



Digital Smart Technologies for Amateur Radio

***Amateur's digital voice communication
centering on
XLX Multiprotocol Gateway Reflector***

May 20, 2018

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History to the present (1)

2001	2006 ~	2016 - 3	2017	2018
D-Star	REF Reflector DCS Reflector	XLX Reflector trial started by JR3VH	XLX Reflector Spread rapidly throughout the domestic	The movement of D - Star, FUSION and DMR comprehensive connection is getting active

Domestic : Repeaters, gateway function only, reflector was not well known.

Overseas : There are three functions: repeater, gateway, reflector function.



AA4RC
(Robin Cutshaw)






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History to the present (2)

- ▬ JARL D-Star registration IP address 10.1.1.x to 10.1.1.1x (10.3.9.16x to 10.3.9.16x)
- ▬ 2012 - 10, CQ magazine ICOM IC-9100
- ▬ 2014 - 3, DX QSO by DV of HF band done by IC-9100 posted to CQ magazine
- ▬ 2015 - 11 - 18, QSO with AF6IM parachute mobile (ICOM FB News November issue)
- ▬ 2016 - 3 - 6, JR3VH Japan's first XLX reflector trial / 2016-7 Exhibited at KANHAM
- ▬ 2017 JR3VH Expands the XLX Reflector Node Station Trial

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Representative domestic digital mode

	D-Star(ICOM)	FUSION (YAESU)	DMR (Motoroler)
Codec	AMBE+	AMBE+2	AMBE+2
Band Width	6.25Kc (FDMA)	12.5KHz (2FDMA)	12.5KHz (2TDMA)
Radio format	F7W	F7W	F7W
Modulation method	2FSK (GMSK)	4FSK(C4FM)	4FSK(C4FM)
Band	HF/VHF/UHF	HF/VHF/UHF	VHF/UHF
Repeater	○	X	X
Node St.	○	○	X
Reflector	XLX Multiprotocol DEXTRA,DPLUS, DCS	YSF、 FCS	XLX Multiprotocol XLXDMR,Brandmeister, DMR+
Hot Spot	○	○	○

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Why does the XLX reflector increase?

- It is open source and user friendly.
- Multi-protocols that can be used DCS, DEXtra, DPlus.
- No need to register like a REF reflector.
- DMR-ID is unnecessary as well.
- All dashboards are written in PHP and can be customized.
- Quick and easy to install on Linux server.
- Author's "Ham Spirit" is active (vigor).

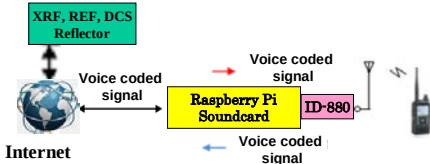
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XLX reflector and node station

XLXreflectors

The XLXreflector node station connects a radio existing 9600 baud data communication terminal, and an accessory made up of Raspberry Pi and a USB sound card to the reflector via the Internet and becomes a access point of a commercially available D-Star radio. You can build the station all of themby yourself.



Wires-X

The WIRES-X node station is a relay station that becomes an access point of WIRES-X which connects radio signals of amateur radio and the Internet, which consists of a personal computer, WIRES-X connection kit HRI-200, and radio. Construction is all dependent on the manufacturer. <https://www.yaesu.com/jp/wires-x/index.php>



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Let's establish XLX reflector

We will provide know-how we experienced to those who wish to open up.

- Raspberry Pi or Linux PC installed at home or installed on VPS.
- Detailed reference materials is on http://xlxreflector.jpn.ph/index.php?show=xlx_doc
- Installation of software is very simple as follows.

<pre># apt-get update # apt-get upgrade # apt-get install git git-core # apt-get install apache2 php5 # apt-get install build-essential # apt-get install g++-4.7 # git clone https://github.com/LX3JL/xlxd.git # cd xlxd/src/ # make clean # make</pre>	<pre># make install # cp ~/xlxd/scripts/xlxd /etc/init.d/xlxd # pico /etc/init.d/xlxd # wget -O /xlxd/dmrid.dat http://xlxapi.rlx.lu/api/exportdmr.php # update-rc.d xlxd defaults # service xlxd start # service xlxd stop # cp -r ~/xlxd/dashboard /var/www/db # chmod +r /var/log/messages # reboot</pre>
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LX1IQ (Luc Engelmann)

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Let's make QSO with the reflector





ThumbDV
with
PC



ThumbDV



PA7LIM (David Grootendorst)



BlueDV for Windows



ThumbDV
with
Cellphon



DVmega&Bluestack

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Hardware and software for use of reflectors



Although there are many other hardware and software,
I listed what I can offer know-how from experience of use.

Hard	Soft	Available Reflectors etc.	Remarks
ThumbDV	BlueDV for Windows	D-Star (XRF, REF, DCS) DMR (BM,DMR+,XLXDMR) FUSION (YSF,FCS)	Used on a PC FUSION needs Dvmega
	BlueDV AMBE	D-Star (XRF, REF, DCS) DMR (BM,DMR)	Use with Android version of cellphone or tablet
DV4mini	DV4mini	D-Star (XRF, REF, DCS) DMR (DMR+) FUSION (YSF,FCS)	Used with Windows PC or Linux
DVmega	BlueDV	D-Star (XRF, REF, DCS) DMR (BM,DMR+)	Used with PC or Raspberry PI
	Maryland Image	D-Star (XRF, REF, DCS)	Used with Raspberry PI It can also be used as software for node stations

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Reflector or repeater in the world

A list that can be seen at the following URL is included in each software.

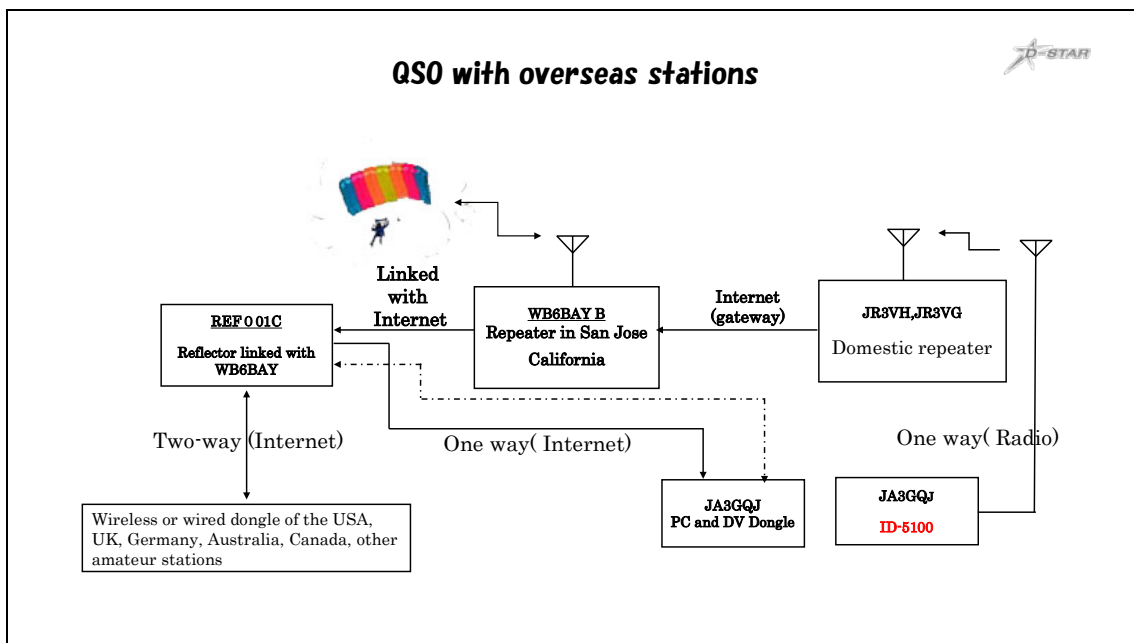
XLX Reflector Administration panel
<http://xlxapi.rlx.lu/admin/index.php>
X Reflector Directory
<http://xrefl.net/>

REF reflector list
<http://www.dstarinfo.com/Reflectors.aspx>

Brandmeister
<https://brandmeister.network/>

ircDDB Network & DCS Reflector Information
<http://www.bm-dmr.uk/>

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Let's establish XLX node station



We will provide know-how we experienced to those who wish to open up.

- Electronic application for the establishment of the club station of the fourth grade amateur radio at the transceiver with ICOM 9600 baud data communication terminal. (Application fee : 2900 yen)
- Create an accessory for Internet connection with Raspberry Pi and USB sound card.
- Download Maryland image for Raspberry Pi OS and burn it to SD card.
- Do apply electronic application for change of club station with detailed explanation of attached equipment attached. (Change application fee free)
- No warranty certification required
- Detailed refrenc materials is on http://xlxreflector.jp/index.php?show=xlx_doc

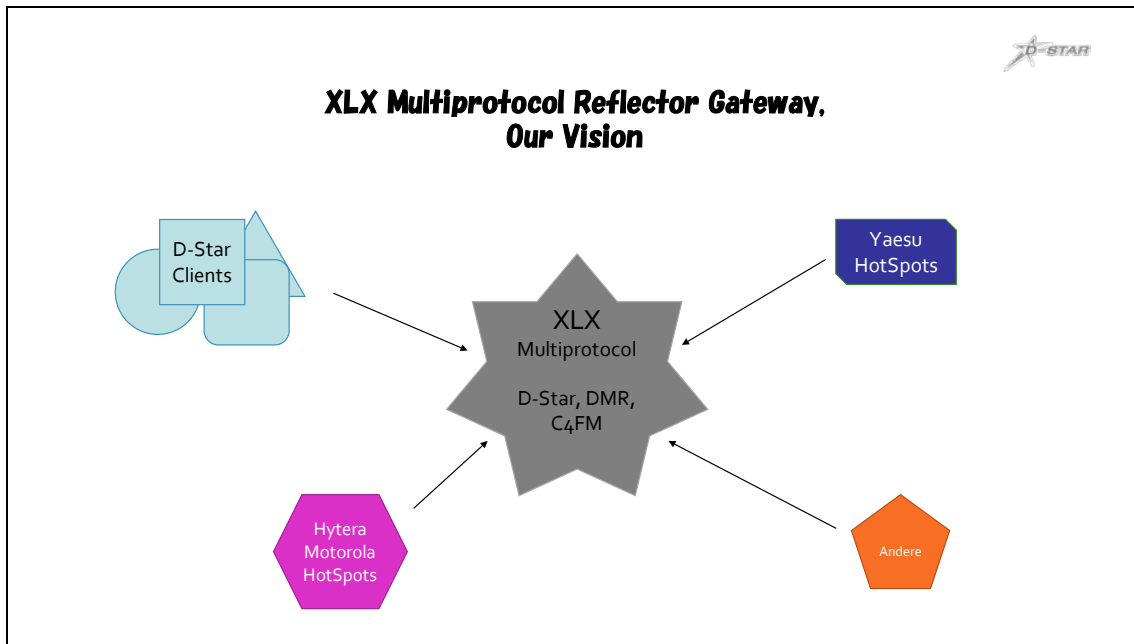
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Future of digital voice communication



- If possible, the development of G3 in Japan. (It is already adopted abroad.)
- DMR is rapidly developing.
- 6 channel XLXDMR <> D- Star transcoder is under developping.
- There is a action to develop a transcoder of Fusion <> D-Star. (NXDN™)
- It seems that DMR reflector can be used from C4FM transceiver with Pi-star 3.4.10
See <http://mrickey.com/2018/02/pi-star-3-4-10-whats-new/>
- Character communication of CW · RTTY between reflectors and image communication (Wish)

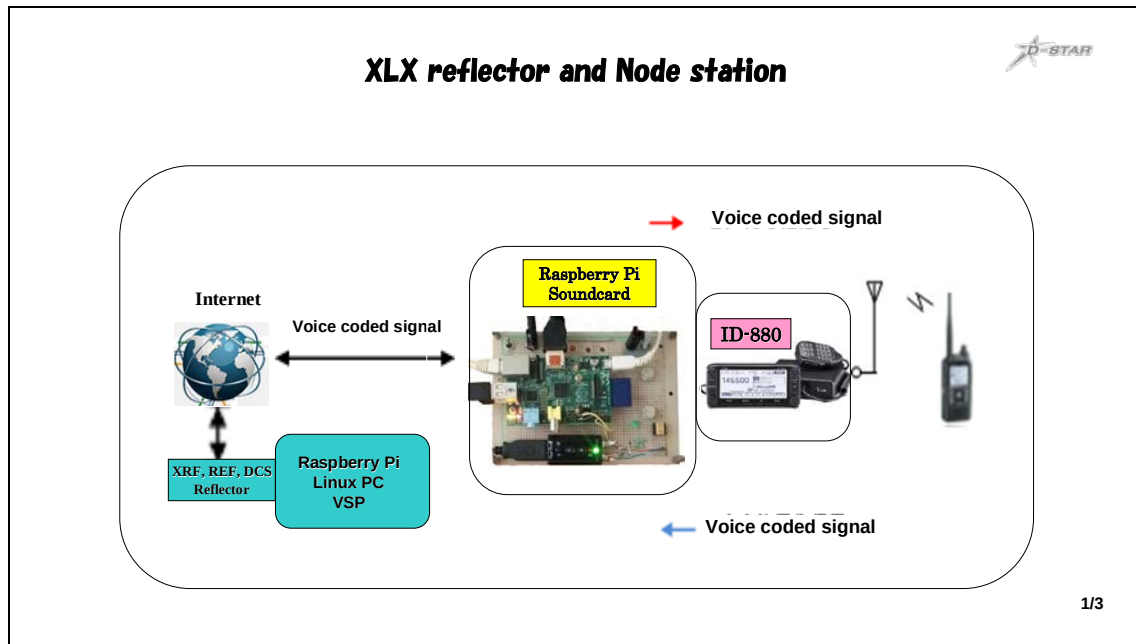
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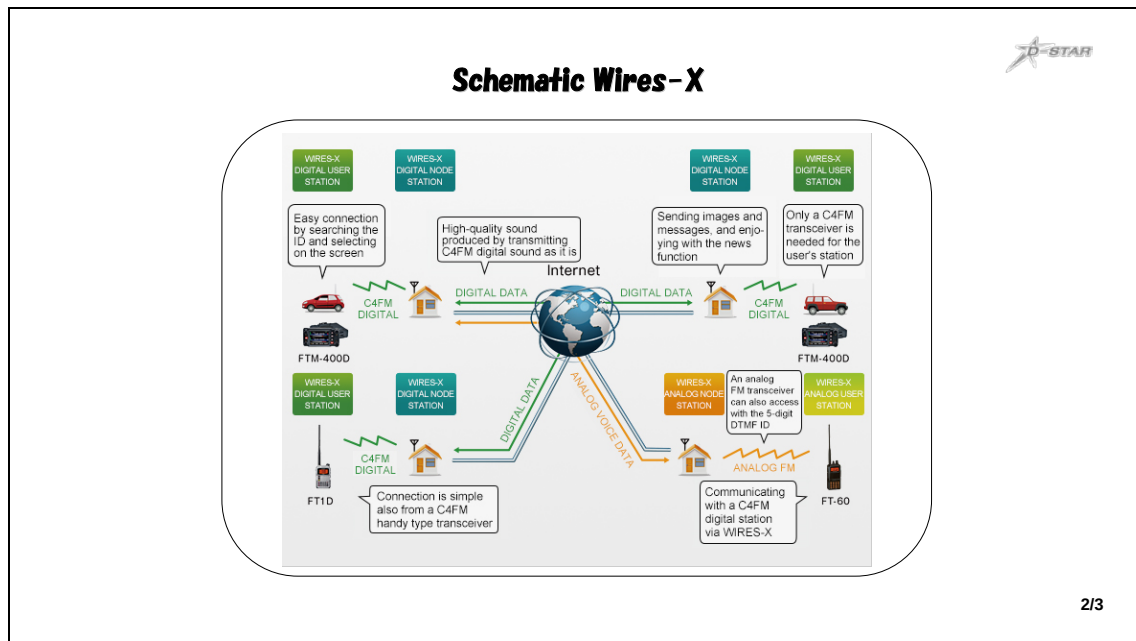
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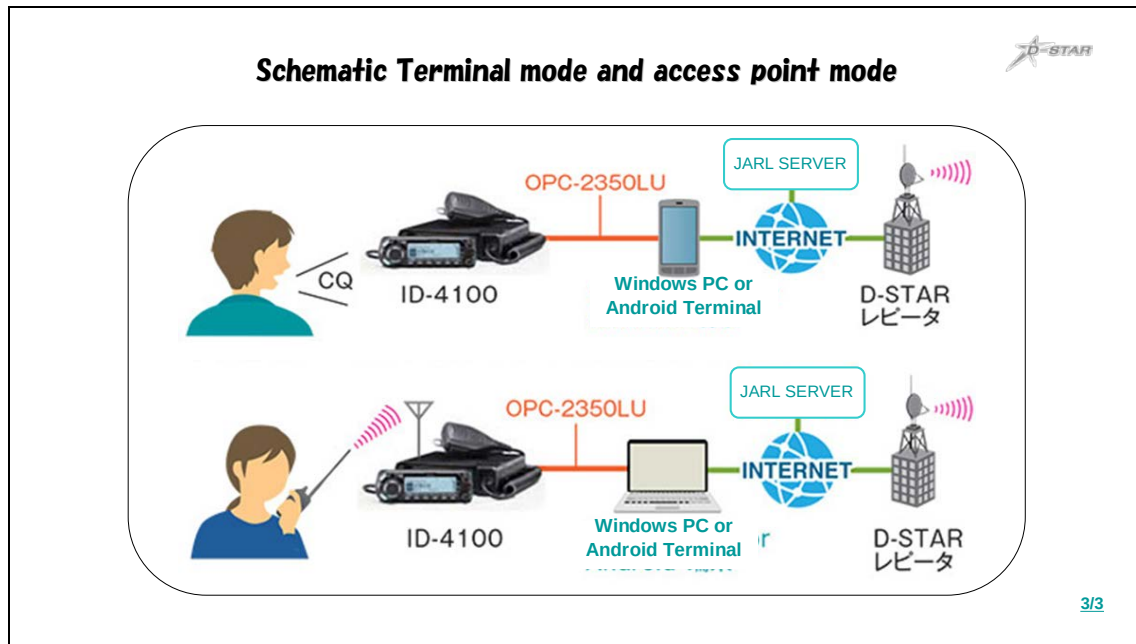
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ThumbDV with Cellphon or Tablet

The software is at <http://hamradio.dip.jp/jl3zii/>.

- 1) My AQUOS SH - 01 F Android version 4.2.2
But it does not start at once, it will be comfortable after it start.
- 2) JN3EDL's NEC tablet PC - TE 508 HAW Android version 7.1.1 has no problem at launch and is good.

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Formation of DV communication system

- The radio interface common to the DV communication system is :
- Definition of modulation method
 - Modem synchronization
 - Make a signal flow
 - Make timing for time division multiple access / time division multiple access
- The network is :
 - Define the destination of the signal
 - Signaling (usually IP)
 - Command and control
 - Access and service
- The protocol structure is :
 - Definition of start and end
 - Mix two or more digital signals alternately between them
 - A set of data that describes other data and gives that information
 - IP address specification and ID
- Audio / data encoding is :
 - Vocoder method and rate
 - Method of data loading
 - Data format

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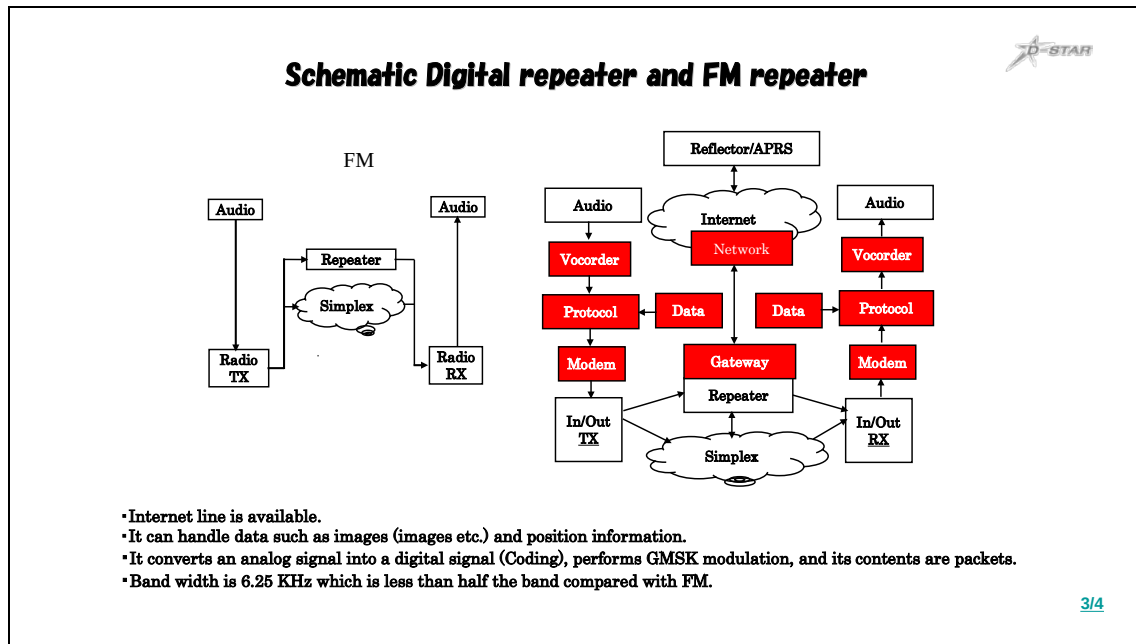


Network protocol versus Radio frequency

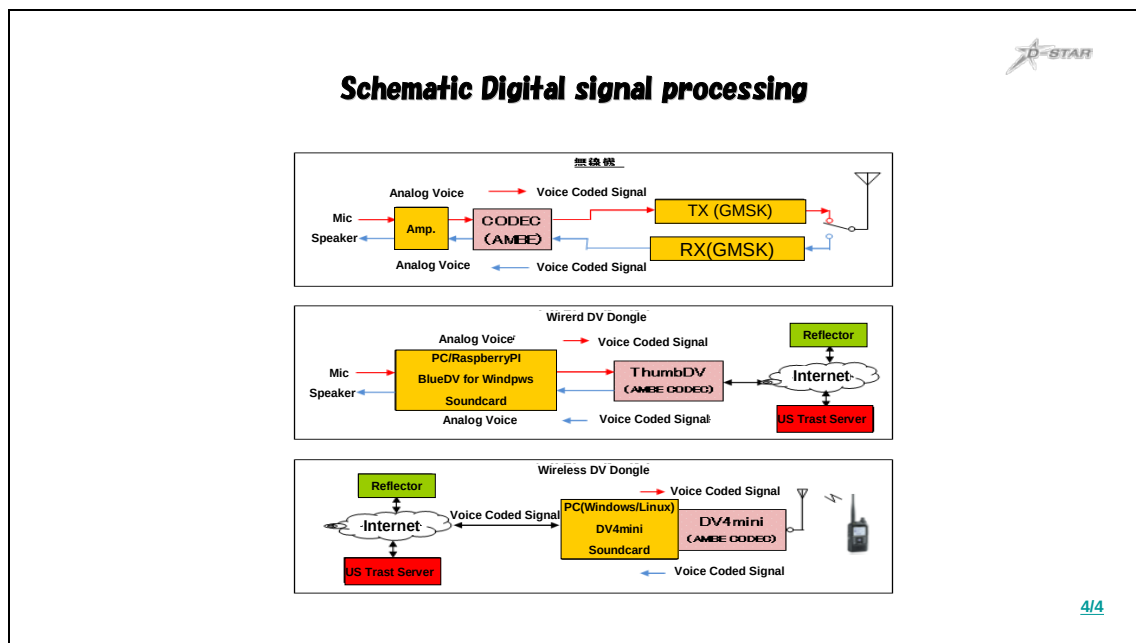
- RF protocol seems to be designed to minimize bandwidth while maintaining data integrity in noisy environments.
- Network protocols seem to be designed to maximize throughput on generally reliable links.

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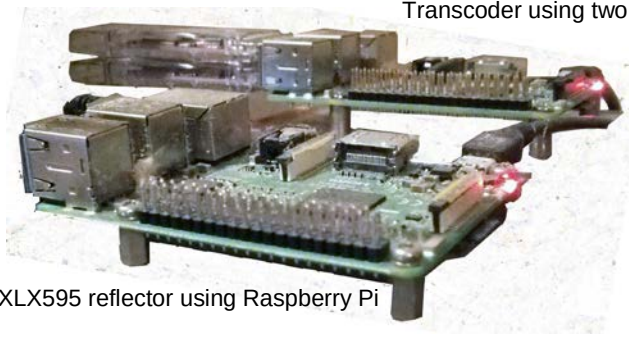


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JL3ZII is trying DMR <> D-Star transcoder at XLX595

Overseas there is a movement to develop a 6 channel transcoder, but this is a 1 channel transcoder using two ThumbDVs.



Transcoder using two ThumbDV

Server for XLX595 reflector using Raspberry Pi

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NXDN™

NXDN™ was a very narrowband protocol adopting FDMA technology of 6.25 / 12.5 KHz, and FCC specifically demanded that the VHF band and the UHF band be shifted to narrowband capability by January 1, 2005 Where ICOM and KENWOOD jointly developed and responded to this protocol.

Access Method	FDMA	
Modulation	4-level FSK	
Vocoder	AMBE+2™	
Channel Spacing	6.25 kHz	12.5 kHz
Transmission Rate	4800 bps	9600bps
Codec Rate	3600bps	7200bps
Conventional	Yes	
Trunking operation	Yes Type-C and Type-D	Yes Type-C
Digital Scrambling	Yes (15-bit/32,000 keys)	
Encryption	Yes (AES/DES)	

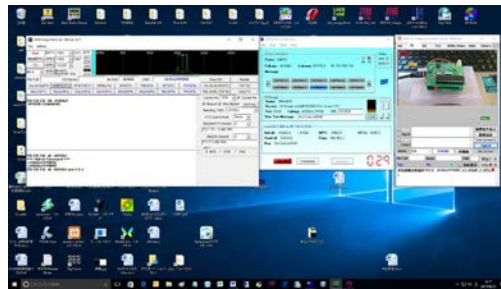
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Character / image communication using XLX reflector (Future wish)



- Since there are many modules, letter communication can be done in CW, RTTY or mfsk mode with VARIFRONT.
- It does not send the image signal directly like MMSSTV, but if you adds special software you are able to exchange images as well.



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This is a list of detailed Japanese reference materials explained today. You are able to download from the following URL.

http://xlxreflector.jp/index.php?show=xlx_doc

番号	資 料 名	ファイル名
1	Raspberry Pi によるリフレクター開設体験	RasPi_expe.pdf
2	CentOS によるリフレクター開設体験	centOS_expe.pdf
3	ThumbDV によるリフレクター 使用体験	ThumbDV_expe.pdf
4	DVmega によるリフレクター 使用体験	DVmega_expe.pdf
5	DV4min によるリフレクター 使用体験	DV4mini_expe.pdf
6	ThumbDVBlueDVwindows 版使用体験	ThmbDV_BlueDV9433.pdf
7	XLXV2.0.0 バージョンで DMR を体験	DMRexpe.pdf
8	VARIFront による文字通信体験記	rtty_on_reflector.pdf
9	IC-7100 によるノード局の体験記	IC-7100_node.pdf
10	ICOM IC-7100 制御プログラム (Excel で)	ICOM-HF-Dstar-Front20170720.zip

11	ICOM IC-7100 制御方法 (Excel で)	ICOM_HFDStarFront.pdf
12	Raspberry Pi の遠隔操作体験 (その 1)	RasPi_remote.pdf
13	Raspberry Pi の遠隔操作体験 (その 2)	Raspi_VNC.pdf
14	XLX リフレクターの概要	xlx_reflector_overview.pdf
15	DV ドングルの話	DVdongle.pdf
17	DVMegaBlueDVWindows 使用体験	DVmegaBlueDVwindows.pdf
18	VPS 利用体験記(レンタル申し込み編)	VPS_rental.pdf
19	VPS 利用体験記(VPS サーバー設定編)	VPS_setting.pdf
20	VPS 利用体験記(xlx ソフトインストール編)	VPS_xlinstall.pdf
21	ID880 変更申請付属装置詳細説明	syousai.pdf
22	ノード局用 Maryland Image 設定変更	setteihennkou.pdf
23	D-Star に関連する用語	yogo.pdf
24	私の見た D-Star	Marchkousyuukai.pdf
25	ThumbDV をスマホやタブレットで使う	ThumbDV_with_cellphon.pdf

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