AllStarLink, EchoLink, and Wires-X

Montgomery County ARES Meeting

April 26, 2022

John Westerkamp, W8LRJ

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- AEC for Administration, Greene County ARES
- Bellbrook Amateur Radio Club Communications Coordinator
- Ph.D. in Electrical Engineering from Purdue University
- 17 years on Electrical Engineering Faculty at University of Dayton
- Lori, Rachel, Jacob (LRJ)

- Worked in 2020 with Eric Vinande, KG6NFJ, Tim Procuniar, N8NQH, Jim Dean, W8UD, and Russ Roysden, N8NPT, and Dan Kinney to integrate these new technologies into the BARC repeaters.

Overview

BARC 147.045 Repeater
(+ offset, no tone)
BridgeCom BCR-50 VHF

Analog repeater and analog Internet modes

BARC 443.675 Repeater
(+ offset, no tone)
Yaesu System Fusion DR-1X

Analog or digital repeater and digital Internet mode

AllStar Link vs. IRLP

IRLP – Internet Radio Linking Protocol

- Not open source – requires hardware purchase
- Good audio quality – ADPCM – half duplex
- Smaller user base
- Only radio originated
- Low number of nodes
- Limited linking ability

AllStar Link

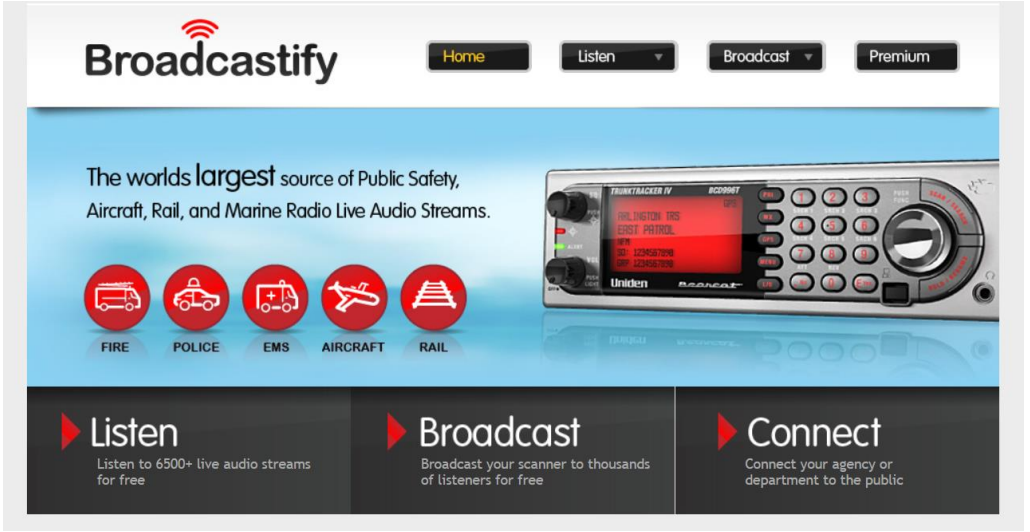
- Fully open source hardware & software – free
- Excellent audio quality – full duplex
- Full repeater control!!
- Choice of codecs to meet available bandwidth
- Currently 23,165 nodes online now
- Radio, SIP phone or smart phone, or computer originated
- EchoLink, D-STAR, DMR, C4FM, P25 and other service bridges
- Requires some LINUX knowledge; strong user base support

AllStar Link

- AllStar Link is a network of Amateur Radio repeaters, remote base stations, and hot spots accessible to each other via Voice over Internet Protocol (VoIP).
- AllStar Link runs on a dedicated computer (including the Raspberry Pi) that you host at your home, radio site, or computer center.
- It is based on the open source Asterisk PBX. This makes AllStar Link a powerful system capable of controlling one or more radios. It provides linking of these radio *nodes* to other systems of similar construction anywhere in the world via VoIP.
- AllStar Link's primary use is as a dedicated computer node wired to your repeater or radio. Connections from EchoLink, other VoIP clients, and telephone calls are supported.
- *http://www.allstarlink.org*

AllStar Link Features

- Full Feature Repeater Controller
- VoIP Full Duplex Linking with *great audio*
- Frequency Agile Remote Base Station
- Simplex (half-duplex) Station
- EchoLink
- APRS
- Autopatch
- Based on Asterisk - the Open Source PBX
- Real-time status reporting
- Broadcastify



AllStar Link at BARC

Raspberry Pi
Running AllStar Link
Connected to Internet

USB ↔

URIx USB Radio Interface

↔ DB-25 to DB-25

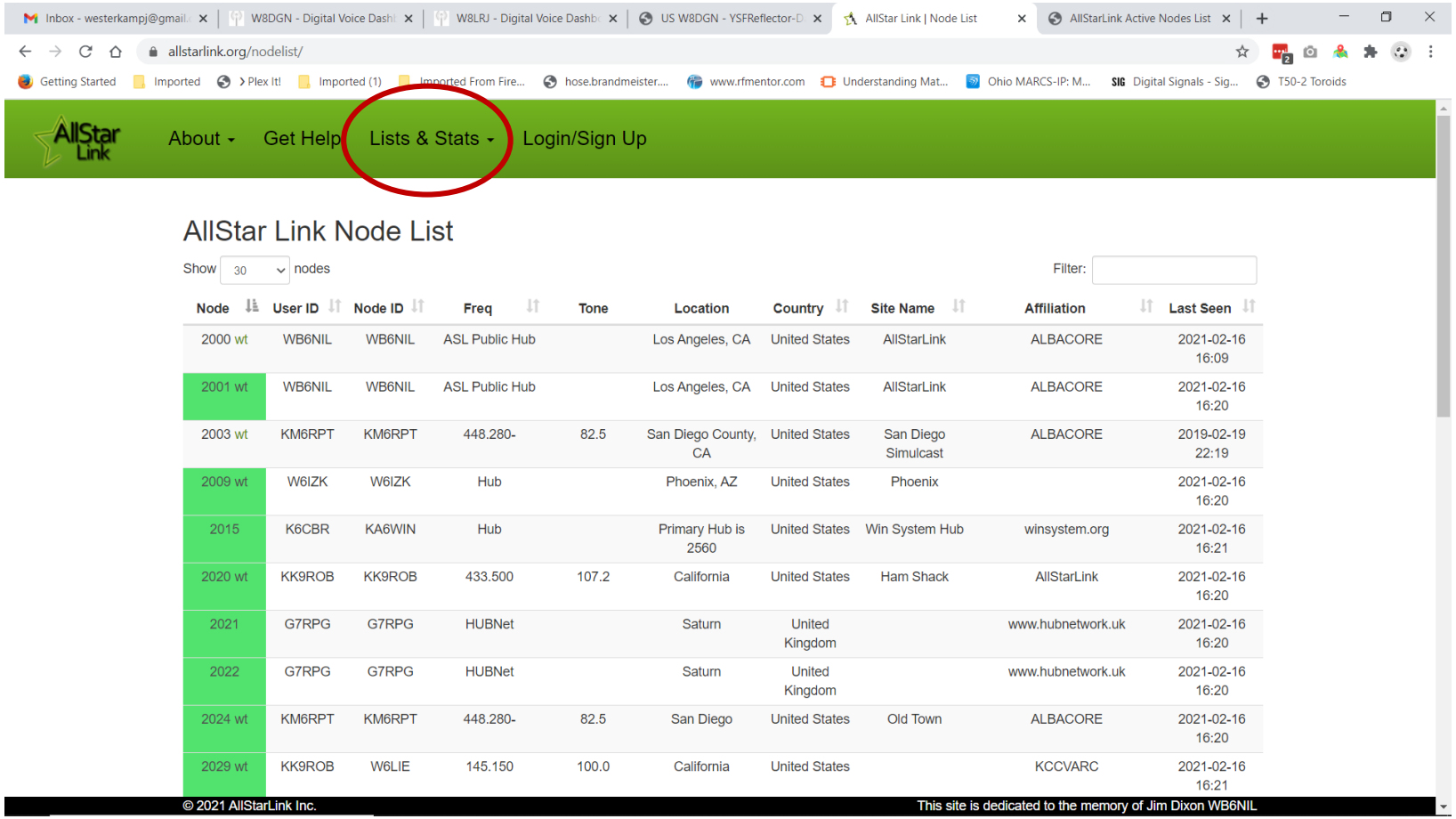
BridgeCom BCR-50V
147.045+ (no tone)

Using AllStar Link

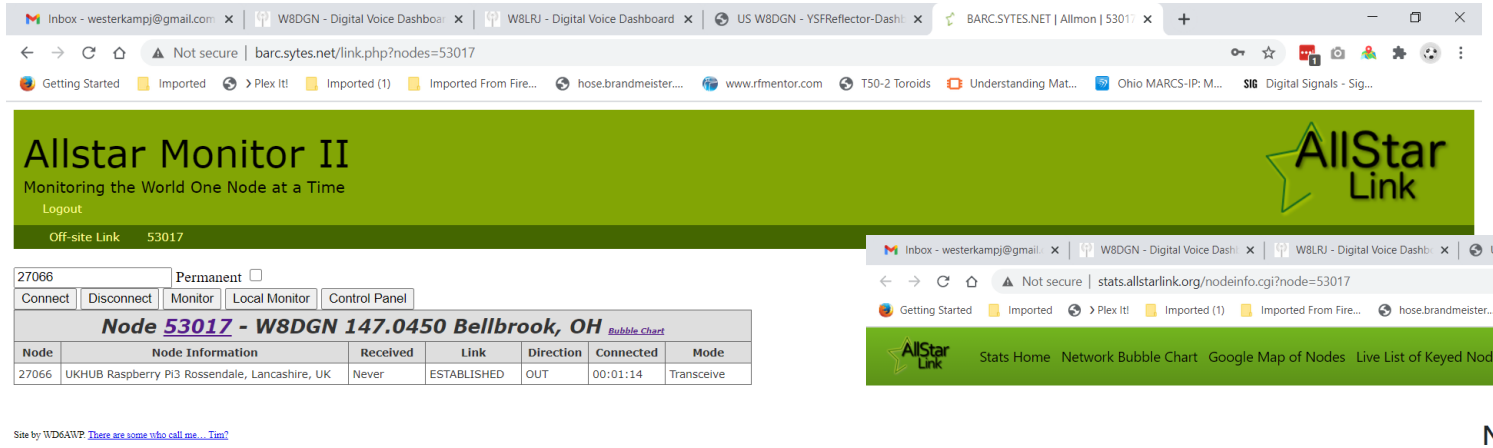
- AllStar Node: 53017 (BARC 147.045+, no tone, repeater)
- To use AllStar on the W8DGN repeater, simply listen to be sure the repeater is not in use, then identify your station and state that you are connecting to AllStar.
- Every command must begin with a *Star* character (*). If a * is issued as part of a command string, it causes a reset of the decoder and the decode begins from the last entered * character. This is useful if you make a mistake; you just start again. Decoding is abandoned if the gap between digits is too long.
- Available Functions:
  *1 nnnn Disconnect from node nnnn
  *3 nnnn Connect to node nnnn
  *73 Shortcut to disconnect from any node
- *Be sure to disconnect when you are finished!*

AllStar Link Node List

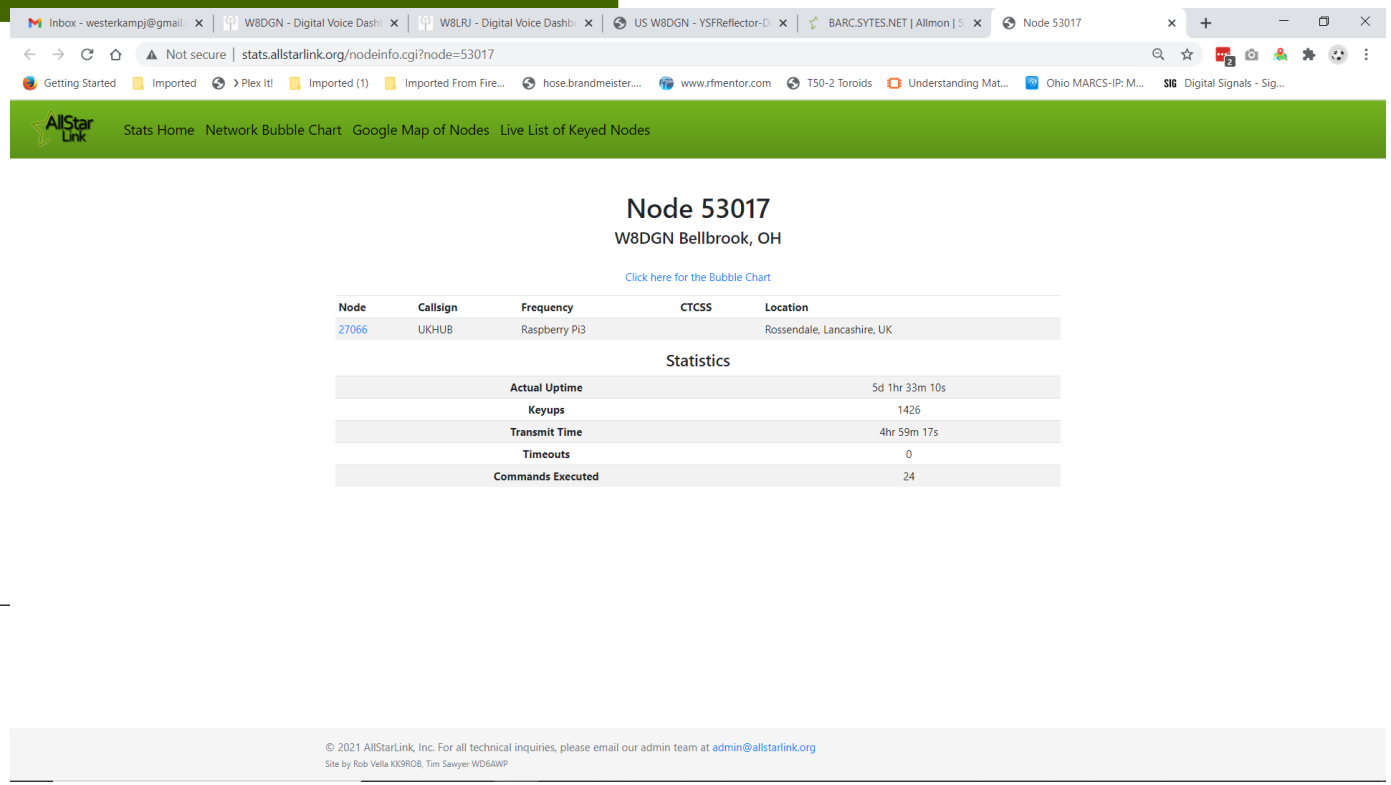
http://www.allstarlink.org/nodelist or http://www.repeaterbook.com



AllStar Link Dashboard

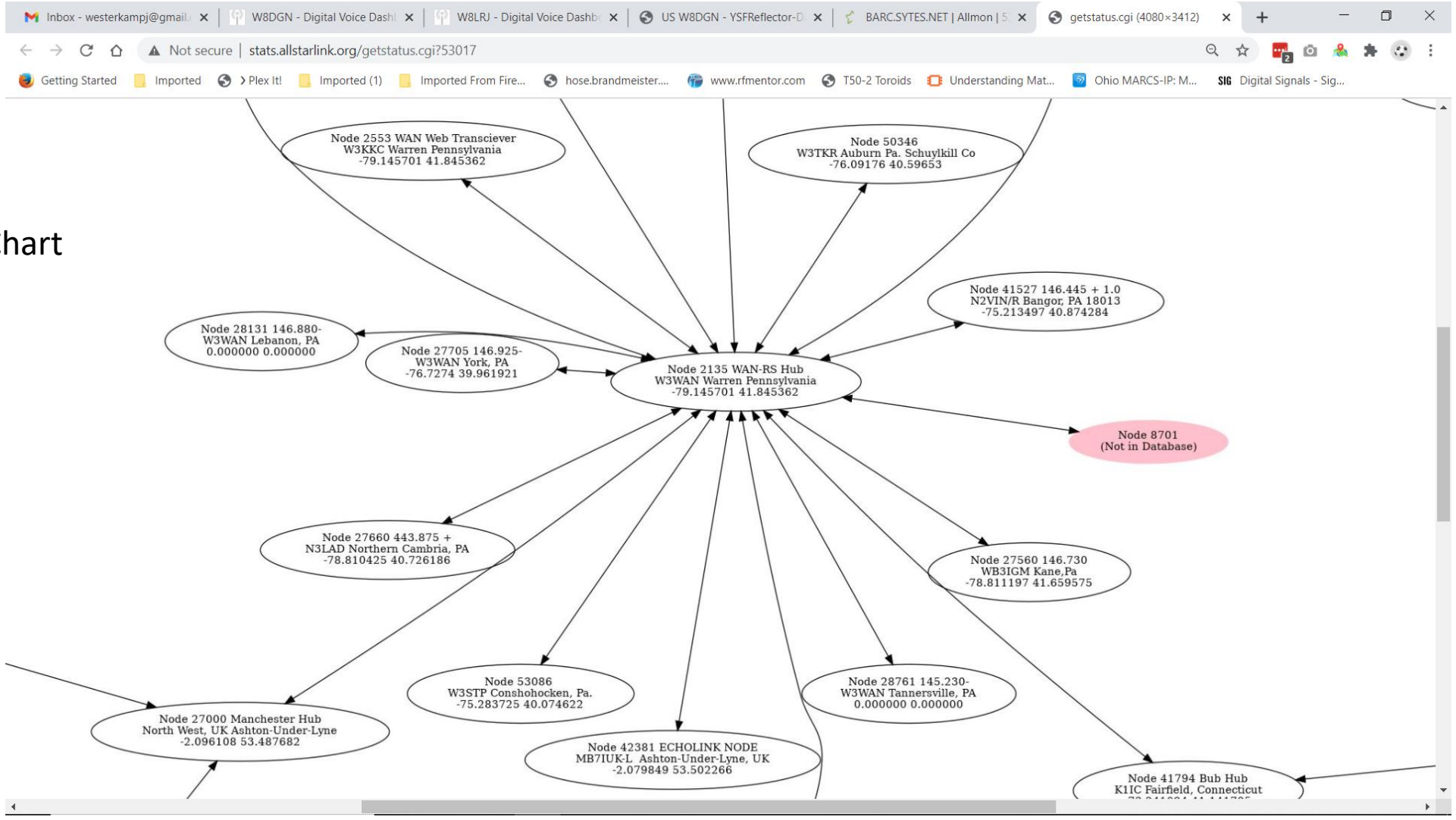


http://barc.sytes.net



AllStar Link Dashboard

Bubble Chart



AllStar Link at Home (W8LRJ 51403)

Raspberry Pi
Running AllStar Link
Connected to Internet

USB

URIx USB Radio Interface

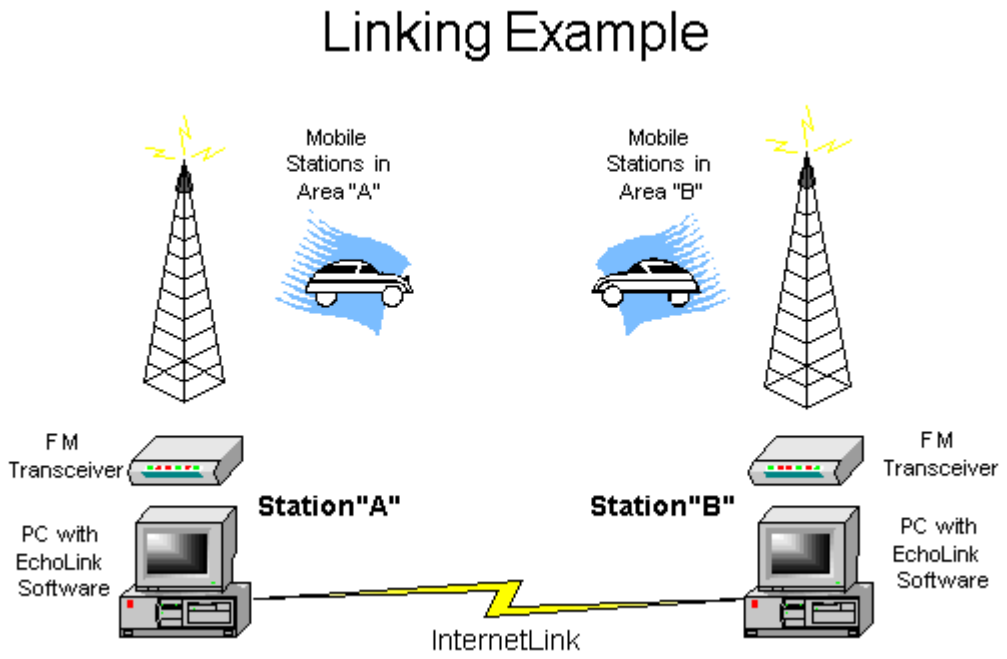
DB-25 to 6-pin Mini-DIN

Icom IC-207
445.950 simplex

Note: Use HT to communicate with AllStar node.

EchoLink

- EchoLink® software allows licensed Amateur Radio stations to communicate with one another over the Internet, using streaming-audio technology. The program allows worldwide connections to be made between stations, or from computer to station, greatly enhancing Amateur Radio's communications capabilities.

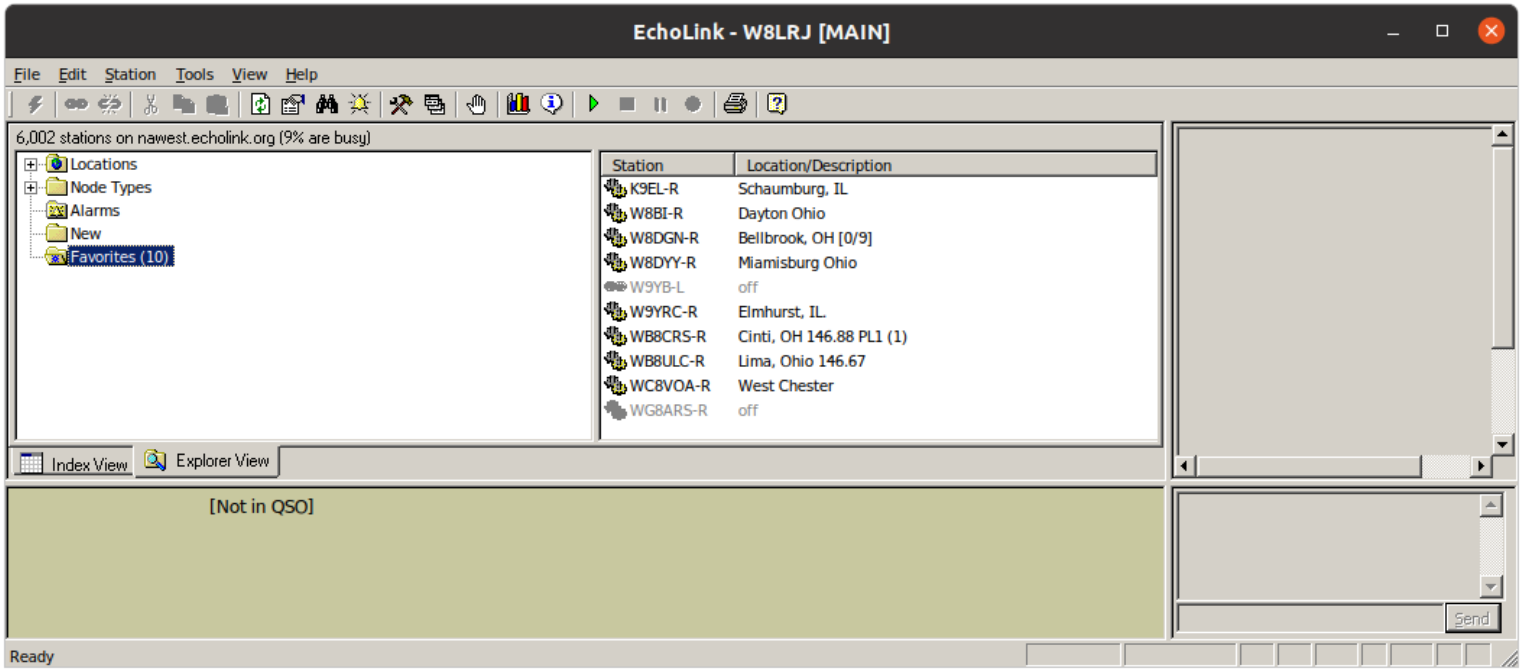


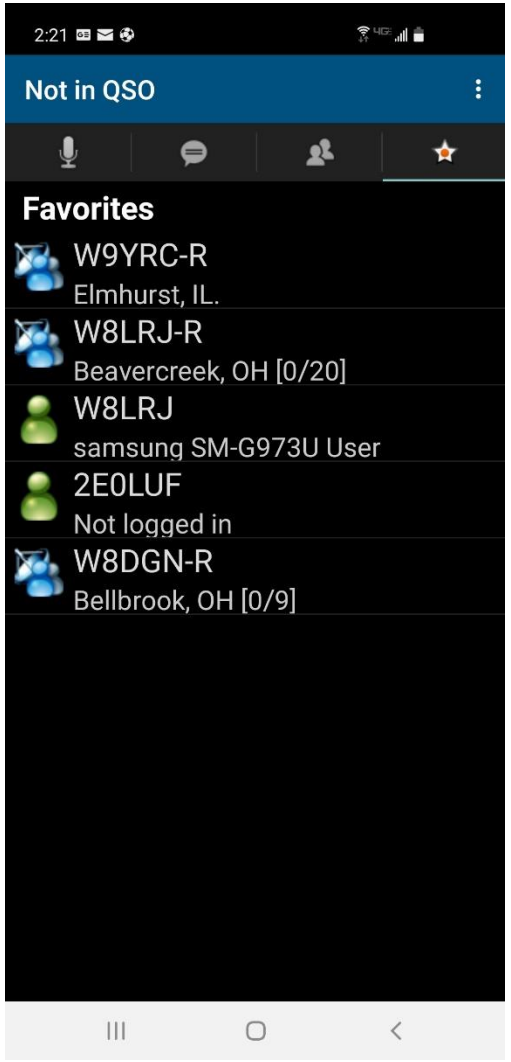
Using EchoLink

- EchoLink Node: 353955 (BARC 147.045+, no tone, repeater)
- To use EchoLink on the W8DGN repeater, simply listen to be sure the repeater is not in use, then identify your station and state that you are connecting to EchoLink.
- AllStar treats *ALL* EchoLink node numbers as 6-digits long. Nodes with shorter numbers need to have leading zeroes added.
  e.g., EchoLink node 1234 = AllStar Node 001234
- Also, to distinguish EchoLink node numbers from AllStar numbers, the 6-digit number has to he prepended with a "3". So the example above becomes 3001234; a total of 7 digits.
- Having constructed the number of the desired node, we need to issue the command to make the link. To call EchoLink node 1234, you would dial *33001234
- Finally, please remember to disconnect from any call using *1nnnn or *73.
- *http://www.echolink.org*

EchoLink Demo

- EchoLink app on Android phone, PC, or connected to my AllStar Link node via radio
- Using the EchoLink application, connect as usual
- From AllStar Link, need to know the EchoLink node number for my phone or PC
- Using radio DTMF codes, enter *33989747 (phone)
- Disconnect with *73





WC8OH EchoLink Node

- WC8OH-R node

WC8OH-R	Dayton, OH 145.11(- offset, 67.0 Hz tone)	868982

- Contact Bill White, WB4LAI, for more information on how to use it.

EmComm Applications

- Use phone if radio unavailable to connect to local net
- Connect to repeater outside affected area
- Use phone as an Internet hotspot and use AllStar Link node to reach other repeaters with an HT
- There is software available to connect repeaters using the mesh as a local Internet

Wires-X

- WIRES (Wide-coverage Internet Repeater Enhancement System) is an Internet communication system which expands the range of amateur radio communication (without the X it is analog).
- For WIRES-X (digital version), an amateur node station connecting to the Internet is used as the access point and connects the wireless communication to the Internet.
- A user's station can communicate with other amateur stations all over the world using a node within the radio range.
- But what is it?

Wires-X Terminology

- C4FM is the digital signaling mode (4-level Frequency Shift Keying).
- System Fusion is Yaesu's implementation of Digital Amateur Radio, utilizing C4FM 4-level FSK Technology to transmit digital voice and data over the amateur radio bands.
- AMS (Automatic Mode Select) is a part of the System Fusion operating system which automatically detects whether a transmission is C4FM digital or analog FM.
- WIRES-X (Wide-Coverage Internet Repeater Enhancement System) is a system for linking repeaters and/or home stations together, using Internet voice technology.

Wires-X Repeater at BARC

The WIRES-X Repeater is a repeater that is in a location where access to the internet is available. The WIRES-X Interface, HRI-200 and a dedicated PC can be directly connected to the DR-1 repeater. The PC via the HRI-200 now becomes the controller for the DR-1 repeater.

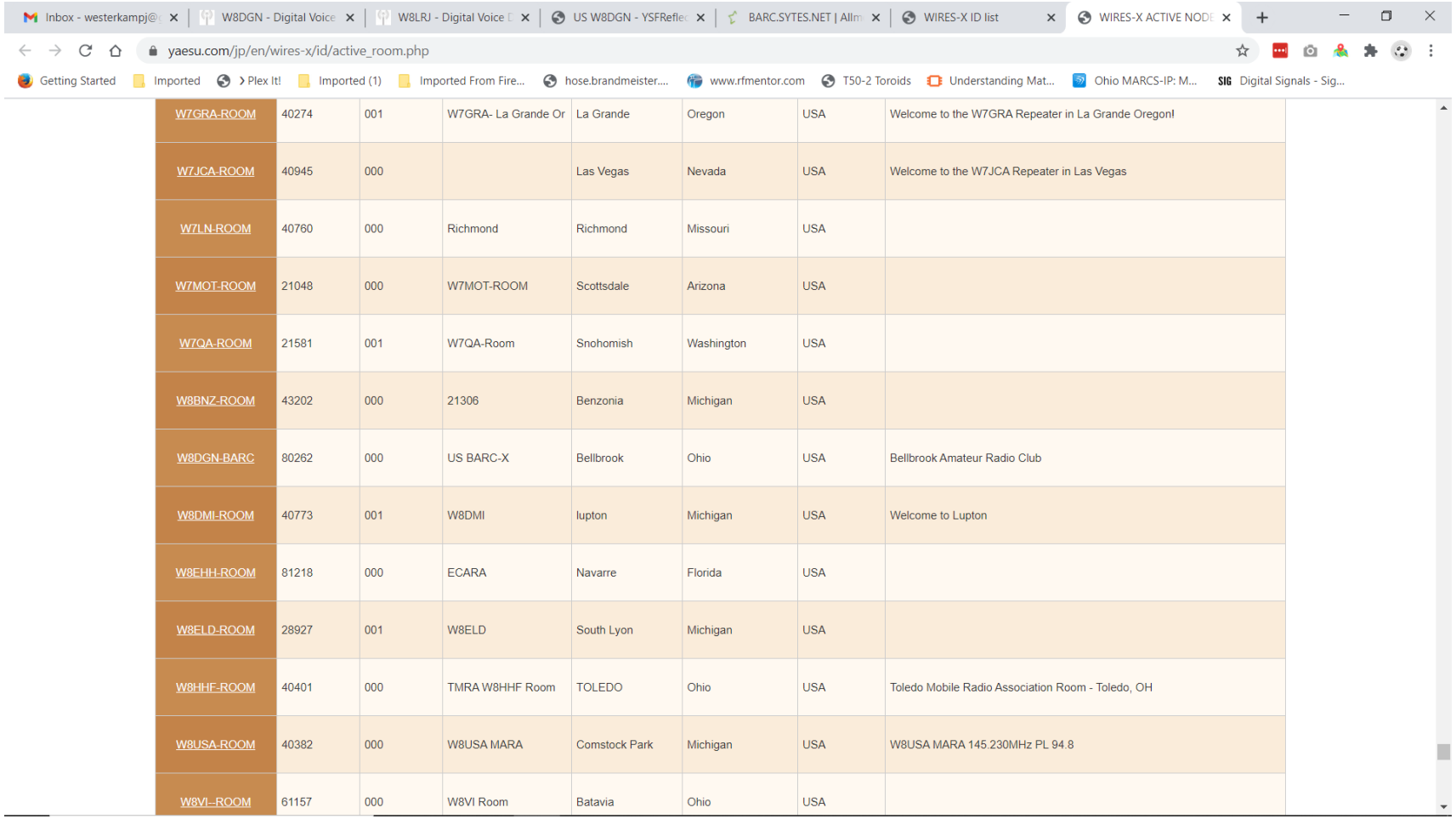
443.675+ (no tone)
Digital C4FM

Using Wire-X

- BARC 443.675+, no tone, repeater
  W8DGN-ND Wires-X Node ID: 70262
  W8DGN-BARC Room ID: 80262
- To use Wires-X on the W8DGN repeater, simply listen to be sure the repeater is not in use, then identify your station and state that you are connecting to Wires-X.
- You must have a Yaesu radio that supports C4FM digital voice. Every radio has a different method for connecting to Wires-X, but generally there is a DX or X button that connects you to Wires-X and allows you to get a list of nodes to which you can connect.
- *Be sure to disconnect from the room when you are finished.*
- *Note: To avoid hearing the digital noise on your analog FM receiver, add a receive tone 118.8 Hz (Tone Squelch).*
- *https://www.yaesu.com/jp/en/wires-x/user/index.php*

Wires-X Rooms

https://www.yaesu.com/jp/en/wires-x/id/id_active.php



Inbox - westerkampj@ | W8DGN - Digital Voice | W8LRJ - Digital Voice | US W8DGN - YSFRefle | BARC.SYTES.NET | Allm | WIRES-X ID list | WIRES-X ACTIVE NODE

yaesu.com/jp/en/wires-x/id/active_room.php

Getting Started | Imported | Plex It! | Imported (1) | Imported From Fire... | hose.brandmeister.... | www.rfmentor.com | T50-2 Toroids | Understanding Mat... | Ohio MARCS-IP: M... | Digital Signals - Sig...

W7GRA-ROOM	40274	001	W7GRA- La Grande Or	La Grande	Oregon	USA	Welcome to the W7GRA Repeater in La Grande Oregon!
W7JCA-ROOM	40945	000		Las Vegas	Nevada	USA	Welcome to the W7JCA Repeater in Las Vegas
W7LN-ROOM	40760	000	Richmond	Richmond	Missouri	USA	
W7MOT-ROOM	21048	000	W7MOT-ROOM	Scottsdale	Arizona	USA	
W7QA-ROOM	21581	001	W7QA-Room	Snohomish	Washington	USA	
W8BNZ-ROOM	43202	000	21306	Benzonia	Michigan	USA	
W8DGN-BARC	80262	000	US BARC-X	Bellbrook	Ohio	USA	Bellbrook Amateur Radio Club
W8DMI-ROOM	40773	001	W8DMI	lupton	Michigan	USA	Welcome to Lupton
W8EHH-ROOM	81218	000	ECARA	Navarre	Florida	USA	
W8ELD-ROOM	28927	001	W8ELD	South Lyon	Michigan	USA	
W8HHF-ROOM	40401	000	TMRA W8HHF Room	TOLEDO	Ohio	USA	Toledo Mobile Radio Association Room - Toledo, OH
W8USA-ROOM	40382	000	W8USA MARA	Comstock Park	Michigan	USA	W8USA MARA 145.230MHz PL 94.8
W8VI--ROOM	61157	000	W8VI Room	Batavia	Ohio	USA	

Popular Wires-X Rooms

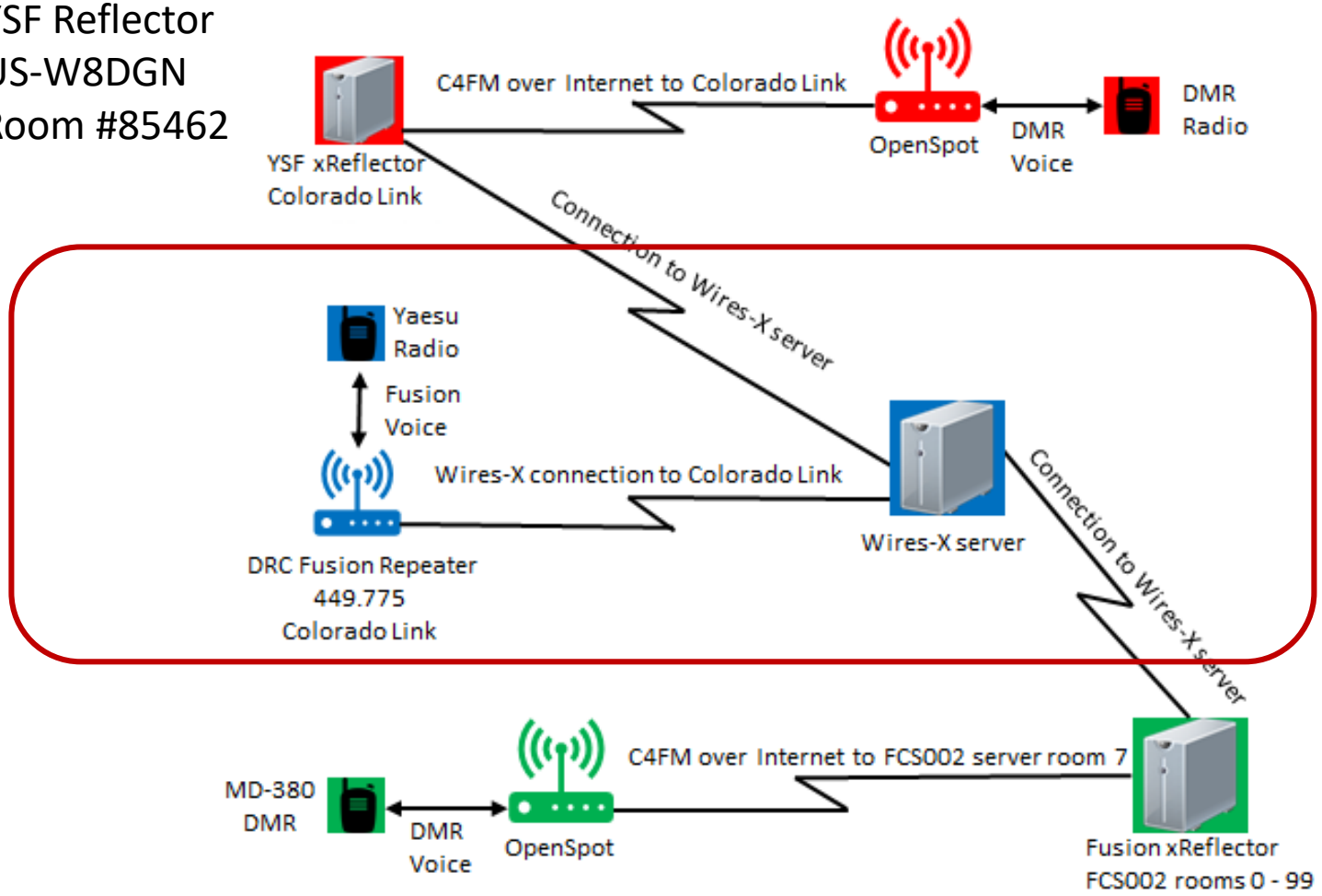
- AmericaLink Room #21080
- OhioLink Room #40557 (net Sunday nights at 8:30 pm ET, see https://www.olnradio.digital/ for more info)
- QuadNet Array #45058 (see https://www.openquad.net/ for net info)

Bridging a YSF Reflector

- Wires-X technology is Yaesu proprietary so users with hotspots cannot connect directly to Wires-X rooms.
- It is possible to bridge a Wires-X room to a YSF Reflector (note that YSF in this case *does not* stand for Yaesu System Fusion, it is just a name for an open reflector system).
- I have implemented a YSF Reflector on a Raspberry Pi with a dual band Pi-Star hotspot matched to the BARC 443.675+ (no tone) repeater.

YSF to Wires-X Bridge Overview

YSF Reflector
US-W8DGN
Room #85462



Remote Connect to BARC Repeater
DMR Radio to OpenSpot Hotspot

Yaesu System Fusion Repeater
Wires-X Room ID # 80262

DMR Radio to OpenSpot Hotspot

BARC YSF to Wires-X Bridge

YSF Reflector
US-W8DGN
Room #85462