			0.0		8.3	58.3	50.3
461.4313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	61.7	47.2
461.6438	WPNZ964	YK	MOC	125.8	261.4			0.0		11.0	62.4	56.3
461.6438	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	63.2	44.4
461.6438	WPNZ964	YK	MOC	125.8	261.4			0.0		7.6	66.0	49.3
461.6563	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	66.1	55.9
461.6563	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	66.6	45.6
461.6563	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	66.6	45.6
461.9313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	66.8	62.7
461.9313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	67.3	61.2
461.9313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	68.3	60.2
466.4063	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	70.0	46.2
466.4063	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	70.4	58.1
466.4063	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	71.7	59.4
466.4313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	72.3	62.2
466.4313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.0	73.9	50.1
466.4313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	75.3	63.0
466.6438	WPNZ964	YK	MOC	125.8	261.4			0.0	3.8	11.2	75.9	44.1
466.6438	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	75.9	71.7
466.6438	WPNZ964	YK	MOC	125.8	261.4			0.0	3.8	11.2	76.2	45.0
466.6563	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	76.4	44.5
466.6563	WPNZ964	YK	MOC	120.1	273.7			0.0		11.0	76.4	46.5
466.6563	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	76.5	66.4
466.9188	WPSG356	YK	MOC	125.8	261.4			0.0	3.8	11.2	76.9	44.8
466.9313	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	77.3	44.9
466.9313	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	77.4	44.7

Notes:
1. Mobile analysis performed within a defined area of operation from mobile LM coordinates
2. 48 km radius used for mobile area of operation if not specified in authorization
3. Mobile Distance/Azimuth is shown to the cell with the lowest margin
4. Average mobile interference and/or Desensitization margins over the area are shown

APPENDIX 5
Land Mobile Fixed Base Stations with the Lowest Receiver Desensitization Margins
Listing of the Lowest 30 out of 4,255 Fixed Base LM Facilities

Freq Mhz	Call Sign	Svc Code	Svc Cls	DTV->LM Dist km	DTV->LM Az deg	Ant Pol	HAAT m	HAGL m	Gain dBd	BW khz	IX Mgn dB	OL Mgn dB
461.4063	WPNZ964	YK	MOC	125.8	261.4			0.0	3.8	11.2	75.9	44.1
461.4063	WPNZ964	YK	MOC	125.8	261.4			0.0	3.8	11.2	78.2	44.1
461.4063	WPNZ964	YK	MOC	125.8	261.4			0.0	3.8	11.2	79.3	44.2
461.4313	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	79.9	44.2
461.4313	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	79.9	44.3
461.4313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	63.2	44.4
461.6438	WPNZ964	YK	MOC	125.8	261.4			0.0	3.8	11.2	78.4	44.4
461.6438	WPNZ964	YK	MOC	125.8	261.4			0.0	3.8	11.2	76.4	44.5
461.6438	WPNZ964	YK	MOC	125.8	261.4			0.0	3.8	11.2	77.9	44.5
461.6563	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	79.3	44.6
461.6563	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	77.4	44.7
461.6563	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	77.8	44.7
461.9313	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	76.9	44.8
461.9313	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	77.3	44.9
461.9313	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	78.6	44.9
466.4063	WPNZ964	YK	MOC	125.8	261.4			0.0	3.8	11.2	76.2	45.0
466.4063	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	87.9	45.0
466.4063	WPNZ964	YK	MOC	125.8	261.4			0.0		11.0	80.7	45.1
466.4313	WPNZ964	YK	MOC	120.1	273.7			0.0	3.8	11.2	81.1	45.1
466.4313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	80.4	45.3
466.4313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	80.8	45.4
466.6438	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	66.6	45.6
466.6438	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	66.6	45.6
466.6438	WPNZ964	YK	MOC	125.8	261.4			0.0		11.2	81.1	45.9
466.6563	WPNZ964	YK	MOC	120.1	273.7			0.0		11.0	54.1	46.1
466.6563	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	70.0	46.2
466.6563	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	50.4	46.3
466.9188	WPSG356	YK	MOC	125.8	261.4			0.0		11.0	76.4	46.5
466.9313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	80.5	47.0
466.9313	WPNZ964	YK	MOC	120.1	273.7			0.0		11.2	61.7	47.2

Notes:

1. Mobile analysis performed within a defined area of operation from mobile LM coordinates
2. 48 km radius used for mobile area of operation if not specified in authorization
3. Mobile Distance/Azimuth is shown to the cell with the lowest margin
4. Average mobile interference and/or Desensitization margins over the area are shown