

# 146.73 in a nutshell

Understanding the changes that have occurred over the past months on  
the 146.73 repeater in Georgetown Ohio

**N1DJS – Jeff King Mt Orab, Ohio**

**KB8JTJ – Troy Dotson Seaman, Ohio**

**WD8LSN – Larry Cobb Peebles, Ohio**

# Repeater Changes over the past couple of years.

- A few years back, the Georgetown repeater took a direct lightning hit. The combination of massive lightning egress from the power line, antenna, and phone line overwhelmed the lightning protections that had been in place for the prior 30 years of operations.
- The destroyed repeater was replaced by a Yaesu fusion repeater. The repeater, with its simpler controller, was configured at that time to only transmit in analog mode.
- Later that repeater was replaced with Yaesu's newest model.
- 3 months ago, we began to exploit the digital capabilities of this newest repeater, that has resulted in the configuration we have today.

## *What is Yaesu System Fusion* *Layers of Fusion*

*Yaesu System Fusion uses three levels of operation to the protocol:*

- 1.) User level operation*
- 2.) Infrastructure operation*
- 3.) Network operation*

*These levels of operation are directly related to what type of usage is occurring at that time for communication.*

**YAESU**  
The radio

*System* **Fusion**

## *What is Yaesu System Fusion* *Layers of Fusion*

*Yaesu System Fusion - User level operation*

**FT2DR**



**FT70D**



**FTM-400DR/XD**



**FTM-100DR**



**FTM-7250DR**



**FT-991A**



**FTM-3200 (VHF)**  
**FTM-3207 (UHF)**



**YAESU**  
*Education*  
**System**

*The radio...YAESU*

# FT3D

FT3D has several enhancements to the FT2D handheld series.

- Color screen
- Bluetooth
- Record capabilities
- DGID Memory capabilities



**YAESU**  
The radio

**System Fusion**

## What is Yaesu System Fusion Layers of Fusion

*Yaesu System Fusion - Infrastructure operation*

**DR-1XFR**



**DR-2X**



**HRI-200**



**YAESU**  
**Education**  
**System**

*The radio...YAESU*

A

RX	AUTO	FIX	
	12.5kHz DIGITAL		
	DIGITAL	VOICE WIDE	DATA
			FM
TX	AUTO	FIX	
	12.5kHz DIGITAL		
	DIGITAL	VOICE WIDE	DATA
			FM

B


RX	AUTO	FIX	
	12.5kHz DIGITAL		
	DIGITAL	VOICE WIDE	DATA
			FM
TX	AUTO	FIX	
	12.5kHz DIGITAL		
	DIGITAL	VOICE WIDE	DATA
			FM

 REMOTE

A SETUP

B SETUP

# DISPLAY

<b>A</b>	<b>RX</b>	<b>AUTO</b>	<b>FIX</b>		
		12.5kHz DIGITAL		FM	
		DIGITAL	VOICE WIDE	DATA	FM
	<b>TX</b>	<b>AUTO</b>	<b>FIX</b>		
		12.5kHz DIGITAL		FM	
		DIGITAL	VOICE WIDE	DATA	FM
<b>B</b>	<b>CNTL</b>	<b>AUTO</b>	<b>FIX</b>		
		12.5kHz DIGITAL		FM	
	<b>RX</b>	DIGITAL	VOICE WIDE	DATA	FM
		<b>AUTO</b>	<b>FIX</b>		
		12.5kHz DIGITAL		FM	
		DIGITAL	VOICE WIDE	DATA	FM
	 REMOTE	<b>A</b> SETUP	<b>B</b> SETUP		



# What is Yaesu System Fusion Layers of Fusion

*Yaesu System Fusion - Network operation*

WiRES-X

HRI-200



IMRS



## *What is Yaesu System Fusion II* *Understanding DG-ID/DP-ID*

*Yaesu System Fusion II also added the feature of DP-ID which stands for Digital Personal – Identification. This is a unique ID number that each Fusion capable radio transmits when in digital voice or data mode.*

*DP-ID serves many purposes in the features of Yaesu System Fusion II. Allows for selective receiving of radios regardless of DG-ID; allows for digital control of the DR-2X for remote control; and allows for radios to be restricted for WiRES-X node operation.*

## *What is Yaesu System Fusion II* *Understanding DG-ID/DP-ID*

*Yaesu System Fusion II then started to use the digital signaling format of DG-ID. This change was done via a firmware update that was free and provided for download on the Yaesu.com website.*

*DG-ID stands for Digital Group – Identification and is a form of signaling when using digital voice. It is –NOT- like a talkgroup and can be considered more like a CTCSS for digital voice.*

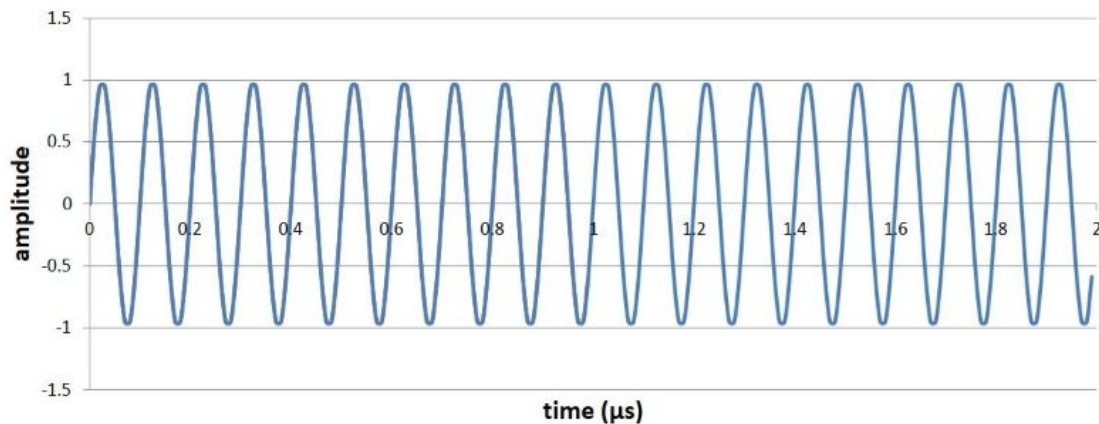
*DG-ID has a value range of 00 -99, with 00 being like CSQ and 01-99 being the individual code for selective monitoring.*

# Definitions (Analog World)

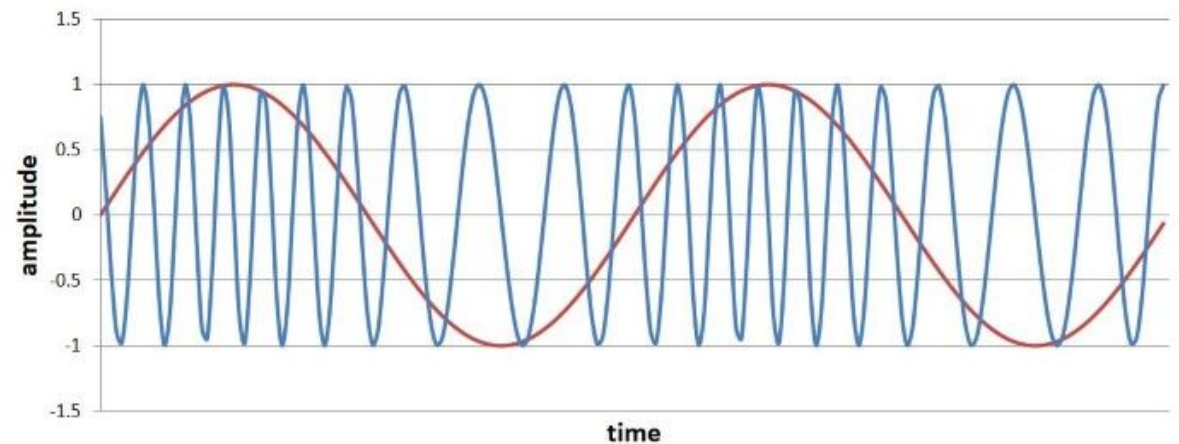
## Analog FM

- Your voice vibrates a cartridge in the microphone which generates an electrical signal to vary the deviation of the transmitter frequency.
- The receiver detects the frequency variation of the received signal and demodulates the frequency variations back into an audio signal and fed to the speaker system.

Carrier



Frequency Modulation



# Definitions (Analog World)

**CTCSS** (Continuous Tone-Coded Squelch System)

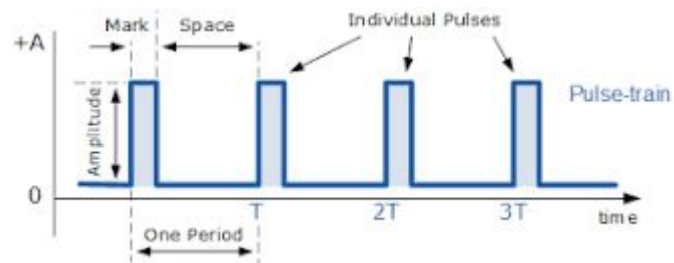
- **Tone** – sub-audible frequencies that are transmitted along with the transmitted operator audio.
- **Tone Squelch** – An analog sub audible tone listened for by a receiver to open the receivers squelch

There are 38 generally available tones. In analog mode, the 146.73 machine in Georgetown both transmits and receives CTCSS tone number 26 which is 162.2hz. The Peebles Ohio machine does not require a CTCSS tone to access. It does however transmit a 100 HZ tone for reasons to be explained later in this presentation.

# Definitions (Digital World)

## Digital FM

- Your voice vibrates a cartridge in the microphone
- The electrical output of the microphone is converted into a series of binary numbers that represents the sound. Those binary numbers modulate the frequency of a transmitter.
- The transmitter frequency modulates the circuitry in a receiver tuned to the same frequency of a transmitter. That circuitry converts those binary numbers back in to the analog waveforms that modulate the speaker and produce the audio signal.



# Definitions (Digital World)

## **DGID**

- **TX-DGID** – A digital code transmitted by a fusion transmitter
- **RX-DGID** – A digital code listened for by a fusion receiver to open a receivers squelch

DGID Codes range from 0 to 99. In digital mode, the 146.73 machine in Georgetown listens for DGID 60 to retransmit your audio on it's output. It also listens for other DGID codes transmit across other predefined network links. Peebles 444.025 machine utilizes DGID 50. Also the Peebles machine is interconnected to Wires-X on DGID 50. A RX-DGID of 00 will pass all status tones to the radio receiver.

2. Setting the transmit and receive DG-ID number.

This procedure is unnecessary if the transceiver is already set to the required transmit and receive DG-ID number.

Since the transmit and receive DG-ID number is "TX: 00" and "RX: 00", it operates as an open node and is accessible from all transceivers using C4FM digital mode.

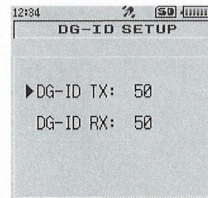
When using a portable node station to be accessed only by the specific members, set the transmit and receive DG-ID to a number other than "00".

- In the Access Point, if the receive DG-ID is set to other "00", set the transmit DG-ID number to the same DG-ID number. Note that setting to a different number will not work properly.
- When setting the receive DG-ID number to "00" and then setting the transmission DG-ID number to anything other than "00", the audio of all received C4FM digital stations will be heard on the speaker, but for the transmission DG-ID Only the matched communication is relayed to the opposite station on the Internet.
- The DG-ID Subcode cannot be used or set in Portable Digital Node mode.



**FT3D/FT2D**

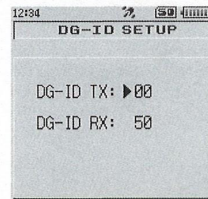
1. Press and hold the **[GM]** key.  
The DG-ID SETUP screen is displayed on the LCD.



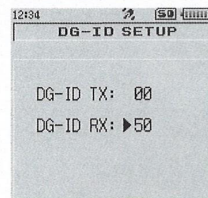
2. Press the **[GM]** key, then rotate the **DIAL** knob to set the transmit DG-ID number (DG-ID TX).



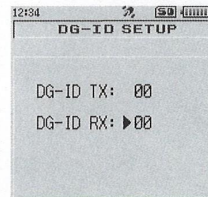
When setting the DG-ID number, pressing and holding the **[DISP]** (SETUP) key will set the transmit and the receive DG-ID numbers to "00".



3. Press the **[GM]** key, then rotate the **DIAL** knob to select "DG-ID RX".



4. Press the **[GM]** key, then rotate the **DIAL** knob to set the receive DG-ID (DG-ID RX).

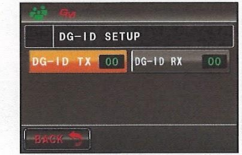


5. Press and hold the **[DISP]** key, to save the setting and return to normal operation.

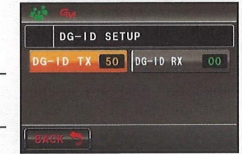
The setting of the FT3D/FT2D transceiver is complete.

**FTM-400XD/D**

1. Press and hold the **[GM]** key.  
The DG-ID SETUP screen is displayed on the LCD.



2. Touch **[DG-ID TX]**.  
The numbers of the set value will turn orange in color.



3. Rotate the **Band A DIAL** knob (upper side) to set the transmit DG-ID.

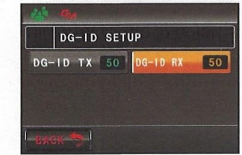


When setting the DG-ID number, pressing and holding the **[DISP]** (SETUP) key will set the transmit and the receive DG-ID numbers to "00".

4. Touch **[BACK]**, then touch the screen to select "DG-ID RX".  
"DG-ID RX" will turn orange.



5. Touch **[DG-ID RX]**.  
The numbers of the set value will turn orange in color.



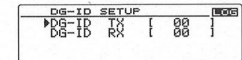
6. Rotate the **Band A DIAL** knob (upper side) to set the receive DG-ID.

7. Press and hold the **[GM]** key to save the setting and return to normal operation.

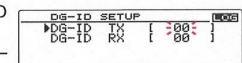
The setting of the FTM-400XD/D transceiver is complete.

**FTM-100D**

1. Press and hold the **[GM]** key.  
The DG-ID number setting screen is displayed.

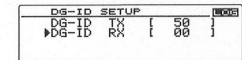


2. Press the **[GM]** key, then rotate the **DIAL** knob to set the transmit DG-ID (DG-ID TX).

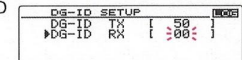


When setting the DG-ID number, pressing and holding the **[DISP]** (SETUP) key will set the transmit and the receive DG-ID numbers to "00".

3. Press the **[GM]** key, then rotate the **DIAL** knob to set the "DG-ID RX".



4. Press the **[GM]** key, then rotate the **DIAL** knob to set the receive DG-ID (DG-ID RX).



5. Press and hold the **[GM]** key to save the setting and return to normal operation.

The setting of the FTM-100D transceiver is complete.



# Setting the FT-70 DG-ID

## Using the convenient Digital C4FM feature

### About the Digital Group ID (DG-ID) feature

1. Digital Group ID (DG-ID) function allows communications with only the specific group members using the two-digit ID numbers. The desired DG-ID number from 00 to 99 is set in advance by all the group members. This ID number may be set separately for transmit and receive, when the same ID number is set for both transmit and receive, only group members with the same ID number will be heard. This feature may be used to communicate only with group members that have the same DG-ID number. The GM function may also be utilized to automatically monitor whether or not group member stations with the same DG-ID number are operating within communication range.

The DG-ID number 00 detects signals with all ID numbers. Normally setting the ID number to "00" for both transmit and receive will permit reception of the signals from all other stations using the digital C4FM mode, regardless of the transmit DG-ID number settings of the other stations.

Also note that when the receive DG-ID number of your transceiver is set to a DG-ID number other than "00", received signals that do not have the same DG-ID number may not be heard.

2. When accessing the C4FM digital repeater controlled by the DG-ID number, set the transmit DG-ID number of the FT-70DR/DE to that of the repeater input. Even in that case, if the receive DG-ID number of the FT-70DR/DE is set to "00", all the downlink signals from the repeater may be received.

### Communicating with the DG-ID feature



- Digital C4FM mode transceivers compatible with the DG-ID function are required in order to utilize this function.
- If the firmware is not compatible with the DG-ID function, update the latest firmware to use the DG-ID function. The latest firmware is available on the YAESU website.

### Setting the transmit and receive DG-ID number to "00" for communicating with all other stations using C4FM digital mode

1. Press and hold the [MODE] key.
  - The DG-ID number setting screen appears and the transmit DG-ID number "T00" blinks.
  - If the transmit DG-ID number is not set to "T00", rotate the DIAL knob to set "T00".
2. Press to the [MODE] key again and the receive DG-ID number "R00" will blink.

If the receive DG-ID number is not set "R00", rotate the DIAL knob to set "R00".



3. Press and hold the [MODE] key, or press the PTT switch to save the setting and return to the normal operation.

The setting is complete.

# DGID Group Definitions

.	. DG-ID	. Link Description
. N1DJS	. 60	. N1DJS ONLY
. Group 1	. 99	. All-RPTRS
. Group 2	. 50 or 51 . Wires-X node on ID 50	. N1DJS/R & WD8LSN Peebles, OH
. Group 3	. 69 or 02 . Wires-X node on ID 02	. (N1DJS) & (KA6SUB Gold Run, CA)
. Group 5	. 17	. (N1DJS) & (K5JG Longview, TX)

Note: Establishing a link to a remote repeater wires-x node is governed by which DGID code was used to bring up the link. An example is using DGID 51 to bring up Peebles will not allow you to be heard on Peebles wires-x node where using DGID 50 will.

EXP A1

UP LINK

449.025

VOL\_

DN

SIGNALING

ID MODE  
DG-ID

TIMER

ID ANNOUNCE

SQL  
R-OFF  
T-TONE

MODE/REMOTE

ID SET

DEVIATION  
NARROW

BACK

SQL

Tx PWR  
HI

F

DG-ID LIST

LOCAL RPT DG-ID 50 TWINTOWERS

RPT Group DG-ID 02, 15, 50, ...

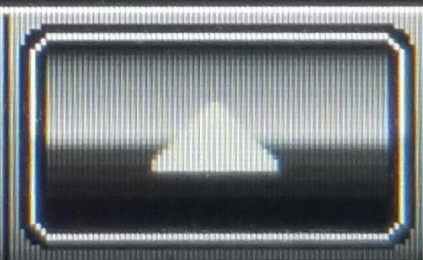
Group 1 DG-ID 16 K5JG-PEEBL

Group 2 DG-ID 51 LSN-DJS

Group 3 DG-ID 59 IMRS-TEST

BACK ↩

DEL



# RPT Group DG-ID

02, 15, 50, 55, 60,

BACK 

EDIT



# DG-ID's in Memory

Most radios do not have the ability to store DG-ID numbers into a memory. As of the present time, the only radio that has this capability is the Yaesu FT3D and FTM7250. On the FT3D an operator can have one repeater in several different memories and have different DG-ID's stored in each memory channel. This is done slightly different on an FTM-7250.

With this procedure, one only has to dial up the appropriate channel with the correct DG-ID for his desired communication.

# A Deeper Dive Into System Fusion

## Definitions

- **System Fusion AMS:** Basically this refers to the ability of Yaesu's amateur digital radios to automatically switch between analog FM and digital FM use. You may select either, or use automatic switching.
- This is better explained on the next slide for further explanation.
- Both the Georgetown and the Peebles Repeaters utilize the AMS function. Both analog and digital users can co-exist on the repeater and thus the system can perform a dual function. To mute the digital audio from the FM receiver, analog users should program their FM radio to the appropriate CTCSS tone being transmitted to eliminate the Digital audio from being output. The Georgetown repeater uses 162.2 hz and the Peebles machine uses 100.0 hz.

# Definitions

- **AMS or Automatic mode Select:** This is the method by which your digital repeater or radio can automatically switch between analog and digital. Using AMS causes your device to match the incoming type of signal. If your device is a repeater in AMS, it will re-transmit in whatever mode it received. If your device is a handie-talkie or mobile in AMS mode, it will match the incoming mode and your next transmission will be in that mode as well. Obviously you can change the settings to lock out AMS or to switch modes even if AMS changed modes. Be aware that if the radio switches modes due to a repeater that ID's or another user using FM, your radio's next transmission will be in the mode it last received, not necessarily the mode you want.



# Definitions

## **C4FM** - Continuous Four Frequency Modulation

The 12.5 kHz channel spacing used in the C4FM FDMA digital modulation mode allows high-speed data communication along with voice communication using strong error correction. C4FM / FDMA technology provides three digital modes and an analog mode (FM).

V/D-mode voice and data communication in the same time frame.

- **Data Narrow (DN) mode** allows voice data with GPS position data and the ID data to be sent in the same time frame. In addition, transmitting the voice data with strong error correction data. This mode is the basic mode of C4FM FDMA Digital HAM radio system.
- **Data Wide (DW) mode** uses the full data rate of capacity for the Transmission of data. This mode allows you to transfer large amounts of data, text messages, pictures and voice notes data at twice the speed as the V / D-mode. This mode offers a 9.6 kbps data transfer rate speed.
- **Voice Wide (VW) mode** uses the full data rate of capacity for voice data.
- **Analog FM mode** is the same as the current FM mode used by all VHF / UHF amateur radio operators.

**Automatic Mode Select** - identifies and selects these four modes automatically upon receipt of the respective signal.

# There are 3 modes of digital transmission on the Yaesu System Fusion II system

**YAESU**  
The radio

**System Fusion II**

## What is Yaesu System Fusion Modes of Operation

- V/D mode (DN)* - Voice/Data simultaneous communication mode
- Voice FR Mode (VW)* - Voice Full Rate Mode
- Data FR mode (DW)* - High Speed 9600 bits per second data transfer
- Analog mode (FM)* - For Conventional Communication



**YAESU**  
Education  
System

DN Mode

VW Mode

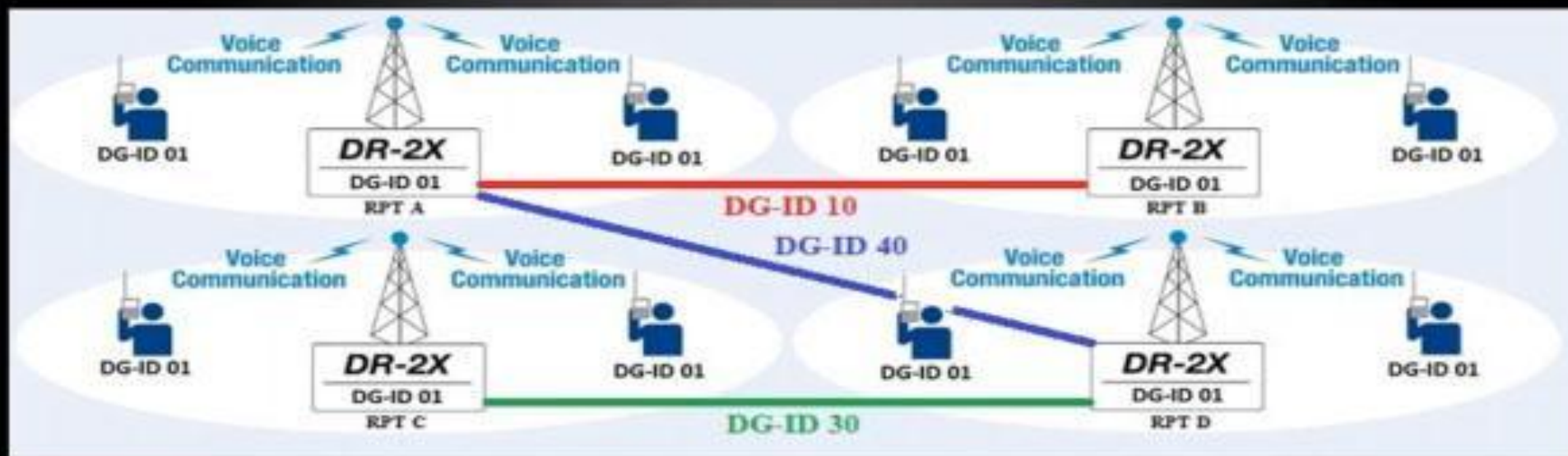
DW Mode

The radio...YAESU

# What is Yaesu System Fusion II IMRS Networking



# What is Yaesu System Fusion II IMRS Networking



# Status Beeps

- **1 Beep:** A requested network link was established
- **2 Beeps:** A prior requested network link has closed
- **3 Beeps:** A requested network link connection has failed

Note: Beeps are only transmitted with DGID 0. Setting your receive DGID to anything other than DGID 0 will filter these status beeps from your audio.

My Repeater Information

Callsign: WD8LSN-RPT  
Repeater: DR-2X  
CPU F/W Version: 1.501 (20171101)  
DST/TYP: EXP A1  
IP Setting: Fixed IP mode

Program Version: 1.3.0  
Firmware Version: 1.4.0  
MAC Address:   
Local IP: DHCP

Interface: USB

Settings...  
DG-ID List...  
Search Repeaters...  
Load Setup File...  
Save Setup File...  
Read from Device...  
Write to Device...

Destination Repeater's Information

<input type="checkbox"/> 001	WD8LSN-RPT	<input checked="" type="checkbox"/> 002	KA6SUB-R	<input checked="" type="checkbox"/> 003	N1DJS/R	<input checked="" type="checkbox"/> 004	K5JG
<input type="checkbox"/> 005		<input type="checkbox"/> 006		<input type="checkbox"/> 007		<input type="checkbox"/> 008	
<input type="checkbox"/> 009		<input type="checkbox"/> 010		<input type="checkbox"/> 011		<input type="checkbox"/> 012	
<input type="checkbox"/> 013		<input type="checkbox"/> 014		<input type="checkbox"/> 015		<input type="checkbox"/> 016	
<input type="checkbox"/> 017		<input type="checkbox"/> 018		<input type="checkbox"/> 019		<input type="checkbox"/> 020	
<input type="checkbox"/> 021		<input type="checkbox"/> 022		<input type="checkbox"/> 023		<input type="checkbox"/> 024	

# The fusion capable sphere...



# Definitions

**NODE:** This term can be confusing so we should get to it right away. A 'node' is basically the hardware necessary to establish an Internet terminal...terminal meaning a point at which to input and output information.

- In the case of WiRES-X, our Internet linking system, a node will consist of a node radio or repeater, cables to a PC running WiRES-X software and an Internet connection. It may also consist of a Yaesu interface device called an HRI-200.
- Several Yaesu radios can operate as nodes without an HRI-200 interface. These are the FT2D, FT3D, FTM-100 and FTM-400.



✦ [ ] 444.025  
[ ] [ ]  
[ ] [ ] 444.025 [ ]

A/B  
DW

TXPO

V/M  
MW

**D<sub>x</sub>**

**GM**

SQL  
VOICE

BACK

DISP  
SETUP



WIRES-X

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

G.User ID	+DTMF ID	Act	Call/RmN...	City	State	Cou...	Freq(MHz)	SQL	Lat	Lon	Comment
PADUCAH-KY-ROOM	40396	000	Paducah ...	Paducah	Kentucky	USA					Welcome to the K4KM...
OHIO-LNK	40557	027	Ohio Link	Columbus	Ohio	USA					Ohio Link Net Sunday at...
OHIO-LNK-YSF	40913	000		Delaware	Ohio	USA					
MID-MI-LINK	43148	000	mid-mi-li...	GLADWIN	Michigan	USA					
WV-LINK	46488	005	WV-LINK	South Cha...	West Virginia	USA					WV Fusion Information ...
WD8LSN-GW	51920	IN	WD8LSN	Peebles	Ohio	USA			N:3...	W:...	C4FM Repeater WD8LS...
WD8LSN-ROOM	61920	001	Adams Co...	Peebles	Ohio	USA					

+A.User ID	DTM...	CallSign	City	State	Country	Freq(MHz)	SQL	Lat	Lon	Comment
--ECHIGO-	12796	JR0ZFW	Kashiwazaki-city	Niigata	Japan					
--GLOBAL-CQ	18261	NK5CC	Copper Canyon	Texas	USA	146.680MHz-0.600...	DG-ID:00...			
--IWAKUNI-	15403	JH4VIZ	Iwakuni-city	Yamagu...	Japan	144.560MHz	TSQ:118...			
--JM3UGH...	32173	JM3UGH	Kashiwara-city	Osaka	Japan			N:3...	E:13...	ftf0ef"fh"Zm.A...
--KT-TOJI-	39015	JR3VC	Kyoto-city	Kyoto	Japan	439.66MHz	TSQ: 88.5...	N:3...	E:13...	TEST MODE/RP-N...
--KYOTO-	19414	JL3ZGV	Kyoto-city	Kyoto	Japan	430.820MHz	DG-ID:00...	N:3...	E:13...	FREE Access/Open...
--SHIKOCHU-	32732	JR5YFG	Shikokuchuo-c...	Ehime	Japan	430.920MHz	TSQ: 77.0...	N:3...	E:13...	;Z@-R.E;Zg,c;...
09-JR0ZFI	13076	JR0ZFI	Azumino-city	Nagano	Japan					
1ST-RIG-ND	12556	JH8IKV	Sapporo-city	Hokkaido	Japan	430.940MHz	DG-ID:00...	N:4...	E:14...	
2E0EMZ-ND	31716	2E0EMZ	Colchester	Essex	UK	144.950MHz	DG-ID:00...			

Room WD8LSN-ROOM(61920) member 1 node Refresh Close

WD8LSN-GW	DTMF ID	CallSign	City	State	Country	Freq(MHz)	SQL	Lat	Lon	Comment
-----LADO	40937	001	-----LADO	San Antonio	Texas	USA				LADO - Los Amigos Digital Operators
-----NERV	22945	000	NERV-"Zi-B"	Nagoya-city	Aichi	Japan				U.N.NERV@ZaS^EMZwSofVfXfefE
-----CQ-UK	27793	021	CQ-UK	Pudsey	West Yorkshire	UK				XLX925A ALL MODES
-----CQ-VK	24117	002	CQ-VK	Laidley Heights	Queensland	Australia				VK linked Systems
-----CQ-UK2	44195	000	CQ-UK Closed Room	Aberdeen	Aberdeenshire	UK				Email erniepratt@hotmail.co.uk Ysf GB CQ ...
-----WI-LINK	21667	003	WISCONSIN LINK	Baldwin	Wisconsin	USA				Open to any users not just Wisconsin
-----XLX925C	41280	001	Irish Scottish link	Belfast	County Antrim	UK				XLX925C XLX600C/www.mi5daw.com
-----LADO-LRD	43154	000		Laredo	Texas	USA				
-----NYORKS-UK	41085	000	North Yorkshire UK	Yarm	North Yorkshire	UK				
-----2LO-LONDON	28846	000	TRANS-ATLANTIC NET	Surbiton	Surrey	UK				C4FM - LONDON AND THE HOME COUNTIES
-----BM-TG31444	21768	003	R.I. DIGITAL LINK	Warwick	Rhode Island	USA				
-----UK-NET-HUB	27721	002	English Speaking UK	Middlesbrough	North Yorkshire	UK				UK WIDE REPEATER & GATEWAY NETWORK
-----WIRES-XUK	44233	000	-----WIRES-XUK	Ringwood	Hampshire	UK				
-----FLORENCE-OR	40225	000	Florence Chat	Florence	Oregon	USA				Our local meeting place. Digital only
-----AMERICA-LINK	21080	128	America Link Network	Beaumont	Texas	USA				America Link Network-Central
-----CANADA-LINK	40505	004	OTTAWA VE3ORF GRO...	Ottawa	Ontario	Canada				VE3ORF/3730 Group Linked System of Rep...
-----FLORIDA-LINK	63004	001	FLORIDA-LINK	Spring Hill	Florida	USA				West Coast of Florida and Beyond!
-----MONTANA-LINK	40519	000	MONTANA-LINK	Great Falls	Montana	USA				Montana Fusion Network
-----WIDE-AREA---	40595	001	WIDE-AREA USA	Gasport	New York	USA				www.wide-area.net

Ready Ver-1.530 ONLINE

NET DIGITAL ON-AIR LOCAL HRI-20

WD8LSN-ROOM

View QSL de WD8LSN (ID:WD8LSN-GW)

DTMF ID: 61920 2020/02/09 21:29:50

Adams County OH C4FM

< WD8LSN-ROOM #61920 by WD8LSN-GW #51920 >

Welcome to WD8LSN-ROOM. This room is associated with WD8LSN repeater(444.025) near Peebles, OH USA. All are welcome to connect.WD8LSN repeater is currently linked to N1DJS via DG-ID 51.

HardCopy Save Close

News GM

## What is Yaesu System Fusion II WiRES-X Networking

- Designed to be stand-alone (node config)
- Was adapted to work with DR-X's
- Requires Internet, UDP ports, and Windows
- Can be used in analog or digital and cross the two modes to each other
- WiRES-X will not be opened up for other devices or for other OS



Suggested labeling: ND – Node: Simplex setup running low power; GW – Gateway: Simplex running high power or feeding a repeater; RP (RPT) – Repeater: Directly connected to a repeater

# Definitions

**ROOM:** A room differs from a node in a couple of ways. Whereas a node is tangible, a room is virtual. A room only exists where a node employing an HRI-200 exists. A room only exists where it is told to exist. The room will not exist without the supporting node.

- Even though you can utilize one of the 4 above listed radios as nodes, you cannot host a room without the use of an HRI-200.

## What is Yaesu System Fusion II WiRES-X Networking

- A Room is locked as a virtual location in cyber space that is attached to that HRI-200 (if the HRI-200/WiRES-X is turn off the room is off)
- A Room can have an infinite amount (based on internet bandwidth) connected to it at one time
- The number for a Room is the first digital of the NODE ID# but one digital higher (Example: 11002 – Node, 21002 – Room)
- A Room can have a mixture of different modes connected to it (meaning analog or digital all at the same time)

# Definitions

**NODES vs. ROOMS:** A node may contact another node or it may contact a room. Think of a node as an individual. A room cannot contact anything...it can only BE contacted. A room is a collection of nodes...a meeting place. A room can be empty however with no one in at it a given time. If every node in a room signs out, the room can still exist, waiting for the next nodes to come back in.

- Rooms are not automatically established. You must take a few simple steps to establish one. You can dis-establish a room if you desire as well as limit who may join the room. The rules for entry could be digital vs. analog or it could simply be stations you chose. Connecting nodes can be blocked from a room or have their audio muted if they are causing a problem by using their DP-ID code.

-

# Definitions

**NODE NUMBERS/ROOM NUMBERS/DTMF ID's:** To operate a node, you must first have registered with Yaesu. They will send you both a node number AND room number for every registration. It is only necessary to have one registration for every radio that will be operating in the WiRES-X system AT ONE TIME. That is, even if you have 50 digital radios, if you will never use more than one at a time, you will only need one registration. However, most stations get two or three. You may wish to have a fixed node at home and a mobile node that could be transmitting at the same time.

- These numbers are then used by your radio to establish contact with nodes or rooms. They can be input manually or saved into memory, or even searched for by a 'synced' radio.



WIRES-X

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

G.User ID	+DTMF ID	Act	Call/RmN...	City	State	Cou...	Freq(MHz)	SQL	Lat	Lon	Comment
PADUCAH-KY-ROOM	40396	000	Paducah ...	Paducah	Kentucky	USA					Welcome to the K4KM...
OHIO-LNK	40557	027	Ohio Link	Columbus	Ohio	USA					Ohio Link Net Sunday at...
OHIO-LNK-YSF	40913	000		Delaware	Ohio	USA					
MID-MI-LINK	43148	000	mid-mi-li...	GLADWIN	Michigan	USA					
WV-LINK	46488	005	WV-LINK	South Cha...	West Virginia	USA					WV Fusion Information ...
WD8LSN-GW	51920	IN	WD8LSN	Peebles	Ohio	USA			N:3...	W:...	C4FM Repeater WD8LS...
WD8LSN-ROOM	61920	001	Adams Co...	Peebles	Ohio	USA					

+A.User ID	DTM...	CallSign	City	State	Country	Freq(MHz)	SQL	Lat	Lon	Comment
--ECHIGO-	12796	JR0ZFW	Kashiwazaki-city	Niigata	Japan					
-GLOBAL-CQ	18261	NK5CC	Copper Canyon	Texas	USA	146.680MHz-0.600...	DG-ID:00...			
-IWAKUNI-	15403	JH4VIZ	Iwakuni-city	Yamagu...	Japan	144.560MHz	TSQ:118...			
-JM3UGH-...	32173	JM3UGH	Kashiwara-city	Osaka	Japan			N:3...	E:13...	ftfCef"fh"Zm.A...
-KT-TOJI-	39015	JR3VC	Kyoto-city	Kyoto	Japan	439.66MHz	TSQ: 88.5...	N:3...	E:13...	TEST MODE/RP-N...
-KYOTO-	19414	JL3ZGV	Kyoto-city	Kyoto	Japan	430.820MHz	DG-ID:00...	N:3...	E:13...	FREE Access/Open...
-SHIKOCHU-	32732	JR5YFG	Shikokuchuo-c...	Ehime	Japan	430.920MHz	TSQ: 77.0...	N:3...	E:13...	;Z@-R.E;Zg,c;...
09-JR0ZFI	13076	JR0ZFI	Azumino-city	Nagano	Japan					
1ST-RIG-ND	12556	JH8IKV	Sapporo-city	Hokkaido	Japan	430.940MHz	DG-ID:00...	N:4...	E:14...	
2E0EMZ-ND	31716	2E0EMZ	Colchester	Essex	UK	144.950MHz	DG-ID:00...			

Room WD8LSN-ROOM(61920) member 1 node Refresh Close

WD8LSN-GW	DTMF ID	CallSign	City	State	Country	Freq(MHz)	SQL	Lat	Lon	Comment
-----LADO	40937	001	-----LADO	San Antonio	Texas	USA				LADO - Los Amigos Digital Operators
-----NERV	22945	000	NERV-"Zi-B"	Nagoya-city	Aichi	Japan				U.N.NERV@ZaS^EMZwSofVfXfefE
-----CQ-UK	27793	021	CQ-UK	Pudsey	West Yorkshire	UK				XLX925A ALL MODES
-----CQ-VK	24117	002	CQ-VK	Laidley Heights	Queensland	Australia				VK linked Systems
-----CQ-UK2	44195	000	CQ-UK Closed Room	Aberdeen	Aberdeenshire	UK				Email erniepratt@hotmail.co.uk Ysf GB CQ ...
-----WI-LINK	21667	003	WISCONSIN LINK	Baldwin	Wisconsin	USA				Open to any users not just Wisconsin
-----XLX925C	41280	001	Irish Scottish link	Belfast	County Antrim	UK				XLX925C XLX600C/www.mi5daw.com
-----LADO-LRD	43154	000		Laredo	Texas	USA				
-----NYORKS-UK	41085	000	North Yorkshire UK	Yarm	North Yorkshire	UK				
-----2LO-LONDON	28846	000	TRANS-ATLANTIC NET	Surbiton	Surrey	UK				C4FM - LONDON AND THE HOME COUNTIES
-----BM-TG31444	21768	003	R.I. DIGITAL LINK	Warwick	Rhode Island	USA				
-----UK-NET-HUB	27721	002	English Speaking UK	Middlesbrough	North Yorkshire	UK				UK WIDE REPEATER & GATEWAY NETWORK
-----WIRES-XUK	44233	000	-----WIRES-XUK	Ringwood	Hampshire	UK				
-----FLORENCE-OR	40225	000	Florence Chat	Florence	Oregon	USA				Our local meeting place. Digital only
-----AMERICA-LINK	21080	128	America Link Network	Beaumont	Texas	USA				America Link Network-Central
-----CANADA-LINK	40505	004	OTTAWA VE3ORF GRO...	Ottawa	Ontario	Canada				VE3ORF/3730 Group Linked System of Rep...
-----FLORIDA-LINK	63004	001	FLORIDA-LINK	Spring Hill	Florida	USA				West Coast of Florida and Beyond!
-----MONTANA-LINK	40519	000	MONTANA-LINK	Great Falls	Montana	USA				Montana Fusion Network
-----WIDE-AREA---	40595	001	WIDE-AREA USA	Gasport	New York	USA				www.wide-area.net

Ready Ver-1.530 ONLINE

NET DIGITAL ON-AIR LOCAL HRI-20

WD8LSN-ROOM

View QSL de WD8LSN (ID:WD8LSN-GW)

DTMF ID: 61920 2020/02/09 21:29:50

Adams County OH C4FM

< WD8LSN-ROOM #61920 by WD8LSN-GW #51920 >

Welcome to WD8LSN-ROOM. This room is associated with WD8LSN repeater(444.025) near Peebles, OH USA. All are welcome to connect.WD8LSN repeater is currently linked to N1DJS via DG-ID 51.

HardCopy Save Close

News GM



# Definitions

**LISTSERVER:** The listserver is one of a number of servers operated by Yaesu for the purpose of letting WiRES-X users know who is available for a contact. Even though a station (be it a room or node) is 'available', this does not mean they are listening to their radio at that moment. It simply means their node or room is online.

- The listserver is like a phone book that is dynamic. It changes all the time according to who checks in and out. Your software 'checks in' when you turn it on with an active Internet connection. If the information sent by your node matches the Yaesu database, you are listed in the 'phone book'. If you turn your node off, you drop out of the phone book.
- You will not be able to see the complete listserver 'lists' unless you are operating a node and can see the computer screen displaying the WiRES-X software. The listserver displays both active 'rooms' and active 'nodes'. This does not mean you cannot make use of the system unless in front of the computer, rather, it means you will either need to search for the right access codes, know them or have stored them in a memory for later access.
- There is one alternative if you are not where you can see the WiRES-X PC software screen. You can go online and look up 'Yaesu WiRES-X Active Nodes List' or 'Yaesu WiRES-X Active Rooms List'. Limited information is available here, but it is better than nothing.

# Definitions

**SYNCED RADIO:** This refers to a state of connection between a radio and a node whereby the radio can manipulate the node. The radio must be within a certain range so that commands are properly received. You may want to do this when your radio is a handheld or mobile and the node radio has the Internet connection. This method extends the range of the HT or mobile to reach anywhere the Internet reaches and beyond!

# Definitions

**WiRES-X ACCESS:** You do not necessarily need to be 'synced' with a node radio, or even HAVE a node radio to get on WiRES-X. You WILL need to be in range of a node radio and you WILL need the owner's permission if you wish to manipulate that node radio.

- Once again, a node radio can be certain HT's, mobiles or even repeaters. Permission may be stated on a node owner's web page, on their electronic QSL card that shows up in the WiRES-X software or in the comments shown in the WiRES-X software interface. **You might contact the owner by radio or other means to inquire about permission to manipulate a node. PLEASE DO NOT ASSUME it is okay to manipulate a node.** Many nodes/rooms are set up as virtual meeting places, sort of like repeaters. Imagine if you tried to call your local repeater and someone had moved it!

# Wires-x access through the repeater

The 146.73 repeater has a wires-x connection via an HRI-200 and located on DG-ID of 60. If you access the repeater on a DGID of 60, you will be heard on the repeater but also be broadcasting on the N1DJS wires-x room which is connected to the internet.

The 444.025 repeater has a wires-x connection via an HRI-200 and located on DG-ID of 50. If you access the repeater on a DGID of 50, you will be heard on the repeater but also be broadcasting on the WD8LSN wires-x room which is connected to the internet.

If you connect to 444.025 repeater via DG-ID of 51, you will not be connected to wires-x on either repeater, but will be heard on both Georgetown and Peebles local repeaters.

# Group Mode Operation

Group Mode is an operation that allows you to broadcast a burst of data which will allow similar users to receive/transmit locations and availability to those who are monitoring on the selected frequency. The frequency selected should in **all** cases be a simplex frequency and not a repeater frequency. Since the radio in group mode sends out a beacon every 15-20 seconds, if used on a repeater frequency, it will constantly bring the repeater up at those time period intervals. Imagine if 10-15 people were using group mode on the repeater. The repeater would be virtually unusable from all the group mode data being repeated.

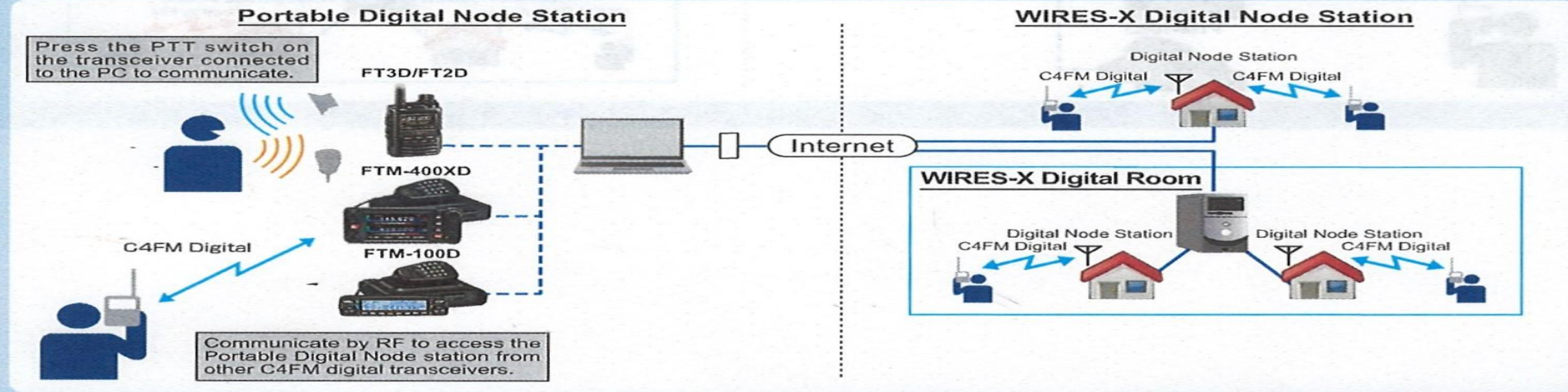
Remember, **NEVER USE GROUP MODE** on a **REPEATER FREQUENCY**. That is poor operating practice.

# Definitions

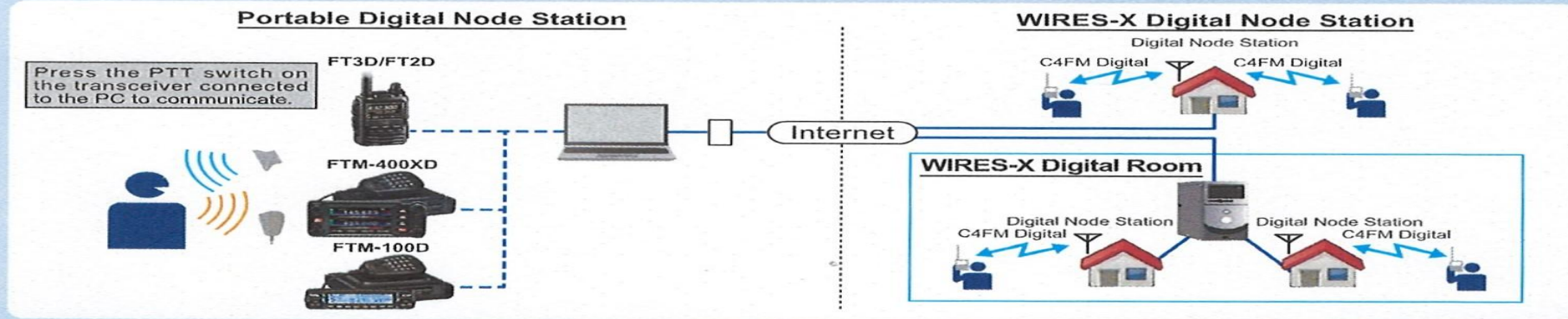
**PORTABLE DIGITAL NODE:** Here's where it gets interesting! In early 2019 Yaesu introduced the PDN or Portable Digital Node. That introduction revolutionized WiRES-X operation. The PDN eliminated the need not only for an HRI-200 (when just running a node), but it eliminated the need for a fixed or dynamic global IP address. This means that in addition to your node radio and your computer with WiRES-X PC software, you will only need an Internet connection. If you have a cellphone or jetpack that can Bluetooth or WiFi over to your computer, you can go mobile or portable with your node, hence the name PDN. Note that a PDN CANNOT support a room.

- The confusion gets going really good when talking about PDN's because some terms are used over and over with different meanings. So let us start with this concept: **THE PDN FUNCTION.**

## Access Point (Portable Digital Node Mode) Illustration



## Direct Operation (Portable Digital Node Mode) Illustration



# Definitions

**THE PDN FUNCTION:** Essentially this means the use of a Portable Digital Node as opposed to the use of an HRI-200 with your node. The two have different requirements as well as having different capabilities. Within the PDN function are two modes known as PDN Mode and HRI Mode. Don't worry, it gets deeper.

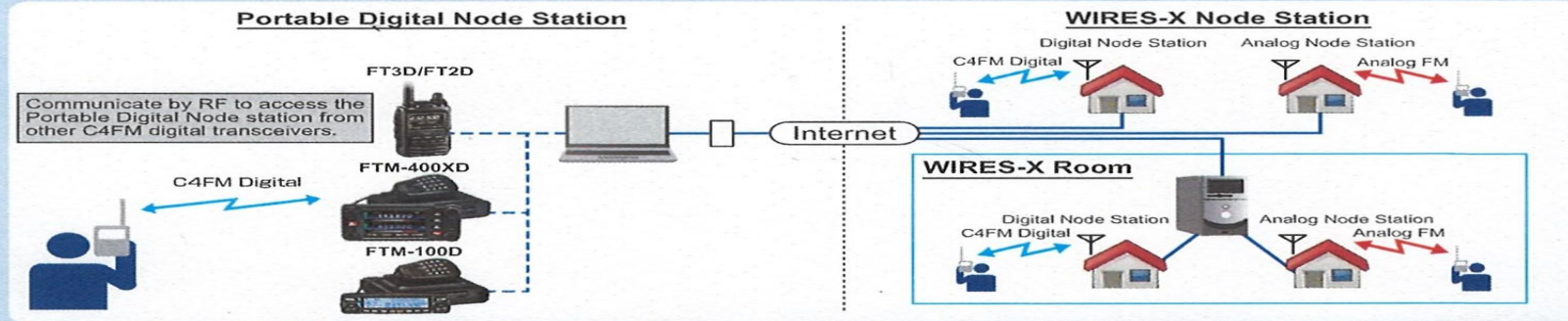
- Within both those two modes are what might be called 'sub-modes'. One is known as 'Direct Mode' and the other is known as 'Access Point Mode'. So, within the PDN FUNCTION (meaning you are using a PDN, not an HRI-200) you could be in PDN Mode/Direct Mode, PDN Mode/Access Point Mode, HRI Mode/Direct Mode or even HRI Mode/Access Point Mode. Got it?
- Just to make it interesting, no HRI-200 is involved in the HRI Mode. It was suggested to me that the HRI Mode emulates the use of the HRI-200 and that's the best answer I've heard for calling it HRI Mode. Now, where do we go from here? Perhaps we should go from top down.



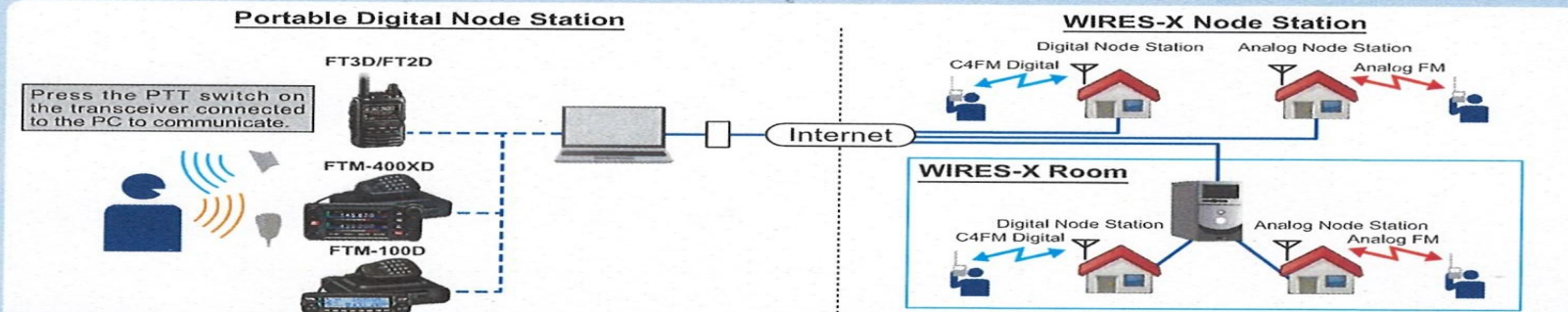
# Definitions

**PDN MODE (within the PDN FUNCTION):** The radios that are capable of PDN operation allow you to select either mode...PDN or HRI. The PDN side is used for digital-only operation. You will be able to contact digital rooms and nodes. Since a node can be analog or digital by virtue of its architecture or by selection of the owner, you need to know which you are attempting to contact. If the system will not allow you to connect, you will get a message letting you know. However, there's nothing like looking at the software interface as it gives you a clue right up front. Each room and node has an icon with it indicating its status as digital or analog.

## Access Point (Portable HRI Mode) Illustration



## Direct Operation (Portable HRI Mode) Illustration



# Definitions

**HRI MODE (within the PDN FUNCTION):** While it is called 'HRI', you cannot establish a room here. No rooms can be established within the PDN Function. In general, use of the HRI Mode allows you to connect to, talk to and hear analog stations. Some cabling is required to get the audio out through your radio instead of through the PC speakers. Now, to throw a monkey wrench into the works: On some radios, when you enter HRI Mode, the display says "WiRES-X". This leads to people calling it 'WiRES-X Mode'. The display of the words 'WiRES-X' I think is a bad choice since the manual clearly calls it "HRI Mode". Not only that, *both* PDN Mode and HRI Mode are part of WiRES-X, so why would we call just one of them 'WiRES-X'? Beats me!

# Definitions

**DIGITAL vs. ANALOG:** Before I get to Direct and Access Point Modes, I want to try to clear up a real mess. Why do we call certain stations 'analog' when they have clearly come across the digital medium known as the Internet? Good question! The answer lies in how they got there to start with. Each digital radio has a 'vocoder', or 'voice encoder'. This part of the radio digitizes your outgoing audio which is then entered into the digital stream going out over RF or into the Internet.

- Being that a true analog radio, or even a pre-amplified microphone can be connected to an HRI-200, signals not digitized by the radio, but rather converted to TCP/IP right away, can be on the system. These signals will not have the other information radio-digitized signals will. Therefore your node will need to be in a mode that can deal with this situation. In the case of the PDN, that is the HRI Mode.
- In addition, analog users can enter the system by virtue of a node in AMS. These radio signals will also not have digitally-encoded information.

# Definitions

**DIRECT MODE:** Direct Mode, known as 'Terminal Mode' in other circles, indicates that the node radio itself can be used to propagate audio and other information across the Internet. Prior to the introduction of the PDN Function, TWO radios were necessary to operate on WiRES-X. When in Direct Mode, the node radio DOES NOT transmit RF. Once again, Direct Mode can be chosen for use in both PDN and HRI modes.

# Definitions

**ACCESS POINT MODE:** Access Point Mode allows you to remotely contact your PDN. An example might be: You are traveling and are using your PDN enroute. You are talking directly into the node radio of the PDN since you do not need to transmit RF. Then perhaps, you stop at a coffee shop along the way but you wish to stay in contact on WiRES-X. At this point, instead of dragging all the equipment with you, you can switch to Access Point Mode and take an HT into the coffee shop. You communicate with the PDN via the HT. In Access Point Mode, you DO transmit RF.

## Further Study of Wires-X Concepts

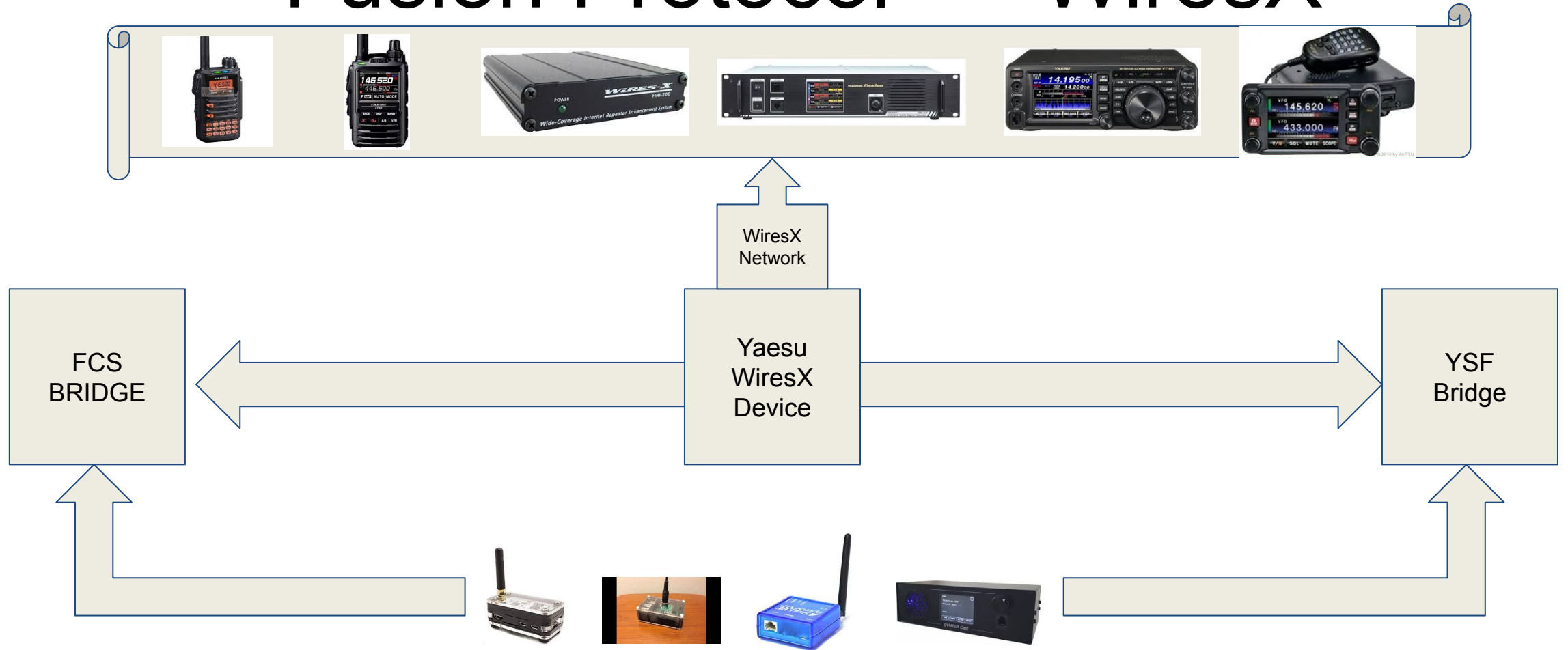
Suggested viewing is the following video's presented on Yaesu USA Official Youtube Channel

**Yaesu Wires-X**  
**Everything you wanted to know but were afraid to ask.**  
**Part 1, 2 & 3**

**Presented by John Kruk N9UPC**

**Also available are youtube videos by John on PDN Nodes, DR2X repeaters  
and Wires-X Software installation.**

# Fusion Protocol <> WiresX





# Definitions

- **YSF, FCS, WiRES-X, and IMRS** are four INDEPENDENT networking systems.
- **WiRES-X:** A system that links Yaesu' manufactured equipment via the Internet. *Only Yaesu manufactured equipment may connect to this network.*
- **IMRS:** Internet-Linked Multi-Site Repeater System. A system that specifically links Yaesu amateur digital repeaters via the Internet. *Only Yaesu manufactured repeaters may be connected by this network.*
- **YSF:** An independent system of internet linking that allows any manufacture's device to connect to a Fusion network.
- **FCS:** An independent system of internet linking that allows any manufacture's device to connect to a Fusion network.

Hotspots can connect to YSF or FCS reflectors. A station on a given reflector system can only talk to other stations on that system unless the system has been bridged to other systems.

# Definitions

**HOTSPOT:** This term has multiple two meanings where WiRES-X is concerned and knowing which one is being discussed is all-important.

- Firstly, hotspots such as Zumspot, MMDVM board, Pi Star, Open Spot, etc. are not Yaesu products and will not get you directly onto WiRES-X. They might get you *indirectly* onto WiRES-X if you find someone who has built a bridge to WiRES-X.
- Secondly, a 'hotspot' can refer to a network device which allows your WiRES-X computer to connect to the Internet via cellular or WiFi. Seeing as WiRES-X is an Internet linking system, this second meaning is more appropriate to WiRES-X.

# Hot spots - What are they, what do they do?

