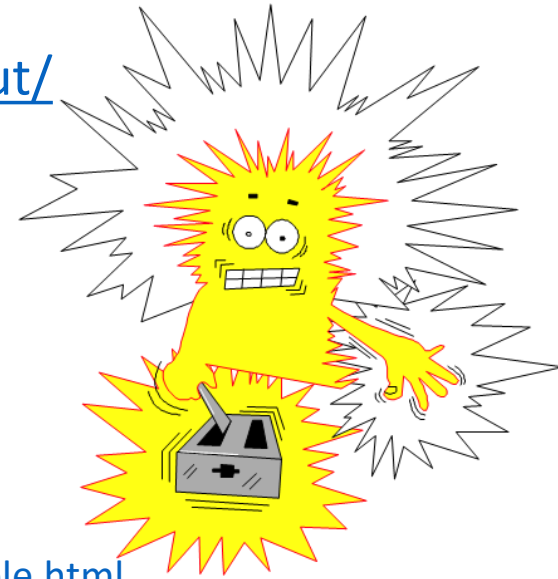


# Digital HAM Radio – An Introduction

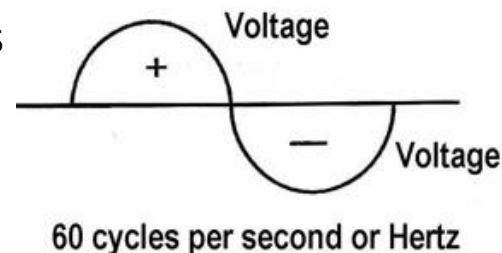
## Basic Introduction to Digital Communications using:

- **Penut** (D-Star – Windows and Android – FREE Software) <http://www.pa7lim.nl/peanut/>
- **Pi Star Hot Spots** (ZUM and Jumbo Spot) <https://www.pistar.uk/>
  - Yaesu and DMR (BrandMeister) Basic Configurations
- **Wires-X** – Yaesu Software connecting to Wires-X Digital Rooms using a FT-2DR
  - <https://www.yaesu.com/jp/en/wires-x/> - General Web Page
  - <https://www.yaesu.com/jp/en/wires-x/regist/index.php> - Registration Link
  - Good reference wires-x bible: <https://www.hamoperator.com/Hamoperator/WiRES-X Bible/WiRES-X Bible.html>



Note: Several slides taken from Brian Donovan, K2AS

Wires-X presentation and from various googled internet sites



As of 12 Aug 19

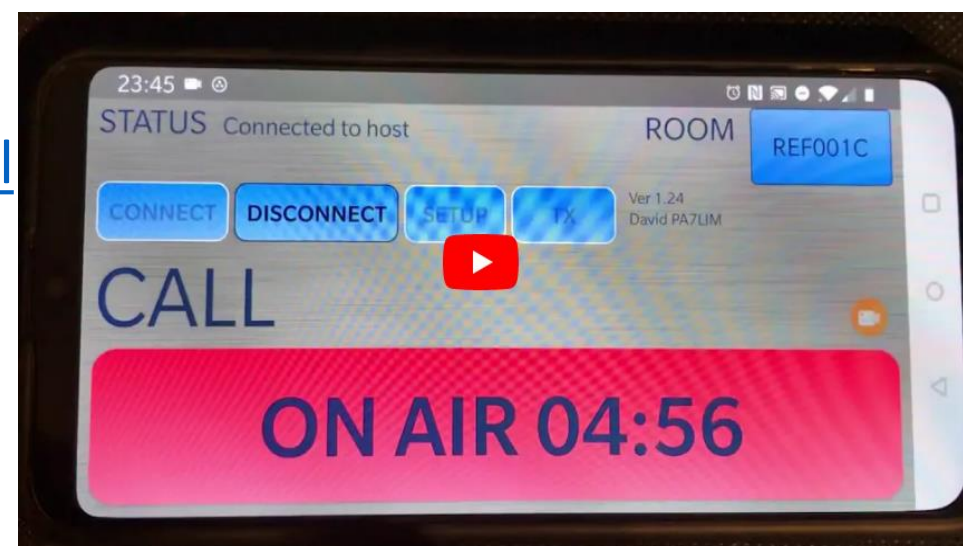
Michael Glennon – KB4JHU

Tullahoma, TN

Email: [KB4JHU@ARRL.NET](mailto:KB4JHU@ARRL.NET)

# Penut – D-STAR and DMR – Free to Download/Use

- Website: <http://www.pa7lim.nl/peanut/>
- Windows (DSTAR/DMR) & Android (DSTAR)
- By David PA7LIM – From the Netherlands
- Uses transcoding with the AMBE3000 chip
- Must Register Penut and also DSTAR
  - <http://www.pa7lim.nl/peanut-request/>
  - [http://www.dstargateway.org/D-Star Registration.html](http://www.dstargateway.org/D-Star%20Registration.html)



# Hotspots

- Lots of options: DVAP, zumspot, jumbospot, dv4mini, openspot, mmdvm, blue dv, DVMega, Nanospot
- Digital modes other than YSF are available: DMR, D-Star, P25, NXDN
- Low power 440 Mhz transceivers – up to 12 mW limited coverage unless mmdvm is used with a higher power radio
- Hotspots were not developed to replace repeaters but rather to supplement them.
- In areas where there is NO repeater, a hotspot allows the user to connect directly to a digital network via the Internet
- Costs vary- approx. \$65 - \$255 for hotspots
- Network is based off DMR (Brandmeister), XLX reflectors and YSF reflectors
- Gateways and bridges are setup and different modes can talk to each other (i.e. openspot DMR<=>C4FM)
- **Pi-Star** software on Raspberry Pi is very popular and will work with most hotspots
- Hotspot can be controlled with the Wires-X function on Yaesu digital radios
- [Wires-X nodes and “rooms”](#) are **NOT** the same as what is available with hotspots



# Hot Spots: AKA RF to Internet Connections

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- Pi Star Hot Spots (ZUM and Jumbo Spot) <https://www.pistar.uk/>
- Yaesu and DMR (BrandMeister) Basic Configurations:
  - DMR User Registration: <https://www.dmr-marc.net/>
  - BrandMeister Registration - <https://brandmeister.network/?page=register>
  - Yaesu registration not required but nice to have <https://www.yaesu.com/jp/en/wires-x/regist/index.php>

# Pi-Star Digital Voice Dashboard for KY4TN

[Dashboard](#) | [Admin](#) | [Configuration](#)

## Modes Enabled

D-Star	DMR
YSF	P25
YSF XMode	NXDN
DMR XMode	POCSAG

## Network Status

D-Star Net	DMR Net
YSF Net	P25 Net
YSF2DMR	NXDN Net
YSF2NXDN	YSF2P25
DMR2NXDN	DMR2YSF

## Radio Info

Trx	TX DMR Slot 2
Tx	433.175000 MHz
Rx	433.175000 MHz
FW	HS_Hat:v1.3.3

## DMR Repeater

DMR ID	3147980
DMR CC	1
TS1	disabled
TS2	enabled
TG 91/No Ref	
DMR Master	
BM United States ..	

## Gateway Activity

Time (PDT)	Mode	Callsign	Target	Src	Dur(s)	Loss	BER
18:13:09 Jun 4th	DMR Slot 2	<a href="#">KS5V</a>	TG 91	Net	2.6	0%	0.0%
18:11:26 Jun 4th	DMR Slot 2	3141560	TG 91	Net	100.6	2%	0.0%
18:11:20 Jun 4th	DMR Slot 2	<a href="#">KI7CDG</a>	TG 91	Net	0.8	7%	0.0%
18:09:47 Jun 4th	DMR Slot 2	<a href="#">N4HAY</a>	TG 91	Net	91.9	2%	0.0%
18:07:05 Jun 4th	DMR Slot 2	<a href="#">WB0NPN</a>	TG 91	Net	0.5	0%	0.0%
18:03:14 Jun 4th	DMR Slot 2	<a href="#">N5AQM</a>	TG 91	Net	5.2	0%	0.0%
18:02:55 Jun 4th	DMR Slot 2	<a href="#">AG6PF</a>	TG 91	Net	14.5	5%	0.0%
17:56:39 Jun 4th	DMR Slot 2	<a href="#">N2JZ</a>	TG 91	Net	1.6	0%	0.0%
17:55:55 Jun 4th	DMR Slot 2	<a href="#">DU1AVC</a>	TG 91	Net	0.8	0%	0.0%
17:54:41 Jun 4th	DMR Slot 2	3143172	TG 91	Net	0.8	0%	0.0%
17:54:06 Jun 4th	DMR Slot 2	3141754	TG 91	Net	0.1	0%	0.0%
17:53:17 Jun 4th	DMR Slot 2	<a href="#">AF6PF</a>	TG 91	Net	0.8	0%	0.0%
17:52:36 Jun 4th	DMR Slot 2	<a href="#">W6JAR</a>	TG 91	Net	1.6	0%	0.0%
17:51:57 Jun 4th	DMR Slot 2	3143125	TG 91	Net	0.8	0%	0.0%
17:51:08 Jun 4th	DMR Slot 2	<a href="#">K9AAO</a>	TG 91	Net	14.5	6%	0.0%
17:51:04 Jun 4th	DMR Slot 2	<a href="#">KM6DZQ</a>	TG 91	Net	0.5	0%	0.0%
17:49:01 Jun 4th	DMR Slot 2	<a href="#">VK7WP</a>	TG 91	Net	1.9	0%	0.0%

## Local RF Activity

Time (PDT)	Mode	Callsign	Target	Src	Dur(s)	BER	RSSI
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# Pi-Star Digital Voice Dashboard for KY4TN

[Dashboard](#) | [Admin](#) | [Configuration](#)

## Modes Enabled

D-Star	DMR
YSF	P25
YSF XMode	NXDN
DMR XMode	POCSAG

## Network Status

D-Star Net	DMR Net
YSF Net	P25 Net
YSF2DMR	NXDN Net
YSF2NXDN	YSF2P25
DMR2NXDN	DMR2YSF

## Radio Info

Trx	TX YSF
Tx	434.175000 MHz
Rx	434.175000 MHz
FW	HS_Hat:v1.3.3

## YSF Network

Linked to: FCS00290

## Gateway Activity

Time (PDT)	Mode	Callsign	Target	Src	Dur(s)	Loss	BER
18:15:32 Jun 4th	YSF	<a href="#">KG7HHG</a>	ALL at FCS002-90	Net	TX		
18:15:03 Jun 4th	YSF	<a href="#">KB0RTQ</a>	ALL at FCS002-90	Net	24.0	0%	0.0%
18:13:52 Jun 4th	YSF	AMERICANLK	ALL at FCS002-90	Net	0.7	0%	0.0%
18:13:06 Jun 4th	YSF	<a href="#">W3AIX</a>	ALL at FCS002-90	Net	9.6	0%	0.0%
18:10:48 Jun 4th	YSF	<a href="#">W7AZC</a>	ALL at FCS002-90	Net	0.6	0%	0.0%
18:08:55 Jun 4th	YSF	<a href="#">N9JJG</a>	ALL at FCS002-90	Net	0.3	0%	0.0%
18:08:12 Jun 4th	YSF	<a href="#">N3JU</a>	ALL at FCS002-90	Net	8.1	0%	0.0%
18:05:56 Jun 4th	YSF	<a href="#">BI3RKD</a>	ALL at FCS002-90	Net	0.3	0%	0.0%
18:04:41 Jun 4th	YSF	<a href="#">KE5MLF</a>	ALL at FCS002-90	Net	3.5	0%	0.0%
18:03:59 Jun 4th	YSF	<a href="#">N3RES</a>	ALL at FCS002-90	Net	1.0	0%	0.6%
18:03:37 Jun 4th	YSF	<a href="#">W4KYT</a>	ALL at FCS002-90	Net	8.9	0%	0.0%
18:03:03 Jun 4th	YSF	<a href="#">N3EXA</a>	ALL at FCS002-90	Net	27.0	0%	0.0%
17:57:13 Jun 4th	YSF	<a href="#">KB5EDR</a>	ALL at FCS002-90	Net	12.2	0%	0.0%
17:52:11 Jun 4th	YSF	<a href="#">WB2FZC</a>	ALL at FCS002-90	Net	0.8	0%	0.0%
17:51:26 Jun 4th	YSF	<a href="#">JE2EZE</a>	ALL at FCS002-90	Net	1.4	0%	0.0%
17:50:30 Jun 4th	YSF	<a href="#">K3CXW</a>	ALL at FCS002-90	Net	0.8	0%	0.0%
17:49:05 Jun 4th	YSF	<a href="#">N0TJD</a>	ALL at FCS002-90	Net	4.4	0%	0.0%

## Local RF Activity

Time (PDT)	Mode	Callsign	Target	Src	Dur(s)	BER	RSSI
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# Hot Spots: AKA RF to Internet Connections

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- Hot Spot Key Configurations:
  - Correct Modem type selected?
  - WIFI / Bluetooth Settings and passwords (if required) correct and connected?
  - Correct mode (YSF or DMR – Many other to select – DSTAR/P25/NXDN/POSAG)?
    - For DMR specific to the Jumbo Spot – entered the 500hz modem RX/TX offset frequency?
    - For DMR Proper Frequency and Color Code Entered in Hot Spot and in DMR radio code plug?
  - YSF / FCS Reflector / DMR Talk Group -- Entered Correct?

# Hot Spot – Correct Modem Selected – YSF Yaesu Setup



## General Configuration

Setting	Value
Hostname:	pi-star-1 <small>Do not add suffixes such as .local</small>
Node Callsign:	KY4TN
CCS7/DMR ID:	3147977
Radio Frequency:	434.175.000 MHz
Latitude:	33.9776 degrees (positive value for North, negative for South)
Longitude:	-118.461 degrees (positive value for East, negative for West)
Town:	Marina del Rey, CA DM03
Country:	USA
URL:	http://www.qrz.com/db/KY4TN <input checked="" type="radio"/> Auto <input type="radio"/> Manual
Radio/Modem Type:	STM32-DVM / MMDVM_HS - Raspberry Pi Hat (GPIO) ▼
Node Type:	<input type="radio"/> Private <input checked="" type="radio"/> Public
System Time Zone:	America/Los_Angeles ▼
Dashboard Language:	english_us ▼

# Hot Spot – Correct Modem Selected – DMR

Note: Radio Freq – Critical Multi Hot Spots



## General Configuration

Setting	Value
Hostname:	<input type="text" value="pi-star-2"/> Do not add suffixes such as .local
Node Callsign:	<input type="text" value="KY4TN"/>
CCS7/DMR ID:	<input type="text" value="3147980"/>
Radio Frequency:	<input type="text" value="433.175.000"/> MHz
Latitude:	<input type="text" value="33.9776"/> degrees (positive value for North, negative for South)
Longitude:	<input type="text" value="-118.461"/> degrees (positive value for East, negative for West)
Town:	<input type="text" value="Marina del Rey, CA DM03"/>
Country:	<input type="text" value="USA"/>
URL:	<input type="text" value="http://www.qrz.com/db/KY4TN"/> <input checked="" type="radio"/> Auto <input type="radio"/> Manual
Radio/Modem Type:	<input type="text" value="STM32-DVM / MMDVM_HS - Raspberry Pi Hat (GPIO)"/>
Node Type:	<input type="radio"/> Private <input checked="" type="radio"/> Public
System Time Zone:	<input type="text" value="America/Los_Angeles"/>
Dashboard Language:	<input type="text" value="english_us"/>

Apply Changes

# Hot Spot – WIFI / Bluetooth Settings



## Firewall Configuration

Setting	Value	
Dashboard Access:	<input type="radio"/> Private	<input checked="" type="radio"/> Public
ircDDBGateway Remote:	<input checked="" type="radio"/> Private	<input type="radio"/> Public
SSH Access:	<input checked="" type="radio"/> Private	<input type="radio"/> Public
Auto AP:	<input checked="" type="radio"/> On <input type="radio"/> Off	Note: Reboot Required if changed
uPNP:	<input checked="" type="radio"/> On <input type="radio"/> Off	

Apply Changes

## Wireless Configuration

Refresh Reset WiFi Adapter Configure WiFi

### Wireless Information and Statistics

Interface Information	Wireless Information
Interface Name : wlan0 Interface Status : <b>Interface is up</b> IP Address : 192.168.0.109 Subnet Mask : 255.255.255.0 Mac Address : b8:27:eb:a7:96:8e	Connected To : Elton John AP Mac Address : 18:d6:c7:4d:7a:66  Bitrate : 72.2 MBit/s Signal Level : -25 dBm
Interface Statistics	Transmit Power : 31 dBm Link Quality : 70/70
Received Packets : 20272 Received Bytes : 3757622 (3.5 MiB) Transferred Packets : 12483 Transferred Bytes : 6229882 (5.9 MiB)	

Information provided by ifconfig and iwconfig

# Hot Spot - Correct mode (YSF or DMR)



## Pi-Star Digital Voice - Configuration

[Dashboard](#) | [Admin](#) | [Expert](#) | [Power](#) | [Update](#) | [Backup/Restore](#) | [Factory Reset](#)

### Gateway Hardware Information

Hostname	Kernel	Platform	CPU Load	CPU Temp
pi-star-1	4.9.35+	Pi Zero W Rev 1.1 (512MB)	0.62 / 0.74 / 0.71	44.4°C / 111.9°F

### Control Software

Setting	Value
Controller Software:	<input type="radio"/> DStarRepeater <input checked="" type="radio"/> MMDVMHost (DV-Mega Minimum Firmware 3.07 Required)
Controller Mode:	<input checked="" type="radio"/> Simplex Node <input type="radio"/> Duplex Repeater (or Half-Duplex on Hotspots)

[Apply Changes](#)

### MMDVMHost Configuration

Setting	Value
DMR Mode:	<input type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
D-Star Mode:	<input type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
YSF Mode:	<input checked="" type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
P25 Mode:	<input type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
NXDN Mode:	<input type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
YSF2DMR:	<input type="checkbox"/>
YSF2NXDN:	<input type="checkbox"/>
YSF2P25:	<input type="checkbox"/>
POCSAG:	<input type="checkbox"/> POCSAG Paging Features

Hot Spot - For DMR specific to the Jumbo Spot –  
Entered the 500hz modem RX/TX offset frequency



Pi-Star Digital Voice - Expert Editors

Dashboard | Admin | Update | Upgrade | Backup/Restore | Configuration

Quick Edit: DStarRepeater | ircDDBGateway | TimeServer | MMDVMHost | **DMR GW** | YSF GW | P25 GW | NXDN GW | DAPNET GW  
Full Edit: DMR GW | PiStar-Remote | WiFi | BM API | DAPNET API | System Cron | RSSI Dat | Tools: CSS Tool | SSH Access

Info		
Latitude	33.9776	
Longitude	-118.461	
Location	Marina del Rey, CA DM03	
URL	http://www.qrz.com/db/KY4T	
RXFrequency	433175500	Change to: 434175 <b>500</b>
TXFrequency	433175500	Change to: 434175 <b>500</b>
Power	1	<b>Note: This offset is not displayed on dashboard! Be carefull changing settings in Expert mode!</b>
Height	0	

Hot Spot: For DMR-Proper Frequency and Color Code Must Be Entered in Hot Spot and Match DMR radio code plug!



DMR Configuration

Setting	Value
DMR Master:	BM_United_States_3108 ▼
Hotspot Security:	
BrandMeister Network:	Repeater Information   Edit Repeater (BrandMeister Selfcare)
DMR Color Code:	1 ▼
DMR EmbeddedLOnly:	<input type="checkbox"/>
DMR DumpTAData:	<input checked="" type="checkbox"/>

Apply Changes

# Hot Spot: YSF / FCS Reflector / DMR Talk Group -- Entered Correct?



## Yaesu System Fusion Configuration

Setting	Value
YSF Startup Host:	FCS00290 - AmericaLinkWIRESEX ▼
APRS Host:	missouri.aprs2.net ▼
UPPERCASE Hostfiles:	<input type="checkbox"/> Note: Update Required if changed
WiresX Passthrough:	<input checked="" type="checkbox"/> Turn ON

WiresX Auto Passthrough - The idea is that YSF and FCS reflectors work like they always did, however now when you connect to YSF2DMR, YSF2NXDN or YSF2P25, the gateway will pass your WiresX commands to the gateway until you unlink, so in YSF2DMR, you can choose reflectors from the radio (use Brandmeister for the best results at the moment, the other networks will catch up soon). When you unlink, it will unlink the YSF2DMR TG, and unlink from YSF2DMR allowing you to switch to a new home.

## DMR Configuration

Setting	Value
DMR Master:	BM_United_States_3108 ▼
Hotspot Security:	
BrandMeister Network:	Repeater Information   Edit Repeater (BrandMeister Selfcare)
DMR Color Code:	1 ▼
DMR EmbeddedLCOnly:	<input type="checkbox"/>
DMR DumpTADData:	<input checked="" type="checkbox"/>

# YSF2DMR Example Configuration:



## MMDVMHost Configuration

Setting	Value			
DMR Mode:	<input type="checkbox"/>	RF Hangtime:	20	Net Hangtime: 20
D-Star Mode:	<input type="checkbox"/>	RF Hangtime:	20	Net Hangtime: 20
YSF Mode:	<input checked="" type="checkbox"/>	RF Hangtime:	20	Net Hangtime: 20
P25 Mode:	<input type="checkbox"/>	RF Hangtime:	20	Net Hangtime: 20
NXDN Mode:	<input type="checkbox"/>	RF Hangtime:	20	Net Hangtime: 20
YSF2DMR:	<input checked="" type="checkbox"/>			
YSF2NXDN:	<input type="checkbox"/>			

## Yaesu System Fusion Configuration

Setting	Value
YSF Startup Host:	YSF00002 - Link YSF2DMR ▼
APRS Host:	missouri.aprs2.net ▼
UPPERCASE Hostfiles:	<input type="checkbox"/> Note: Update Required if changed
WiresX Passthrough:	<input checked="" type="checkbox"/>
(YSF2DMR)CCS7/DMR ID:	3147977
DMR Master:	BM_United_States_3101 ▼
Hotspot Security:	
DMR TG:	3147

# YSF2DMR Example PI-STAR Dashboard:



Hostname: pi-star-1

PI-Star:3.4.11 / Dashboard: 20190429

## Pi-Star Digital Voice Dashboard for KY4TN

[Dashboard](#) | [Admin](#) | [Configuration](#)

### Modes Enabled

D-Star	DMR
YSF	P25
YSF XMode	NXDN
DMR XMode	POCSAG

### Network Status

D-Star Net	DMR Net
YSF Net	P25 Net
YSF2DMR	NXDN Net
YSF2NXDN	YSF2P25
DMR2NXDN	DMR2YSF

### Radio Info

Trx	TX YSF
Tx	434.175000 MHz
Rx	434.175000 MHz
FW	HS_Hat:v1.3.3

### YSF Network

Linked to: YSF2DMR

### YSF2DMR

DMR ID	3147977
YSF2DMR Master	
BM United States ..	

### Gateway Activity

Time (PDT)	Mode	Callsign	Target	Src	Dur(s)	Loss	BER
14:58:13 Jun 5th	YSF	M7AGB	ALL at FCS002-90	Net	TX		
14:56:47 Jun 5th	YSF	KD2SED	ALL at FCS002-90	Net	2.5	0%	0.0%
14:53:55 Jun 5th	YSF	AMERICANLK	ALL at FCS002-90	Net	0.6	0%	0.0%
14:51:42 Jun 5th	YSF	G1YLG	ALL at FCS002-90	Net	26.6	0%	0.0%
14:50:08 Jun 5th	YSF	KC2ABV	ALL at FCS002-90	Net	0.9	0%	0.0%
14:49:23 Jun 5th	YSF	VE7PGE	ALL at FCS002-90	Net	0.2	0%	0.0%
14:48:25 Jun 5th	YSF	EA6ABL	ALL at FCS002-90	Net	1.1	0%	0.0%
14:47:53 Jun 5th	YSF	KN4LXN	ALL at FCS002-90	Net	9.1	0%	0.0%

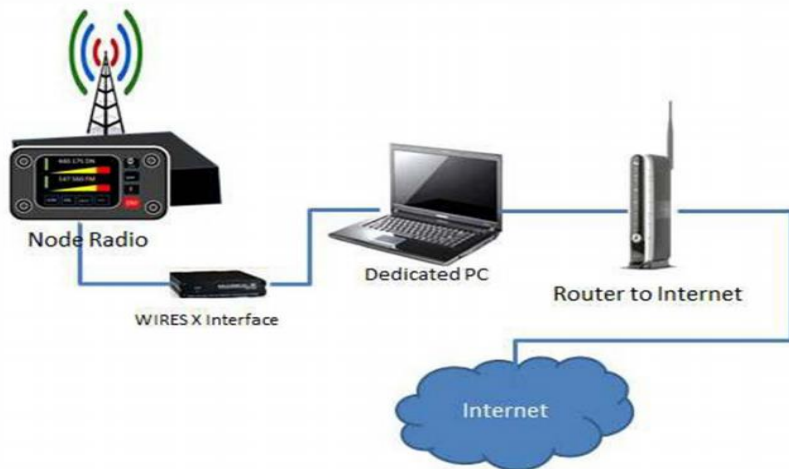
### Local RF Activity

Time (PDT)	Mode	Callsign	Target	Src	Dur(s)	BER	RSSI
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## Hotspots vs. Wires-X

# Transition Slide to: Wires-X Section

**A Typical Local Node**



- Wires-X node software allows operator to set many parameters
  - Access (open, closed, DP-ID, DG-ID, GM-group mode)
  - Analog or digital modes
  - VHF/UHF frequencies
  - Simplex or connected to a repeater
  - Power output - variable up to 50 watts
  - ID/Timers - individual setup
  - News, messages, pictures, info on other stations, who is connected and log history
  - Connect and disconnect options, restrict access. Return to "room"
  - All YSF radios allow for control of Wires-X but how this is done varies from radio to radio
  - Can add a second radio to HRI 200 for preset search function just press the WIRES-X button to find nodes
  - Simple and easy to use once you have it set up

# Terminology

## (info from Wires-X – The Bible)

- **Node** - Radio (repeater or simplex) connected to the Internet via a PC, which repeats communications of a conventional amateur radio as an access point.
- **Local Node** - This is a Node within the radio communication range of a conventional amateur radio station.
- **Analog Node** - A Node that is a transceiver or repeater using a conventional FM format and can only repeat DTMF (Dual Tone Multi Frequencies) codes and analog audio transmission/receptions.
- **Digital Node** - This is a Node which is a transceiver or repeater compatible with digital communications in C4FM (Continuous 4 Level FM) format. With this type of Node you can not only relay voice communications, but also text and image data transmissions. One can also repeat DMTF codes and audio transmissions/receptions.

# Terminology (cont'd)

- **Conventional Amateur Station** - This is a normal Amateur Radio station, an individual on either a hand held radio, a mobile radio or a base station radio.
- **Room** - This is a WIRES-X Network community space to which multiple Nodes can connect simultaneously, like the old telco party line. This is a place where all amateur stations can link to each other via a local Node and communicate with each other. In addition to voice communication, one can chat with text messages on the PC used for the local Node.
- **WIRES-X user ID (node)** - YAESU provides an identification name with the WIRES-X node. Each node is assigned a DTMF ID (5-digit number, e.g. 11916) and user ID (alphanumeric e.g. WB7OEV) up to 10 digits in length. Knowing the ID of the node to connect to, you can transmit the DTMF ID code from the transceiver, specifying the node to connect to by searching by characters.

# Wires-X Software not connected

192.168.1.217 (steve-asus-e45m ( 192.168.1.217 ) - service mode) - VNC Viewer

WIRES-X

File(F) View(V) Connect(C) Tool(T) Help(H)

G.User ID	+DT...	Act	Call/Rm...	City	State	Cou...	Freq(MHz)
WN8Z-RPT	11199		WN8Z	Fulton	New York	USA	147.390M...
----AMERICA---	21080	098	America ...	Beau...	Texas	USA	
MNWS-FUSION	21493	025	MNWS ...	Lino ...	Minneso...	USA	
TEXAS-NEXUS	21636	011	TEXAS-...	Austin	Texas	USA	
WNY-HUB	21704	000	WNY-Hub	Onta...	New York	USA	
WAZEMO-ROO...	21777	000	WAZEMO	Lyons	New York	USA	
ALABAMA-LINK	28933	007	Alabama...	Troy	Alabama	USA	

+A.User ID	DTM...	CallSign	City	State	Cou...	Freq(MHz)
---JA3LBJ-	19639	JA3LBJ	Kakogawa-city	Hyogo	Japan	430.82MH
--9Z4RG--	30199	9Z4RG	Port-of-Spain	Trinidad	Trin...	147.850M.
--ECHIGO-	12796	JR0ZFW	Kashiwazaki-city	Niigata	Japan	430.920M.
--JE1UDL--	16671	JE1UDL	Takasaki-city	Gunma	Japan	
--JF6BWD--	19656	JF6BWD	Fukuoka-city	Fukuoka	Japan	438.220M.
--IWAKUNI-	15403	JH4VIZ	Iwakuni-city	Yamagu...	Japan	144.560M.
--JMBUGH-50	32173	JMBUGH	Kashiwara-city	Osaka	Japan	52.060MH
--JP3DDI-ND	19645	JP3DDI	Kashiwara-city	Osaka	Japan	144.550M.
--KT-T0JI-	39015	JR3VC	Kyoto-city	Kyoto	Japan	439.66MH
--KYOTO-	19414	JL3ZGV	Kyoto-city	Kyoto	Japan	430.820M.
--1ST-RIG-ND	12556	JH8IKV	Sapporo-city	Hokkaido	Japan	430.940M.

+Room ID	DTM...	Act	Room name	City	St
-----C4FM	24423	001	C4FMxyz	Any city	-
-----LADO	40937	001	-----LADO--	San Antonio	Te
-----UKHUB	41491	001	UKHUB Cross-links	BELFAST	Co
-----ARUFON	40254	000	ARUFON	Maplewood	M
-----HUBNET	41461	008	HUBNet	Portsmouth	Ha
-----WI-LINK	21667	004	WI-LINK USA	Baldwin	W
-----KAKOGAWA	29639	000	KAKOGAWA	Kakogawa-city	Hj
-----CQ-IRL	41411	002	CQ-IRL	Kilrea	Co

Ready

ONLINE NUM

20:17 26/04/2018

Wires-X interface showing status and logs:

Buttons: IDLE, DIGITAL, ON-AIR, LOCAL, HRI-200, RADIO 1

User = KD9AGS-KIM > \*\*\*\*\* (DN-Direct)

Uplink = K0ZZX (11798)

Downlink = KA1CNFR (30128)

Room = (21493)

2018/04/26 19:51:14 K7CMB-ND(11599) OUT. 28 Nodes.

2018/04/26 19:52:56 9Z4JC-ND(33211) OUT. 27 Nodes.

2018/04/26 19:53:24 9Z4JC-ND(33211) IN. 28 Nodes.

2018/04/26 19:53:35 9Z4JC-ND(33211) OUT. 27 Nodes.

2018/04/26 19:58:35 End-key(#9999/\*) detected.

2018/04/26 19:58:35 \* Disconnected \*

2018/04/23 20:26:85 K8CJN-GREG > MNWS-FUSION : It does sound better! :)

2018/04/23 20:46:09 KB010A-RPT > MNWS-FUSION : Rever Bend Wireless Mechani

2018/04/23 20:46:28 W0MDT-DAY > MNWS-FUSION : thanks Jason. Nice to hear

2018/04/23 21:05:04 W4IOD-RPT > MNWS-FUSION : de W4IOD Please check in N4H

2018/04/23 21:08:27 W4IOD-RPT > MNWS-FUSION : de W4IOD Correction K4ATR is

2018/04/23 21:41:14 KC2RC-RPT > MNWS-FUSION : AC2AE - checking-in - Graves

2018/04/23 21:59:14 K9NCS-ND > MNWS-FUSION : K9NCS, Ben in Houston, no tra

2018/04/23 22:11:46 KF5F-TX > MNWS-FUSION : K0STUP, Jeremy, Kyle TX.

2018/04/23 22:12:38 W8QJ-RPT > MNWS-FUSION : W8QJ, Dan, Florida, no traffi

Buttons: News, GM, SEND, CLR

# Wires-X Software - connected to MNWis Room

192.168.1.217 (steve-asus-e45m (192.168.1.217) - service mode) - VNC Viewer

WIRES-X

File(F) View(V) Connect(C) Tool(T) Help(H)

G.User ID	+DT...	Act	Call/Rm...	City	State	Cou...	Freq(MHz)
WN8Z-RPT	11199		WN8Z	Fulton	New York	USA	147.390M...
-----AMERICA...	21080	097	America ...	Beau...	Texas	USA	
MNWIS-FUSION	21493	025	MNWis ...	Lino ...	Minneso...	USA	
TEXAS-NEXUS	21636	011	TEXAS...	Austin	Texas	USA	
WNY-HUB	21704	000	WNY-Hub	Onta...	New York	USA	
WA2EMO-ROO...	21777	000	WA2EMO	Lyons	New York	USA	
ALABAMA-LINK	28933	007	Alabama...	Troy	Alabama	USA	

View QSL de KA1CNF (ID:KA1CNF-ND)

**WIRES-X**

DIMF ID: 21493 2018/04/26 20:18:31

MNWis Fusion Network

< MNWIS-FUSION #21493 >

Intended for linking in the upper midwest and MNWis repeaters.

For extended out of area QSO, consider QSYing

HardCopy Save Close

Room MNWIS-FUSION(21493) member 26 nodes

Refresh Close

WROP-ND	WAIUTQ-RPT	WN8J-RPT	NS9RC-RPT	KB9UUU/RPT	NOAN-ND	WORRC-RPT	W9OCR-RPT	NOBJN-ND	K5STAR-RPT
N7YO-ND	NOJOL-ND	W0BU-RPT	W0MDT-MV	K3UCB-ND	K9EQ-RPT	W9LY-RPT	W0MDT-DAY	W0GAU-ND	W0MDT-PC
N1JUX-ND	W0MDT-RF	KB0IOA-RPT	KC9TVN-OZ	WN8Z-RPT	KA1CNF-ND				

NET DIGITAL ON-AIR LOCAL HRI-200 RADIO 1

**MNWIS-FUSION**

User = KD9AGS-KIM > \*\*\*\*\* (DN-Direct)

Uplink = K0ZZX (11798)

Downlink = KA1CNF (30128)

Room = (21493)

2018/04/26 19:53:35 924JC-ND(33211) OUT. 27 Nodes.

2018/04/26 19:58:35 End-key(#99999/\*) detected.

2018/04/26 19:58:35 \* Disconnected \*

2018/04/26 20:18:30 \*--\* Call Start No.21493 \*--\*

2018/04/26 20:18:31 Connected to MNWIS-FUSION(21493).

2018/04/26 20:18:31 Room Member 25 Nodes.

2018/04/28 20:28:35 K9GJN-GBEG > MNWIS-FUSION : It does sound better! :)

2018/04/28 20:46:09 KB0IOA-RPT > MNWIS-FUSION : Rever Bend Wireless Mechani

2018/04/28 20:46:23 W0MDT-DAY > MNWIS-FUSION : thanks Jason. Nice to hear

2018/04/28 21:05:04 W4IOD-RPT > MNWIS-FUSION : de W4IOD Please check in N4H

2018/04/28 21:08:27 W4IOD-RPT > MNWIS-FUSION : de W4IOD Correotion K4ATE is

2018/04/28 21:41:14 KC2RC-RPT > MNWIS-FUSION : AC2AE - checking-in - Graves

2018/04/28 21:59:14 K9NCS-ND > MNWIS-FUSION : K9NCS, Ben in Houston, no tra

2018/04/28 22:11:46 KF5F-TX > MNWIS-FUSION : KG5TUP, Jerrey, Kyle TX.

2018/04/28 22:12:39 W8OJ-RPT > MNWIS-FUSION : W8OJ, Dan, Florida, no traffi

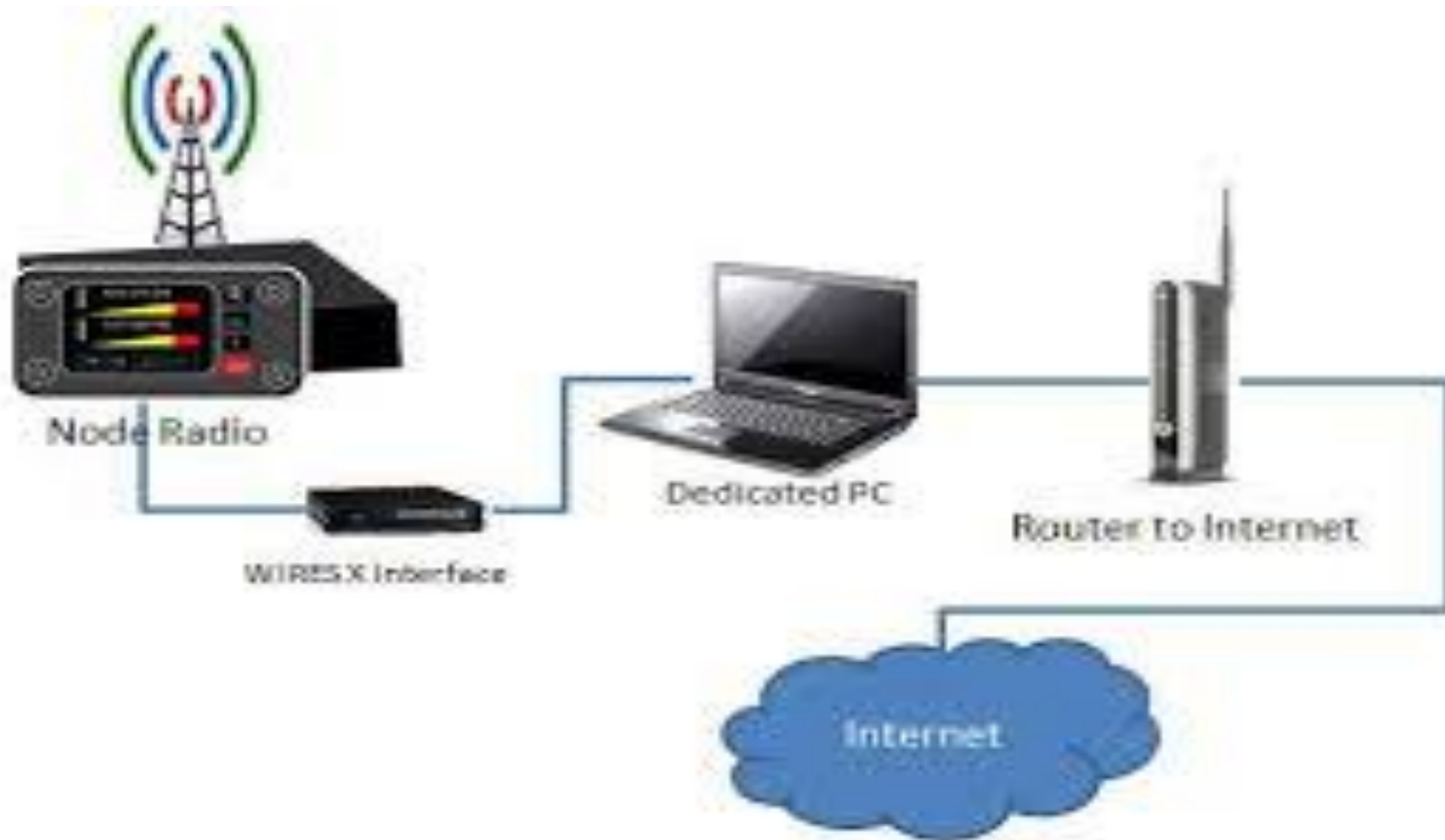
Ready

ONLINE NUM

20:18 26/04/2018

# Wires-X Internet/Computer/Radio Interface

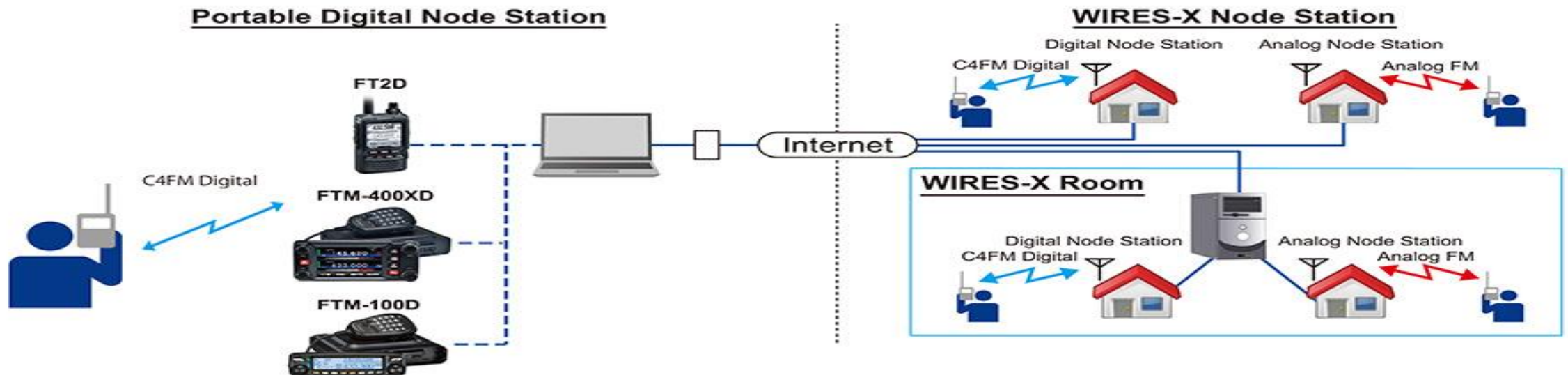
- HRI-200



# Wires-X - Yaesu Software – Home user setup

- **Wires-X** – Yaesu Software connecting to Wires-X Digital Rooms using a FT-2DR
  - <https://www.yaesu.com/jp/en/wires-x/> - General Web Page
  - <https://www.yaesu.com/jp/en/wires-x/regist/index.php> - Registration Link

## Access Point Illustration (Portable HRI Mode)



# Wires-X - Yaesu Software – Typical Repeater setup

- IMRS Repeater network and WIRES-X

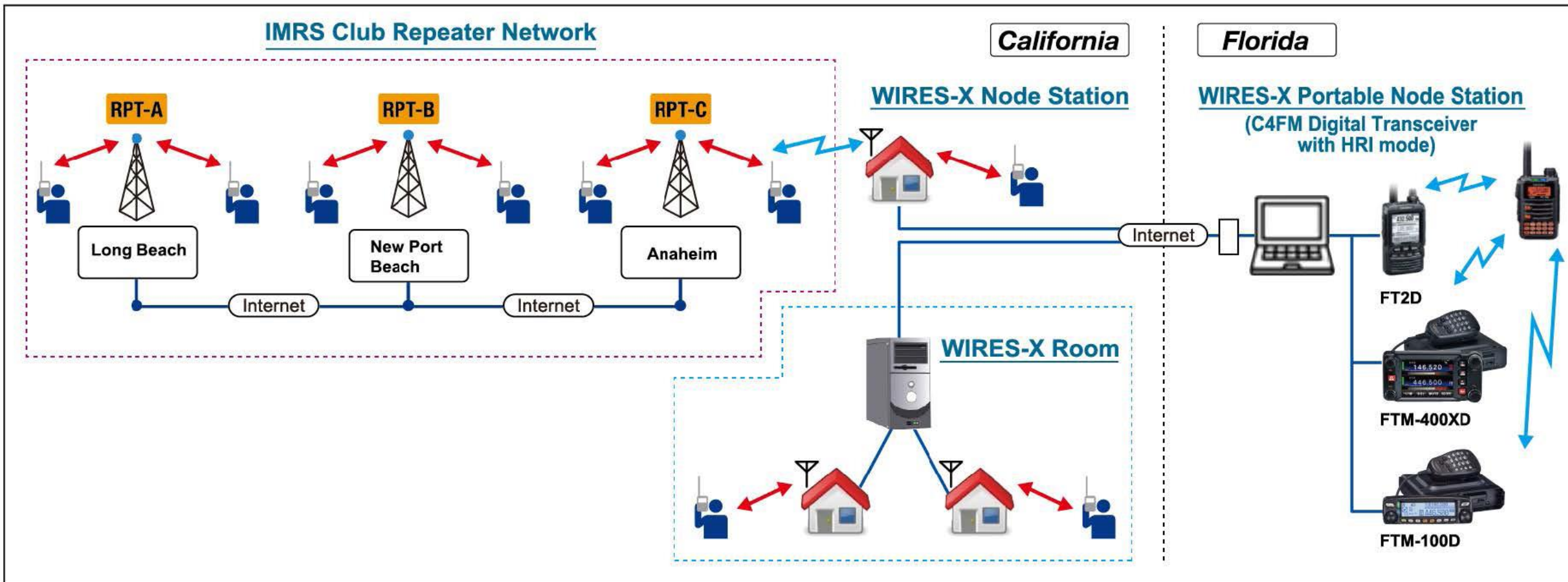


Illustration of Wires-X operation via Portable digital Node Stations

# System Fusion II Radios

C4FM Digital



## System Fusion II

*C4FM Digital  
Pursuing Advanced Communications*



C4FM/FM 144/430 MHz Dual Band 50 W  
Digital Transceiver  
**FTM-100DR**  
(Improved M-CH GPS module included)



C4FM/FM 144/430 MHz  
Dual Band Dual Receive Digital Repeater  
**DR-2X**



C4FM/FM 144/430 MHz Dual Band 50 W  
Digital Transceiver  
**FTM-400XDR**  
(Improved M-CH GPS module included)



C4FM/FM 144 MHz 50 W  
Digital Transceiver  
**FTM-3200DR**  
(Consistent 50 Watts High Power)



CW/SSB/AM/FM/C4FM  
144/30/344/430 MHz Wide-Coverage  
100 W All Mode Transceiver (244/430 MHz 50 W)  
**FT-991A**  
(Real-Time Spectrum Scope included)



C4FM/FM 430 MHz 50 W  
Digital Transceiver  
**FTM-3207DR**  
(Heavy Duty 55 Watts High Power)

**System Fusion II Supports All C4FM Portables and Mobiles**

- Firmware updates will enable System Fusion II compatibility with all existing C4FM products.
- FTM-3207DR: This device has not been approved by the FCC. This device may not be offered for sale or lease or be sold or leased until approval of the FCC has been obtained. The information shown is preliminary and may be subject to change without notice or obligation.

# Advantages of Wires-X (From Yaesu Presentation)

- Supports C4FM digital. Repeating digital data via the Internet, users can enjoy clear voice communications
- Automatically connects to nodes and “rooms”. Call sign, name, distance between stations included in transmission
- Search active nodes and “rooms”
- Similar to Echolink, IRLP, Allstar but with more features
- Does not require repeater controllers
- No repeater needed – can be simplex
- Can also link repeaters
- Range increased when linked to other repeaters and/or nodes
- News bulletins (messages, images, voice memos) can be freely uploaded to nodes and “rooms”
- Also supports traditional FM users and C4FM users can communicate with analog FM stations

# Wires-X Node (From Yaesu Presentation)

- No Fusion repeater or node near you? Then set up your own node!
- Setup is quick and easy!
- Wires-X node consists of a PC, Wires-X connection kit (VOIP), and a transceiver
- Functions as a repeater station in simplex mode to connect to the
- Internet and another radio or repeater
- Can also be connected to a repeater for linking
- Wires-X node can open and run a community space or “room” where multiple nodes can connect at the same time.
- Uses Yaesu server based in Japan

# Wires-X Node (From Yaesu Presentation)

A node radio...such as...

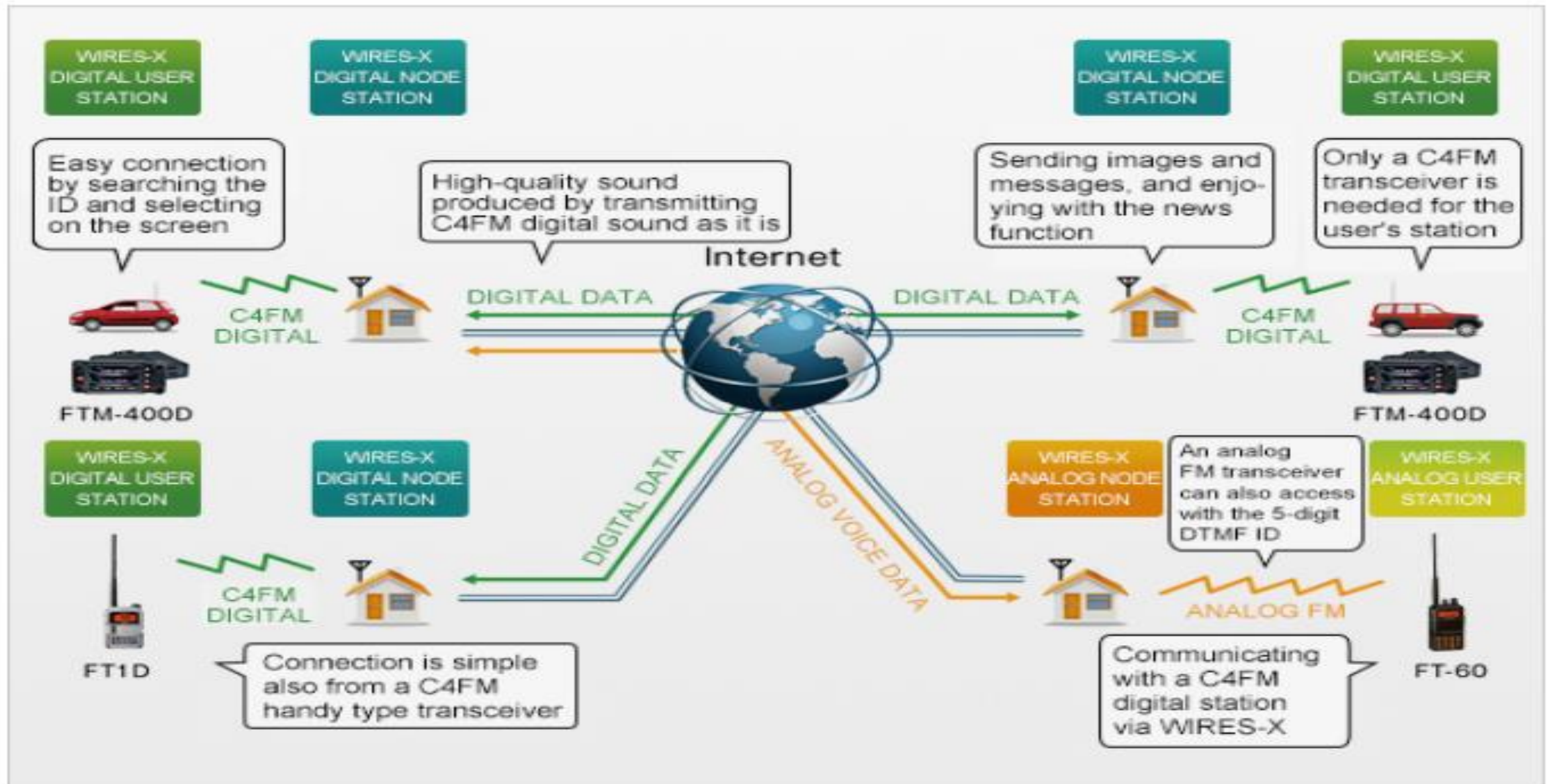
*A Digital Mobile Transceiver for a New Age,  
with a Wide Variety of Mobile Operations  
Made Possible Through Advanced C4FM Technology*



**FTM-100DR**  
American, Asian and Australian versions  
**FTM-100DE**  
European version

(DTMF Microphone MH-48A6JA, Mounting Bracket, Bracket for Front panel, Control Cable 10 ft, PC connection Cable SCU-20, Stereo Monaural Plug and DC Power Cable included)

# Wires-X Communication from Yaesu site -complicated!





QRPBLOG.COM

Yaesu FT3D – new flagship VHF/UHF handheld

Operating Digital –  
Putting all this to use!

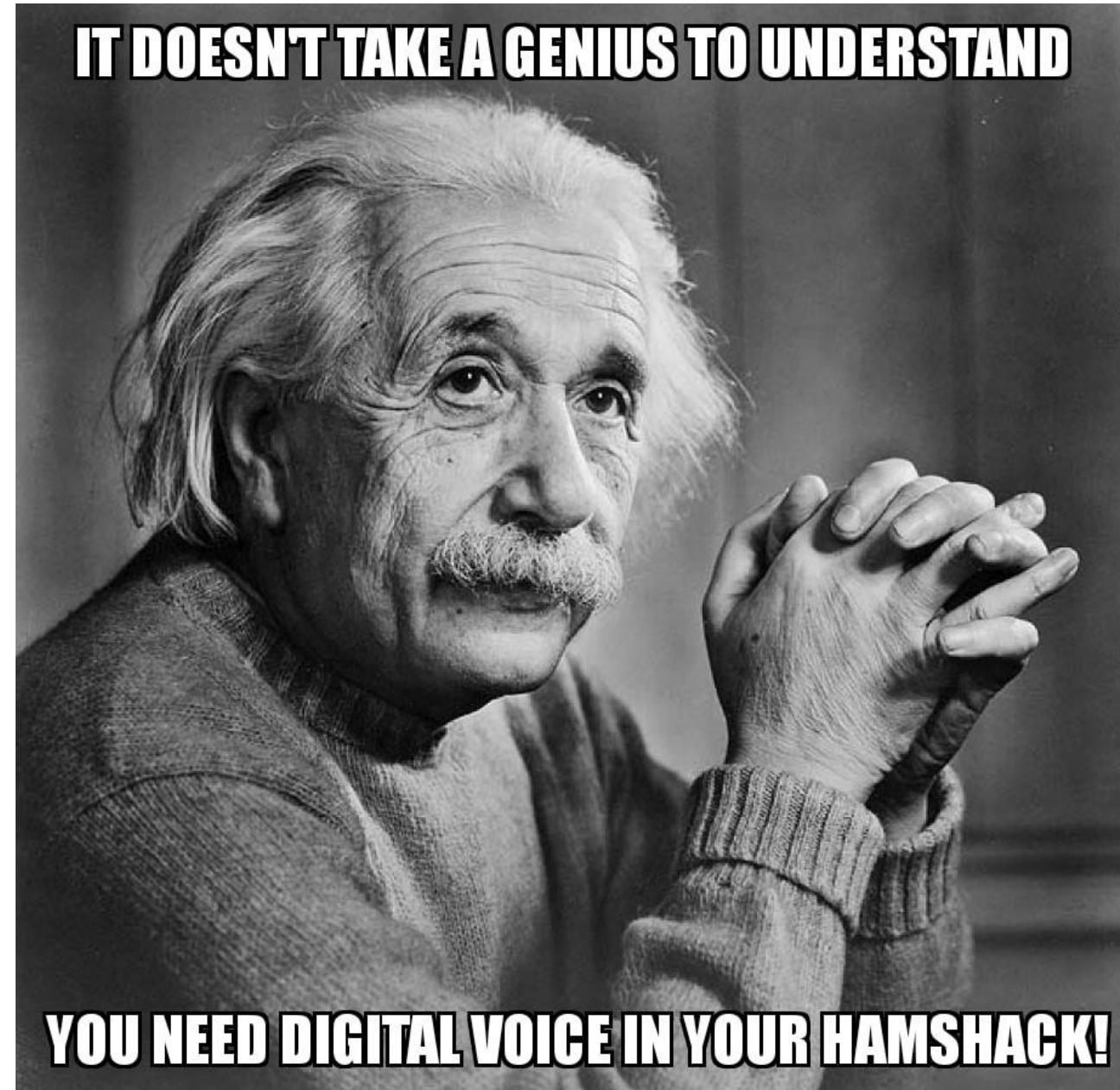
# Digital Operating Tips:

---

- Leave pauses between transmissions (2-3 seconds)
- Listen before you talk
- ID with your call sign every 10 minutes
- Don't kerchunk the repeater, your call sign will be displayed!
  - Kerchunking a digital repeater/hotspot does not have a carrier tail/hang time or courtesy tone
- Just say your call sign
- Roundtable rules
- Nets and Emergency Nets
- Be mindful that you are representing all hams and that you might be heard across the county or the world
- Do not monopolize the repeater
- Switching rooms/nodes: If you are not the repeater or node owner, please call on the radio and ask for permission before changing the node or room linking. You might not receive an answer.
- Then return it to the original node or room when you are done

# WIRES-X Radio Access

- To connect to a Wires-X node enter the 4 to 6 digit node number.
- Transmit # to disconnect.
- Use node number 9999 to check your audio. Node 9999 records and plays back transmissions for testing purposes.



# Different ways to connect to the same net!

Let's find out. How do you connect to America Link?

YSF	  	+50
WIRES-X Node	  	+49
WIRES-X Repeater	  	+38
FCS	  	+24
WIRES-X PDN/HRI	  	+22

America Link room YSF-89804, Wires-X #21080; FCS-00190, FCS-00290, and FCS-00039  
WIRES-X Portable Digital Node (PDN)/HRI Mode: **User Registration assigned by Yaesu**

# WIRES-X Portable Digital Node (PDN)/HRI Registration

- ① User registration (acquire an ID number)
- ② Install WIRES-X Software to the PC
- ③ Install the connection cable USB device driver
- ④ Update the firmware of the transceiver
- ⑤ Connect the transceiver and the PC

- Registration Date : 24 Apr 2019
- Web Member ID : KB4JHU
- Password : \*\*\*\*\*
- WIRES-X Node ID : 50292
- WIRES-X Room ID : 60292
- HRI-200 Serial No / Radio ID : E5G3r
- Callsign : KB4JHU
- Node Location:
  - Country : USA
  - State : Tennessee
  - City : Tullahoma
- Classification : INDIVIDUAL

<https://www.yaesu.com/jp/en/wires-x/regist/index.php> - Registration Link

# Getting Started: Talk Groups and Rooms

## DMR Talk Groups:

TG 91 – Worldwide - Saturday's @ 1700 UTC (1600 DST)

TG 3147 – Tennessee Statewide - Friday 9pm EST Statewide Net

## Yaesu Fusion Rooms/Wires-X:

YSF 95984 – Southeast-Link (Wires-X #43389) Saturday 6pm CST

FCS-00290, YSF-89804, Wires-X #21080; FCS-00190, FCS-00290,  
and FCS-00039 all Americas Link access

Fusion Node: KT4QF-ND #33225

Room #21000 - CQ-AMERICA Yaesu System Fusion Net Sunday 3pm CST

## Echolink:

Node 68581 - YL Chattanooga Net Monday 8PM EST

Node 617991 - K4EGC - MTARS Nets 9PM CST Tuesday/Thursday

Node 232256 - N4UUJ-L– Tracy City ARES Net 730pm CST Tuesday



# Alabama Link Multi Mode Communications Network

Allstar 44110  
Echolink KT4ROY-R 358391  
IRN Alabama Link

YSF Alabama Link  
FCS002-02

Wires-X Room 289333

DSTAR Transcoder  
XLX 334-B

USA Interlinks on XLX 334-I

NXDN TG 31010  
P25 TG 31010  
DMR Brandmeister TG 31010  
DMR XLX334-A TG 4001

**Kentucky D-Star Net**  
**REF056B**  
**Thursdays**  
**7 PM EDT/23:00 UTC**

**TENNESSEE DIGITAL  
AMATEUR RADIO GROUP**  
TG-3132867  
Ragchew, discussion, more..



**I'm still worthy!**

**Net Time: 7:30 - 11 pm Eastern Time**

145.470 - TX



**470 ARG**  
**East Tennessee**

*Echolink Node*  
*During The Net*  
769846  
GlobalDX

**WB4GBI**  
REPEATER SYSTEMS

**AMATEUR RADIO GROUP**

*Connect with us on any of the following Modes:*

*Local Repeater 145.470 / 118.8 Tone Usually Off*

*DMR Brandmeister TG 31669*

*Echolink Node 769846 \*GLOBALDX\**

*Allstar Node 44102 "Global DX System"*

*YSF Reflector 04162 "US - Global DX"*

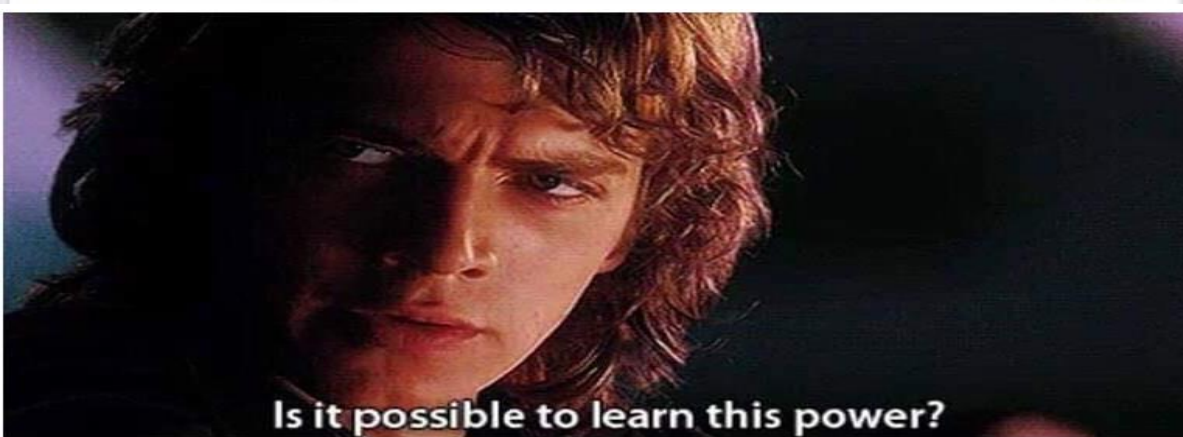
*Wires-X Node 40626 "GLOBAL-DX-SYSTEM"*

Links Provided by:

KE0KEY James - Founder of GlobalDx

KD4CR Charlie - Founder of Tennessee Digital ARG

WB4GBI Tim - Repeater owner



## TAG Digital Voice Radio Wednesday Night Net Coverage

7:30 pm (ET) System Fusion on Wires-X Room --SOUTHEAST-LINK (43389)

YSF Reflector YSF95984 - USSOUTHEASTLINK (openspot/Pi-STAR)

8:00 pm (ET) D-STAR on Reflector 30A (REF030A)

8:30 pm (ET) DMR on Brandmeister Talk Group 31133

For more information, see either TAG (TN AL GA) Digital Voice Radio Group Facebook,

<https://lmarc.net/club/resources-tools/nets/>

or Twitter TAG (TN AL GA) @KA4RVT\_DV

Repeater Type	Location	Callsign	Frequency	Notes
Fusion	Lookout Mountain GA	N4LMC	442.6500	Wires-X --SOUTHEAST-LINK (43389)
Fusion	Signal Mountain TN	N4LMC	442.7250	Wires-X --SOUTHEAST-LINK (43389)
D-STAR	Dalton GA	KA4RVT C	145.3300	REF030A
D-STAR	Lookout Mountain GA	N4LMC C	145.1600	REF030A
D-STAR	Signal Mountain TN	W4RRG B	444.7250	REF030A
DMR	Chattanooga TN	W4DMM	440.5125	CC1, TS2, TG 31133
DMR	Chattanooga TN	W4DMM	443.8250	CC1, TS2, TG 31133
DMR	Dalton GA	W4DMM	442.1750	CC1, TS2, TG 31133
DMR	Evansville TN	KK4GGK	440.7250	CC1, TS2, TG 31133
DMR	Lookout Mountain GA	N4LMC	444.7125	CC1, TS2, TG 31133
DMR	Oswald Dome TN	W4DMM	443.8250	CC1, TS2, TG 31133
DMR	Signal Mountain TN	W4PL	444.1500	CC1, TS2, TG 31133

# Web Links:

- Wires-x bible: [https://www.hamoperator.com/Hamoperator/WiRES-X\\_Bible/WiRES-X\\_Bible.html](https://www.hamoperator.com/Hamoperator/WiRES-X_Bible/WiRES-X_Bible.html)
- Fusion Help :  
[http://www.hamoperator.com/Hamoperator/Fusion\\_Help.html](http://www.hamoperator.com/Hamoperator/Fusion_Help.html)
- Comparison of Hotspots: <https://toshen.com/ke0fhs/hotspots.htm>
- Yaesu Wires-X Info: <http://systemfusion.yaesu.com/wires-x/>
- Wires-X ID List - [https://www.yaesu.com/jp/en/wires-x/id/id\\_usa.php](https://www.yaesu.com/jp/en/wires-x/id/id_usa.php)
- Wires-X Yahoogroups: <https://groups.yahoo.com/neo/groups/wires-x/info>
- Getting started with Wires-X: <https://www.yaesu.com/jp/en/wires-x/node/index.php>
- Wires-X Facebook page: <https://www.facebook.com/groups/wiresx.fusion/>
- Repeaters/Nodes:  
[https://www.repeaterbook.com/repeaters/feature\\_search.php?type=YSF&state\\_id=%25&band=%25](https://www.repeaterbook.com/repeaters/feature_search.php?type=YSF&state_id=%25&band=%25)
- Map of active nodes: <http://wires-x.xyz/wires-x-map.php>
- Coverage Map: <http://www.ve2dbe.com/rmonline.html>

# Questions??

Note: Several slides taken from Brian Donovan, K2AS Wires-X presentation and from various googled internet sites

Michael Glennon – KB4JHU

Tullahoma, TN

Email: KB4JHU@ARRL.NET

