



# FM Translator Myths and Realities

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**The FM Translator service was first created in 1970 to allow FM stations to provide supplementary service to areas in which direct reception of radio service is unsatisfactory due to distance or intervening terrain barriers (for example, a mountain).**

**The first translators were limited to 10 Watts and had to rebroadcast an off-air signal.**



**As of 6-1-2023**

**FM TRANSLATORS &  
BOOSTERS - 8,935**



## **General Information:**

**Translators are listed as Secondary Services Under FCC Rules and are covered under 47 CFR Part 74.**

**There are two classes of translators:  
Fill-In and Non Fill-In**



## **Applicable To All Translators:**

**Contour protection- FM translator stations must meet the contour protection criteria specified in 47 CFR Section 74.1204 with respect to all FM stations (including Class D noncommercial educational secondary stations) and all FM translator or booster stations.**



## **Applicable To All Translators:**

**If the licensee of an FM translator station wants to change the primary station being rebroadcast, it may do so without prior authority from the Commission. If the translator is owned by an entity other than the owner of the new primary FM station, the owner must secure the permission of the primary station to rebroadcast its programming before commencing operation.**



**Special Note To AM Stations who received a translator  
license under AM Revitalization:**

**Check your license carefully!**

**The initial 'move-in' translator construction permits  
had a restriction of four years.**

**The later new construction permits were permanently  
tied to the AM station.**

## **Non Fill-In Translators:**

**Can be both Commercial and Non-Commercial.**

**Ownership and financial support. In general, commercial primary stations and anyone associated with a commercial primary station may neither own nor provide direct or indirect support to non-fill-in translator stations, both before and after the translator commences operation. See 47 CFR Section 74.1232(d).**

**Non-Commercial Operators may own and operate non Fill-In Translators. (Satellators)**





## **Non Fill-In Translators:**

**The primary commercial FM station may provide "technical support" to the independent translator station, which is defined as actual services provided by the primary station's technical staff or compensation for the time and services provided by independent engineering personnel. Such support does not include the supply of equipment or direct funding for the translator's discretionary use.**

## **Non Fill-In Translators:**

**Signal delivery. Non-fill-in translators relaying commercial FM stations must receive the signal off the air, unless a waiver has been granted to feed a "white area" translator by other terrestrial means.**

**A showing of the "white area" must be presented in the application for construction permit, requesting waiver of the signal delivery requirement.**

# **Fill-In Translators:**

**Can Rebroadcast FM, AM and HD 2-3 Channels**

**A fill-in translator station may be owned by the licensee of the primary station or by an independent entity.**

**The primary station may provide financial and technical support for an independently owned fill-in translator both before and after the translator commences operation.**

## **Fill-In Translators:**

**A fill-in translator is required to maintain its service contour within the service contour of the primary station. For a Class A, C3, C2, C1, C0 (C-zero), C, or noncommercial educational Class B, B1, or D FM primary station, the fill-in translator station must maintain its 60 dBu (1 mV/m) F(50,50) service contour within the 60 dBu contour of the primary station.**

## **Fill-In Translators:**

**The fill-in translator of a commercial Class B primary station must maintain its 54 dBu (0.5 mV/m) F(50,50) service contour within the 54 dBu F(50,50) contour of the primary station.**

**And the fill-in translator of a commercial Class B1 FM primary station must maintain its 57 dBu (0.7 mV/m) F(50,50) contour within the 57 dBu F(50,50) service contour of the primary station.**

## Fill-In Translators:

An FM translator may rebroadcast an AM station only if the translator's 60 dBu service contour is within the **GREATER** of (1) a 25 mile (40 km) radius circle from the AM station's transmitter site AND (2) the AM station's 2.0 mV/m contour. See 47 CFR Section 74.1201(g).

## **Fill-In Translators:**

**A noncommercial educational FM translator, that is commonly owned with the primary station, may deliver the signal to the translator by any means, including satellite delivery.**

## Fill-In Translators:

**A commercial fill-in translator may receive a primary station's signal via any terrestrial transmission method, including (but not limited to) microwave, phone, internet, and dedicated fiber optic cable. *Satellite delivery is prohibited.***

**These requirements also apply to noncommercial educational translators in the reserved band (88 to 92 MHz) that are not commonly owned with the primary station.**





**Myth:**

**Translators cannot exceed 100 ft  
height above average terrain.**

## Power And Height:

For Fill-In Service, **no maximum HAAT is specified...**

**74.1235- Power limitations and antenna systems. (a) An application for an FM translator station filed by the licensee or permittee of the primary station to provide fill-in service within the primary station's coverage area will not be accepted for filing if it specifies an effective radiated power (ERP) which exceeds 250 watts.**

## Non Fill-In Translators are another story altogether...

An application for an FM translator station, other than one for fill-in service which is covered in paragraph (a) of this section, will not be accepted for filing if it specifies an effective radiated power (ERP) which exceeds the **maximum ERP (MERP)** value determined in accordance with this paragraph. The antenna height above average terrain (HAAT) shall be determined in accordance with § 73.313(d) of this chapter for each of 12 distinct radials, with each radial spaced 30 degrees apart and with the bearing of the first radial bearing true north. Each radial HAAT value shall be rounded to the nearest meter. For each of the 12 radial directions, the MERP is the value corresponding to the calculated HAAT in the following tables that is appropriate for the location of the translator. For an application specifying a nondirectional transmitting antenna, the specified ERP must not exceed the smallest of the 12 MERP's. For an application specifying a directional transmitting antenna, the ERP in each azimuthal direction must not exceed the MERP for the closest of the 12 radial directions.

# Power And Height: Non Fill-In Translators

East of The Mississippi River

Radial HAAT (meters)    Maximum ERP (MERP in watts)

Less than or equal to 32	250	<- 104 ft
33 to 39	170	
40 to 47	120	
48 to 57	80	
58 to 68	55	
69 to 82	38	
83 to 96	27	
97 to 115	19	
116 to 140	13	
Greater than or equal to 141	10	<- 459 ft

# Power And Height: Non Fill-In Translators

West of The Mississippi River

Radial HAAT (meters)	Maximum ERP (MERP in watts)	
Less than or equal to 107	250	<- 350 ft HAAT
108 to 118	205	
119 to 130	170	
131 to 144	140	
145 to 157	115	
158 to 173	92	
174 to 192	75	
193 to 212	62	
213 to 235	50	
236 to 260	41	

# Power And Height: Non Fill-In Translators

West of The Mississippi River

Radial HAAT (meters) Maximum ERP (MERP in watts)

261 to 285	34
286 to 310	28
311 to 345	23
346 to 380	19
381 to 425	15.5
426 to 480	13
481 to 540	11
Greater than or equal to 541	10



## **Myth:**

**Translators rebroadcasting an AM station cannot add RDS because the the AM signal doesn't have it.**

## **Reality:**

**There are no regulations prohibiting or restricting RDS for translators of any type.**



**Myth:**

**Translators have to be identified every hour along with the main Legal ID**

**(There is much confusion regarding how to properly ID a translator)**



## **47 CFR Section 74.1283(c)(1)...**

**By arranging with the primary station whose signal is being rebroadcast to identify the translator by call sign and location.**

**The identification must occur 3 times daily: once between 7 AM and 9 AM, once between 12:55 PM and 1:05 PM, and once between 4 PM and 6 PM.**

**Stations that do not begin operating before 9 AM must provide the identification at the beginning of the broadcast day.**



**47 CFR Section 74.1283(c)(1)... (continued)**

**... by transmitting the call sign in Morse Code at least once hour. See 47 CFR Section 74.1283(c)(2) for additional requirements for transmission of the call sign in this manner.**

## **47 CFR Section 74.1283(c)(2)...**

**Transmission of the call sign can be accomplished by: (i) Frequency shifting key; the carrier shift shall not be less than 5 kHz nor greater than 25 kHz.**

**(ii) Amplitude modulation of the FM carrier of at least 30 percent modulation. The audio frequency tone use shall not be within 200 hertz of the Emergency Broadcast System Attention signal alerting frequencies.**

101.90

MHz

428

Watts FWD

6.00

Watts REV

77

kHz Dev.



A

B

C



1

2

3

4

0 in the last 24 hours

0 in the last 24 hours



Status / Config



Audio Meters



Log Files



Reboot



Update Firmware



Factory Reset



Disconnect

## RF Settings

Frequency Set

101.900 MHz



Power Set

429 W



RF Mute on Silence

Off



Mute RF



FSK

1 Hour



W270DW

Power Schedule

Disabled

Enabled

Power Set

303 W

Start Time

00:00:00

Finish Time

00:00:00

## **47 CFR Section 74.1283(c)(1)...**

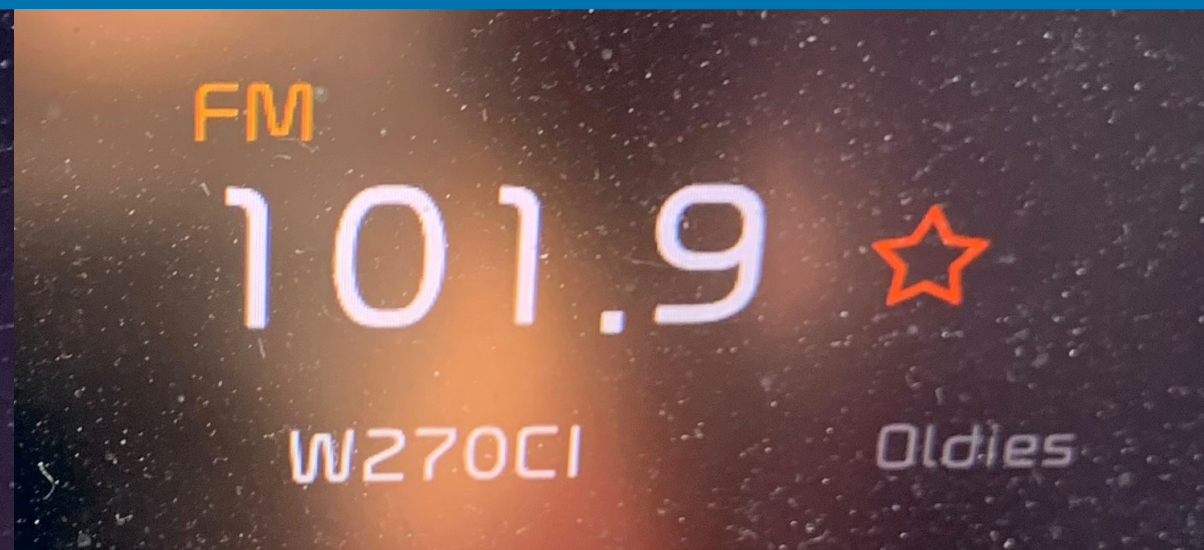
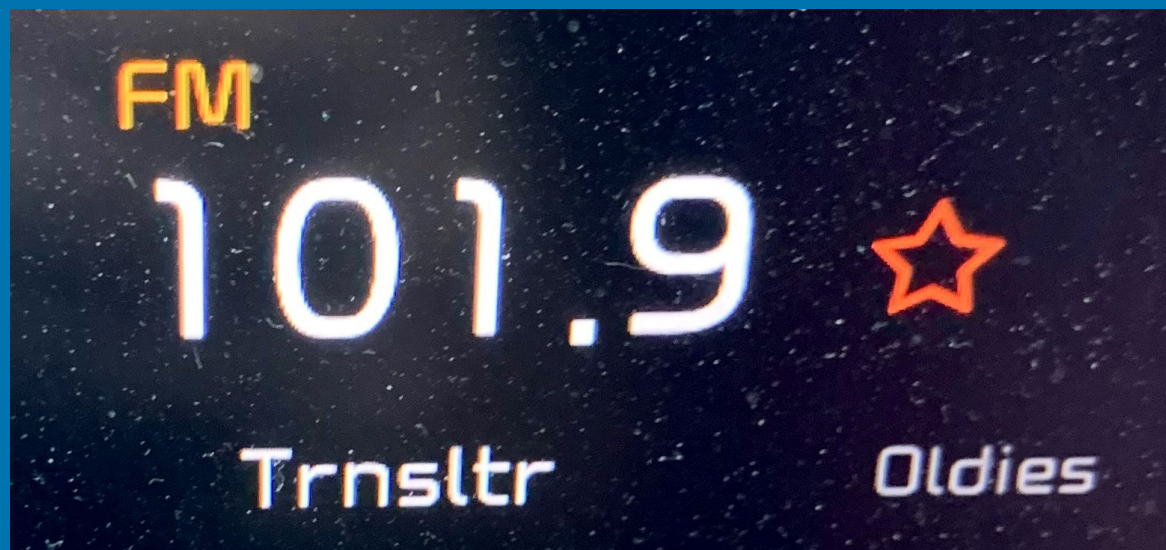
**The licensee of the translator station must arrange for the primary station to keep in the primary FM station's file (and to make available to FCC personnel), the call sign and location of the translator station. This record must include the name, address, and telephone number of the translator licensee or his service representative to be contacted in the case of a malfunction of the translator.**

## **Reality:**

**Using FSK means there is never a need to say the translator call letters/location over the air.**

**The Program Director in me highly recommends avoiding over the air 'alphabet soup' by using FSK on all translators.**

Or on your RDS display...






**Can a translator originate programming different from the station being rebroadcast?**


**There are two instances where this is allowed...**





**Fundraising by FM translators. Translators may interrupt the rebroadcast programming for up to 30 seconds each hour to solicit and acknowledge funds used to maintain the translator station. This interval may be broken up into smaller segments, e.g. two 15 second segments.**

**47 CFR Section 74.1231(g) .**




**Emergency warnings broadcast by translators.  
A translator station may interrupt the  
rebroadcast programming to broadcast an  
emergency warning of imminent danger.  
Emergency transmissions shall be no longer nor  
more frequent than necessary to protect life  
and property.  
47 CFR Section 74.1231(g).**



## **Interference Complaints: (Being A Good Neighbor)**

**Despite your best efforts to engineer a compliant translator, there is still the possibility of interference to a full-power station.**



**With the proliferation of new translators,  
in 2021 the FCC revised interference  
reporting guidelines.**

**See § 74.1203 for complete rules.**



## Highlights:

**...no listener complaint will be considered actionable if the alleged interference occurs outside the desired station's 45 dBu (.177 mV) contour.**



## **Highlights:**

**The required minimum number of valid listener complaints as determined using Table 1 of this section...**

## **Table 1 to § 74.1203(a)(3)**

### **Population within protected contour-**

**Minimum listener complaints required for interference claim:**

<b>1–199,999</b>	<b>6</b>
<b>200,000–299,999</b>	<b>7</b>
<b>300,000–399,999</b>	<b>8</b>
<b>400,000–499,999</b>	<b>9</b>
<b>500,000–999,999</b>	<b>10</b>
<b>1,000,000–1,499,999</b>	<b>15</b>
<b>1,500,000–1,999,999</b>	<b>20</b>
<b>2,000,000 or more</b>	<b>25</b>
<b>LPFM stations with fewer than 5,000</b>	<b>3</b>




**(ii) A map plotting the specific location of the alleged interference in relation to the complaining station's 45 dBu contour;**

**(iii) A statement that the complaining station is operating within its licensed parameters;**

**(iv) A statement that the complaining station licensee has used commercially reasonable efforts to inform the relevant translator licensee of the claimed interference and attempted private resolution;**





**(v) U/D data demonstrating that at each listener location the undesired to desired signal strength exceeds  $-20$  dB for co-channel situations,  $-6$  dB for first-adjacent channel situations or  $40$  dB for second- or third-adjacent channel situations, calculated using the methodology set out in § 74.1204(b).**




# WLOH Radio

Licensed to Lancaster, Ohio

1320 KHz 500W D 16W N

(As of 1998, the only commercial radio  
station left in Lancaster)



In 2007, the FCC issued a Notice of Proposed Rulemaking (MM 07-172) to allow AM stations to operate FM cross-service translators as a fill-in service.

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<sup>26</sup> *See* note 12 *supra*.

<sup>27</sup> *See, e.g.*, “Comments of the AM Daytimers Association” at 1-2; “Comments of Community First Broadcasters” at 1; “Comments of Don Moore, WAWK Radio” at 2-3; “Comments of Jane Elizabeth Davis Pigg, WCRE(AM)” at 1; “Comments of Debbie Beal, WRGS(AM)” at 1; “Comments of Our Three Sons Broadcasting” at 1-3; “Comments of Chris McGinnis, WRUS(AM)” at 1; “Comments of C.R. Communications, Inc.” at 1-3; “Comments of Richard A. Ford, WERT(AM)” at 1; “Comments of Mark and Arlene Bohach, WLOH(AM)” at 1; “Comments of Beverly Broadcasting Company, LLC” at 1-2; “Comments of Paul Hayden” at 1; “Comments of La Porte County Broadcasting Co.” at 1; “Comments of Jerdon Broadcasting” at 1; “Comments of Miller Communications, Inc., *et al.*” at 1-2.



October 1, 2009  
MM 07-172 became official!

2010- We purchased the license  
which became  
W283BO 104.5 FM Lancaster, OH

At this point we thought we were done...



2011- Approached with an offer to sell us  
W257EQ 99.3 FM - Logan, OH

April 2011- became our second translator...



**Then Came 'AM Revitalization'  
(or as I call it- "The Great Translator Land Rush...")**

**Prior to the three special windows created by the FCC, AM stations had to acquire existing FM translators and move them only within the tight regulations of the FCC Minor Change rules.**



**2017- Special application windows were opened to allow AM stations to apply for one FM translator under Revitalization.**





2017-I asked our FCC attorney-  
what about us?

Can we apply for a translator during this  
special window?

(the two we already had had been obtained under existing rules)



2017- The answer... sure go for it!


We applied for and received the license for W275CT  
102.9 FM Somerset-New Lexington OH

And then there were three... but with a catch...



**2018- W275CT Granted**  
Just One Condition...

**This license must forever remain attached to WLOH (AM) and can only be transferred in conjunction with a transfer of the WLOH (AM) license.**



2021- Spirit Communications, Inc. (RadioU)  
decided to sell off three of its translators....  
Including W216CN 91.1 FM Chillicothe, OH

So, I again asked our lawyer and our engineering  
consultant (Bert Goldman)- Could we move this and  
make it fit our contour for Circleville, OH.



The answer is a little complicated-

W216CN was originally on 101.7 FM but was IF flipped to 91.1 to allow the translator to be fed via an internet connection.

Could it be IF Flipped back to a commercial frequency?



The FCC answer was YES-

Since this translator was originally licensed as a commercial band service, An IF flip to 101.9 FM was allowed and was a minor change.

So, we purchased the license and started the process of moving the translator.



**2022- W270DW Granted**

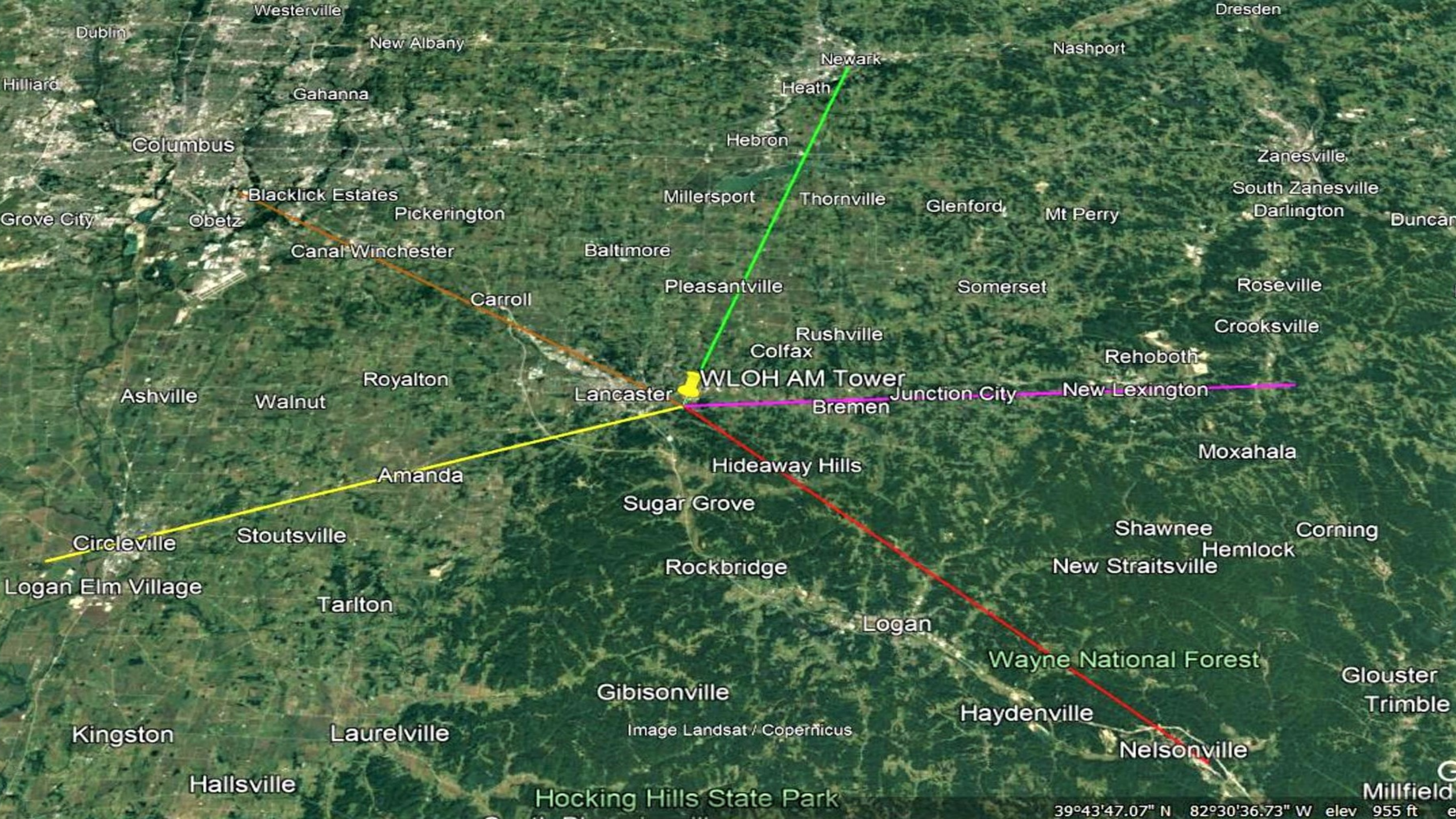
**101.9 FM - Circleville, OH**



**2022- W270DW Granted**

**101.9 FM - Circleville, OH**







# WOLF RADIO NETWORK

Combined FM  
Coverage Map



104.5- Lancaster 101.9- Circleville 102.9- New Lexington 99.3- Logan



## **Antenna Considerations:**

**How can the same antenna be both non-directional and directional?**

**The FCC has a database of 'off the shelf' directional patterns that have been filed by the manufacturers.**

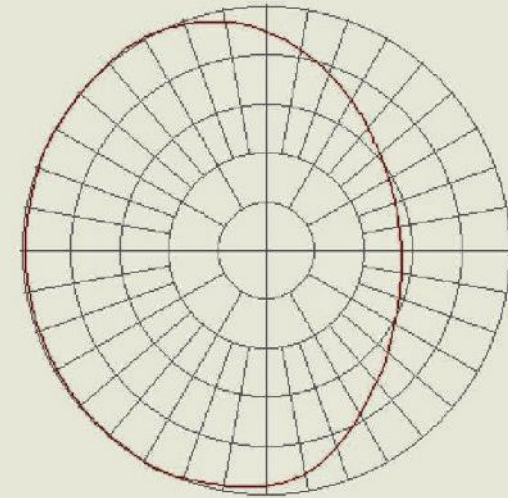
**Our example- The Nicom BKG 77**

**This is the Nicom BKG 77  
Antenna for W275CT at  
New Lexington...**

**This particular antenna is  
configured as a half-wave  
'off the shelf' directional  
antenna.**



Antenna Data for Antenna Id: 133052  
 W275CT FX File: BLFT-20181003AIJ  
 None -  
 Service: FX  
 Pattern and Field Values Include a 265° Clockwise Rotation



Azimuth	Ratio	Azimuth	Ratio	Azimuth	Ratio	Azimuth	Ratio
5	0.862	15	0.797	25	0.731	35	0.676
45	0.628	55	0.594	65	0.571	75	0.558
85	0.553	95	0.558	105	0.571	115	0.594
125	0.628	135	0.682	145	0.738	155	0.815
165	0.897	175	0.953	185	0.973	195	0.983
205	1.000	215	0.992	225	0.988	235	0.988
245	0.983	255	0.983	265	0.983	275	0.983
285	0.983	295	0.988	305	0.988	315	0.992
325	1.000	335	0.991	345	0.963	355	0.923

**This is the Nicom BKG 77  
Antenna for W83BO  
Lancaster, Ohio...**

**This particular antenna is  
configured as a non-  
directional antenna.**



## Feeding Audio and Data Our Translators:

We use STX (Stereo Tool eXtreme) and MicroMPX to feed identical processed audio to our translators.

Advantage- all translators sound exactly alike. All Processing, RDS and Nielsen Encoding is done in the STX...



**Matt Levin built our decoders and did the setup for our station.**

**He has a few words to share about uMPX...**





# Questions...

# THANK YOU