



YAESU SYSTEM FUSION

de KI5OMW

Tech Zoom Session Feb. 12, 2025

CRHRC
CROSS ROADS HAM RADIO CLUB
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COMPARISON TO OTHER DIGITAL MODES



SIMPLE RADIO PROGRAMMING
9.6 KBPS (WIDE MODE)
YAESU RADIOS ONLY



COMPLICATED PROGRAMMING
4.8 KBPS X2 TIME SLOTS
BUDGET RADIO OPTIONS AVAILABLE



MODERATE RADIO PROGRAMMING
4.8 KBPS
ICOM LICENSED RADIOS ONLY



WHAT IS SYSTEM FUSION?

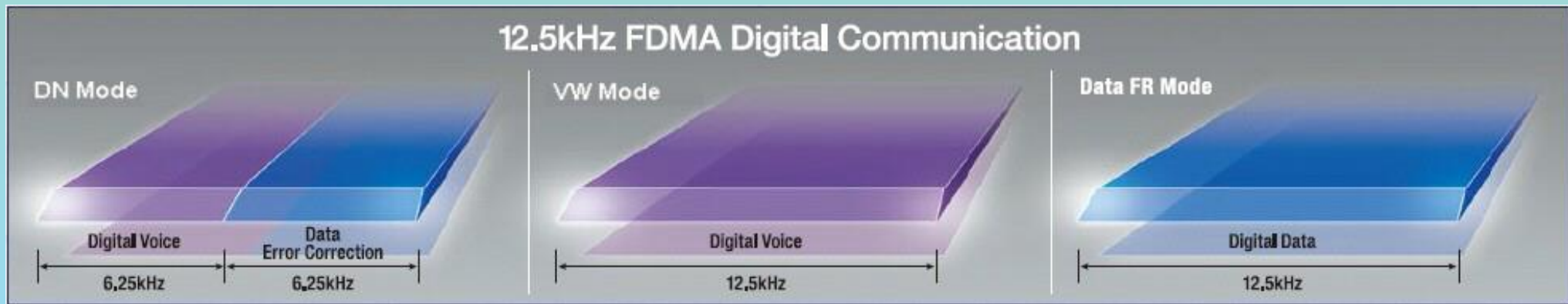
System Fusion is Yaesu's implementation of digital voice and data transmission in amateur radio using C4FM FSK technology.

Compatible 4-level Frequency Modulation – signal deviation varies between 4 levels

Dibit	Symbol	Frequency Deviation
00	+1	+900hz
01	+3	+2700hz
10	-1	-900hz
11	-3	-2700hz

DIGITAL NARROW (DN) VS. VOICE WIDE (VW)

Raw data rate is 9600bps with 7200bps payload after framing (header/terminator etc...)



DN divides available bandwidth to accommodate voice and data. Data can consist of GPS location, text messages, or even images.

VW provides full bit rate for voice and has the best sounding audio.

DW provides full bit rate for data. This mode is not manually selectable.

SYSTEM FUSION RADIOS



FT-5DR
FT-70DR



FTM-500DR
FTM-300DR



FT-991A

PROGRAMMING A SIMPLEX FUSION CHANNEL



Channel No	Receive Frequency	Transmit Frequency	Offset Frequency	Offset Direction	Operating Mode	DIG/ANALOG	Tone Mode	CTOSS Frequency
▶ 1	445.97500	445.97500	0.00000	OFF	FM	AMS Digi Simplex	OFF	100.0 Hz
2								
3								
4								

You will be prompted to enter your call sign when powering the radio for the first time. This is necessary.

No special programming considerations are necessary. Simply enter the desired frequency and select a digital mode! DN – Digital Narrow is available by default while VW – Voice Wide must be enabled in the radio's global settings. AMS – Auto Mode Select can be used to receive either analog or digital signals automatically!

Digital

AMS TX Mode AUTO

Digital Popup 10 sec

Location Service ON

Standby Beep ON

Digital VW ON

OFF

ON

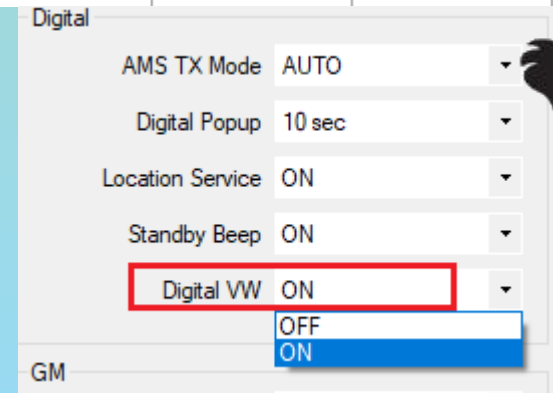
GM

PROGRAMMING A FUSION REPEATER CHANNEL

Channel No	Receive Frequency	Transmit Frequency	Offset Frequency	Offset Direction	Operating Mode	DIG/ANALOG	Name	Tone Mode	CTCSS Frequency
1	442.92500	447.92500	5.00000	+RPT	FM	VW	Digi Repeater	OFF	100.0 Hz
2						FM			
3						AMS			
4						DN			

You will be prompted to enter your call sign when powering the radio for the first time. This is necessary.

To program a Fusion repeater the settings are just as simple with only the addition of a transmit frequency offset! Like the simplex example, once “Digital VW” is enabled in the radio’s settings, the VW option will become available for the channel. There’s no need to program rooms like you would talk groups in DMR.



Digital

- AMS TX Mode AUTO
- Digital Popup 10 sec
- Location Service ON
- Standby Beep ON
- Digital VW ON

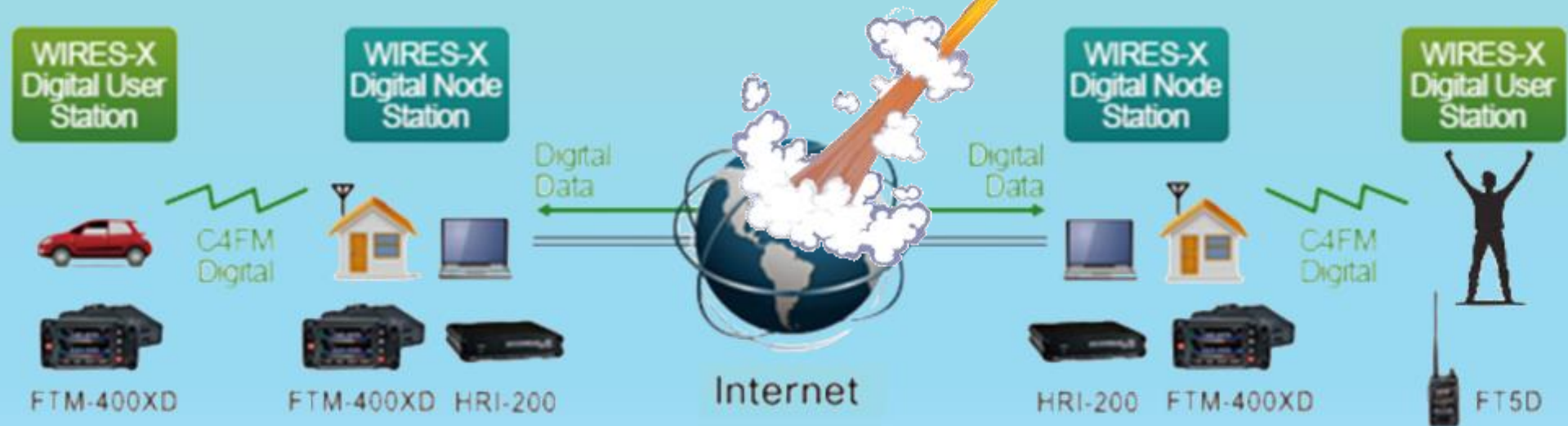
GM



WHAT IS WIRES-X?

WIRES-X is a method of linking digital repeaters together on the internet. WIRES stands for Wide-Coverage Internet Repeater Enhancement System.

WIRES-X nodes and rooms cluster repeaters together.



WHAT IS A REFLECTOR? WHAT ABOUT A ROOM?



A reflector is server on the internet that acts as a hub allowing multiple System Fusion users to connect and talk simultaneously.



A room is a dedicated space that allows users to connect on the Wires-X network.



Rooms and reflectors can be bridged allowing hotspot connectivity into a Wires-X room VIA a reflector.

USING A HOTSPOT TO CONNECT



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
M17 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"/>		
DMR2YSF:	<input type="checkbox"/>	Uses 7 prefix on DMRGateway	
DMR2NXDN:	<input type="checkbox"/>	Uses 7 prefix on DMRGateway	
POCSAG:	<input type="checkbox"/>	POCSAG Paging Features	
MMDVM Display Type:	OLED Type 3	Port: /dev/ttyAMA0	Nextion Layout: G4KLX
<input type="button" value="Apply Changes"/>			

After enabling YSF mode, the Yaesu System Fusion configuration area becomes available. Just choose a startup reflector and apply changes! Enable WiresX passthrough to use your radio's WIRES-X interface to change reflectors rather than DTMF tones.

Yaesu System Fusion Configuration	
Setting	Value
YSF Startup Host:	YSF62426 - US-CRHRG-TX - crhrc.org
UPPERCASE Hostfiles:	<input checked="" type="checkbox"/> Note: Update Required if changed
WiresX Passthrough:	<input checked="" type="checkbox"/>
<input type="button" value="Apply Changes"/>	

USING A HOTSPOT TO CONNECT

From the dashboard page you can choose another reflector anytime! Your radio's WIRES-X capability can also be used to search for and change reflectors.

Hostname: pi-star Pi-Star:4.1.8 / Dashboard: 20240307

Pi-Star Digital Voice Dashboard for KI5OMW

[Dashboard](#) | [Admin](#) | [Live Logs](#) | [Power](#) | [Update](#) | [Configuration](#)

Gateway Hardware Information

Hostname	Kernel	Platform	CPU Load	CPU Temp
pi-star	5.10.11+	Raspberry Pi Zero W Rev 1.1	1.33 / 1.39 / 0.83	39°C / 102.2°F

Service Status

MMDV/Host	DMRGateway	YSFGateway	YSFParrot	P25Gateway	P25Parrot
DStarRepeater	ircDDBGateway	TimeServer	PiStar-Watchdog	PiStar-Remote	PiStar-Keeper

Modes Enabled

D-Star	DMR
M17	NXDN
P25	YSF
DMR XMode	YSF XMode
FM	POCSAG

Network Status

D-Star Net	DMR Net
M17 Net	NXDN Net
P25 Net	YSF Net
DMR2NXDN	DMR2YSF
YSF2DMR	YSF2NXDN
YSF2P25	POCSAG Net

Radio Info

Trx	
Tx	446.525000 MHz
Rx	446.525000 MHz
FW	HS_Hat:v1.4.6
TCXO	14.7456 MHz

YSF Network

US-CRHR-CX

YSF Link Manager

Reflector	Link / Un-Link	Action
YSF62426 - US-CRHR-CX - crhrc.org ^	<input checked="" type="radio"/> Link <input type="radio"/> UnLink	Request Change

Search...

YSF07777 - US-CO-W.A.R.S. - WeldAmateurR
YSF53927 - US-CO-WE0FUN - FunMachineCo
YSF56446 - US-CO719-KF00TE - KF00TEYSFREF
YSF91800 - US-CQ-California - CAL-YSFtoWires
YSF62208 - US-CQ-NODAK-A-ZX - CQNorthDakota
YSF62426 - US-CRHR-CX - crhrc.org
YSF99984 - US-CT-Digital - CTYSFReflect
YSF99797 - US-CT-RI-ROOM - LINKEDSYS
YSF46301 - US-CW-Ops - CWAcademyCW

Pi-Star / Pi-Star Dashboard, © Andy Taylor (MW0MWZ) 2014-2025.
ircDDBGateway Dashboard by Hans-J. Barchen (DL5DI),
MMDVMDash developed by Kim Huebel (DG3VH),
Need help? [Click here for the Facebook Group](#)
or [Click here to join the Support Forum](#)
Get your copy of Pi-Star from [here](#).



DISCUSSION

