

MMDVM

Multi Mode Digital Voice Modem

KD7MPA - November 2021

Digital Voice

Types

DMR – Digital Mobile Radio

C4FM – Yaesu System Fusion

D-Star – Icom and Kenwood Digital Voice

P25 – Series of Digital Radio Standards

NXDN – Icom and Kenwood digital voice open standard

POCSAG - Pagers

AX25 - Packet

M17 - New Amateur Radio specific DV protocol

FM - Analog

Hardware

Open Source

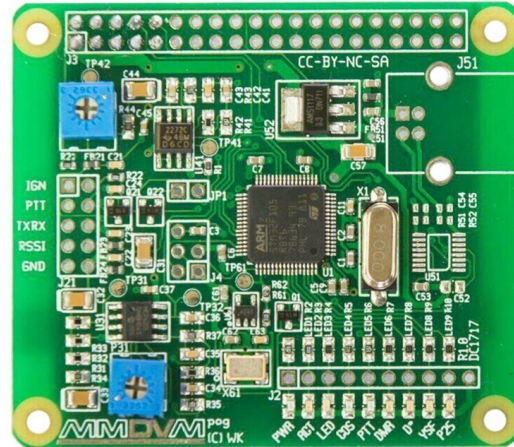
Can have internal or external radio

Simplex or Duplex

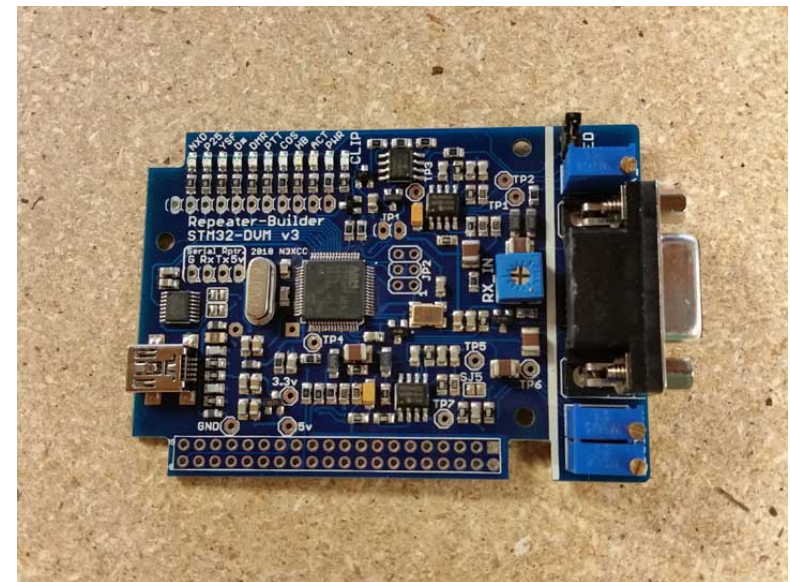
Lots of vendors - varying quality / quality of documentation

Hardware

External Radio



- ARM Cortex-M3, M4, or M7 processors
- minimum clock speed > 70 MHz
- least one analogue to digital converter
- one digital to analogue converter
- a number of GPIO pins.



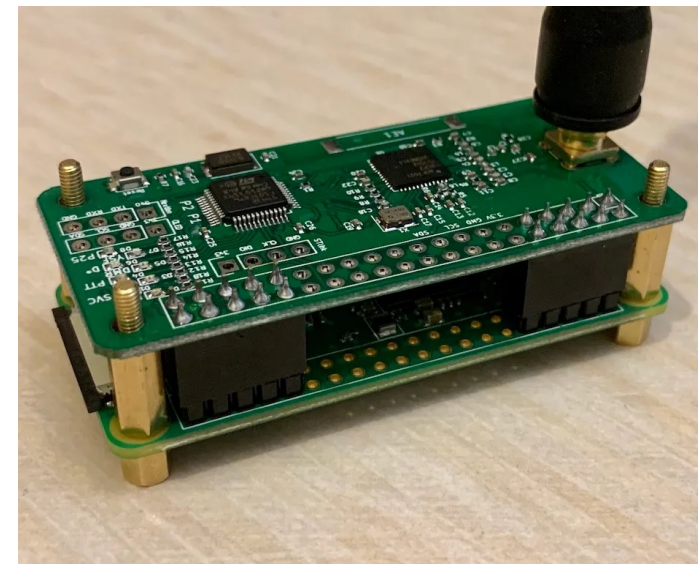
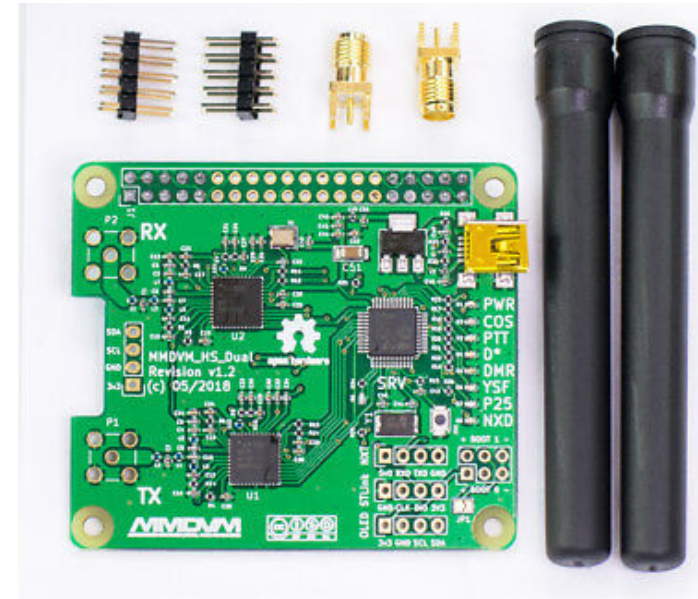
Hardware

Internal Radio

Simplex / Duplex

ADF7021

- Low power, high performance, narrowband transceiver
- Frequency Bands: 80-650MHz and 862-940MHz
- Programmable output power: -16dBm to +13dBm



Software

User Interface

MMDVMHost

Radio Interface Board

Radio

Software MMDVM

<https://github.com/g4klx/MMDVM>

https://github.com/juribeparada/MMDVM_HS

Runs on the micro controller

Decodes FSK signals into packets

g4klx / MMDVM Public

Watch 89 Star 326

<> Code Issues 41 Pull requests Actions Projects Wiki Security Insights

master 26 branches 0 tags Go to file Add file Code

g4klx Add the transmit function. 5474513 8 days ago 1,351 commits

STM32F10X_Lib @ 417e0c2	add STM32F10X_Lib	3 years ago
STM32F4XX_Lib @ 18aeb6e	Update module pointers.	12 months ago
STM32F7XX_Lib @ 6241f7c	Update module pointers.	12 months ago
Tools	Update filter generation script	2 years ago
pins	Merge branch 'master' into M17_AX25_FM	7 months ago
system_stm32f1xx	Adding conditional compilation for Arduino 1.6.7 fix	5 years ago
.gitignore	Add submodules for F4/F7 libs	3 years ago
.gitmodules	add STM32F10X_Lib	3 years ago
AX25Defines.h	Increase the maximum AX25 frame size.	17 months ago
AX25Demodulator.cpp	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
AX25Demodulator.h	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
AX25Frame.cpp	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
AX25Frame.h	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
AX25RX.cpp	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
AX25RX.h	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
AX25TX.cpp	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
AX25TX.h	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
AX25Twist.cpp	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
AX25Twist.h	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
BUILD.txt	More info on Linux & newer libraries OK	5 years ago
CWIdTX.cpp	Handle extended packet lengths.	17 months ago
CWIdTX.h	Handle extended packet lengths.	17 months ago
CalDMR.cpp	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
CalDMR.h	Make AX.25, DMR, P25, NXDN and FM selectable at compile time.	12 months ago
CalDStarRX.cpp	Use the D-Star correlator receiver.	12 months ago
CalDStarRX.h	Use the D-Star correlator receiver.	12 months ago
CalDStarTX.cpp	Make D-Star, System Fusion, M17, and POCSAG optional.	12 months ago

About
The firmware for the MMDVM (Digital Voice Modem)
Readme
GPL-2.0 License

Releases
No releases published

Packages
No packages published

Contributors 24
+ 13 contributors

Languages
C++ 80.2% C 14.2%
Makefile 3.1% Assembly 1.7%
Other 0.8%

Software MMDVM Host

<https://github.com/g4klx/MMDVMHost>

Decodes/translates packets

Sends packets to networks or gateway

g4klx / MMDVMHost Public

Watch 94 Unstar 268 Fork

Code Issues 87 Pull requests 6 Actions Projects Wiki Security Insights

master 33 branches 0 tags Go to file Add file Code

g4klx Merge pull request #721 from jg1uua/master b1d5973 5 days ago 2,736 commits

Images	Restore the branch	11 months ago
Nextion_DB2OE	Add DB2OE Nextion layouts.	4 years ago
Nextion_G4KLX	Restore the branch	11 months ago
Nextion_ON7LDS	Add more dynamic variables and fix command manging	3 years ago
RSSI	Create RSSI_FC-302_RptrBldrV2.dat	4 years ago
Tools	Restore the branch	11 months ago
linux	Merge branch 'master' into M17_AX25_FM	10 months ago
.gitignore	Fix some bugs	3 years ago
AMBEFEC.cpp	Refactor the Golay 24,12,8 code and its uses.	7 months ago
AMBEFEC.h	Re-add the audio blanking for too corrupt audio in DMR, NXDN an...	4 years ago
AX25Control.cpp	Restore the branch	11 months ago
AX25Control.h	Restore the branch	11 months ago
AX25Defines.h	Restore the branch	11 months ago
AX25Network.cpp	Restore the branch	11 months ago
AX25Network.h	Refactored some class names.	9 months ago
BCH.cpp	Change the semantics of the NID processor.	5 years ago
BCH.h	Add the P25 NID BCH encoder.	5 years ago
BPTC19696.cpp	Add new Hamming for YSF.	6 years ago
BPTC19696.h	Initial commit	6 years ago
CASTInfo.cpp	Final modem refactoring.	9 months ago
CASTInfo.h	Final modem refactoring.	9 months ago
CRC.cpp	Decode and encode the System Fusion FICH.	6 years ago
CRC.h	Decode and encode the System Fusion FICH.	6 years ago
Conf.cpp	permit inline comment	10 days ago
Conf.h	Rename SimpleMode to LinkMode.	2 months ago
DMRAccessControl.cpp	Cleanup the access control slightly.	4 years ago
DMRAccessControl.h	Add RSSI display for all modes.	5 years ago

About

The host program for the MMDVM

Readme

GPL-2.0 License

Releases

No releases published

Packages

No packages published

Contributors 60

+ 49 contributors

Languages

C++ 96.6% C 1.7% Shell 1.0% Python 0.4% Makefile 0.2% Batchfile 0.1%

UI / Packaging

Pi-Star

Pre-configured SD Card
image for the Raspberry Pi

<https://www.pistar.uk/>

Interfaces with MMDVMHost
by reading log files 😊

Hostname: repeater

Pi-Star:4.1.5 / Dashboard: 20211021

Pi-Star Digital Voice Dashboard for KD7MPA

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	Listening
Tx	442.800000 MHz
Rx	447.800000 MHz
FW	MMDVM:20180327

DMR Repeater

DMR ID	311499
DMR CC	1
TS1	enabled
TS2	enabled
DMR Master	
BM 3103 United St..	

Gateway Activity

Time (PDT)	Mode	Callsign	Target	Src	Dur(s)	Loss	BER
14:23:41 Nov 4th	DMR TS1	K7GND (GPS)	TG 3141	Net	42.2	0%	0.0%
14:22:50 Nov 4th	DMR TS1	K7CLJ (GPS)	TG 3141	Net	21.4	0%	0.0%
13:57:19 Nov 4th	DMR TS1	VK3TBR (GPS)	TG 3141	Net	0.5	0%	0.0%
13:35:52 Nov 4th	DMR TS1	KC7ZMU (GPS)	TG 3141	Net	0.5	0%	0.0%
11:16:01 Nov 4th	DMR TS1	4000	KK7BJC	Net	1.0	0%	0.0%
11:15:57 Nov 4th	DMR TS1	KK7BJC (GPS)	TG 4000	RF	0.4	0%	0.1%
10:46:38 Nov 4th	DMR TS1	K7PN (GPS)	TG 3141	Net	11.0	0%	0.0%
10:46:22 Nov 4th	DMR TS1	KJ7TBW (GPS)	TG 3141	Net	15.6	0%	0.0%
08:22:19 Nov 4th	DMR TS1	K7MHM (GPS)	TG 3141	Net	0.5	0%	0.0%
06:26:26 Nov 4th	DMR TS1	W7WJY (GPS)	TG 3141	Net	0.1	0%	0.0%
04:52:12 Nov 4th	DMR TS1	KJ7ZCC (GPS)	TG 3141	Net	1.2	0%	0.0%
22:51:03 Nov 3rd	DMR TS1	KD8IDK (GPS)	TG 91	Net	2.2	50%	0.5%
22:50:52 Nov 3rd	DMR TS1	KC2FPE (GPS)	TG 91	Net	DMR Data		
22:50:35 Nov 3rd	DMR TS1	IK6IOK (GPS)	TG 91	Net	0.8	0%	0.0%
22:48:46 Nov 3rd	DMR TS1	W5OU (GPS)	TG 91	Net	5.2	0%	0.0%
22:48:36 Nov 3rd	DMR TS1	HZ1ZH (GPS)	TG 91	Net	2.6	0%	0.0%
22:48:31 Nov 3rd	DMR TS1	BGSDAY (GPS)	TG 91	Net	0.5	0%	0.0%
22:47:51 Nov 3rd	DMR TS1	DJ7ST (GPS)	TG 91	Net	8.8	0%	0.0%
22:47:14 Nov 3rd	DMR TS1	N6KEL (GPS)	TG 91	Net	1.2	0%	0.2%
22:45:19 Nov 3rd	DMR TS1	I7STE (GPS)	TG 91	Net	0.6	0%	12.8%

Local RF Activity

Time (PDT)	Mode	Callsign	Target	Src	Dur(s)	BER	RSSI
11:15:57 Nov 4th	DMR TS1	KK7BJC (GPS)	TG 4000	RF	0.4	0.1%	S9+38dB (-55 dBm)
22:36:05 Nov 3rd	DMR TS1	KK7BJB (GPS)	TG 91	RF	0.7	0.0%	S9+38dB (-55 dBm)

Pi-Star / Pi-Star Dashboard, © Andy Taylor (MW0MWZ) 2014-2021.
ircDDBGateway Dashboard by Hans-J. Barthen (DL5DI),
MMDVMDash developed by Kim Huebel (DG9VH),
Need help? Click here for the Facebook Group
or Click here to join the Support Forum
Get your copy of Pi-Star from here.

Pi-Star

Getting Started

<https://www.pistar.uk/>

1. Load SD Card
2. Configure Networking
3. Configure MMDVM
4. Enjoy

Pi-Star: 4.1.5 / Dashboard: 20211021

Pi-Star Digital Voice - Configuration

Dashboard | Admin | Expert | Power | Update | Backup/Restore | Factory Reset

Gateway Hardware Information				
Hostname	Kernel	Platform	CPU Load	CPU Temp
repeater	5.10.17-v7+	Raspberry Pi 3 Model B Rev 1.2	0.64 / 0.48 / 0.43	50.5°C / 122.9°F

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

Apply Changes

MMDVMHost Configuration	
Setting	Value
DMR Mode:	<input checked="" type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
D-Star Mode:	<input type="checkbox"/> RF Hangtime: 20 Net Hangtime: 20
YSF Mode:	<input 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:	None Port: 0 Nextion Layout: G4KLX

Apply Changes

General Configuration	
Setting	Value
Hostname:	repeater Do not add suffixes such as .local
Node Callsign:	KD7MPA
CCS7/DMR ID:	311499
Radio Frequency RX:	447.800.000 MHz
Radio Frequency TX:	442.800.000 MHz
Latitude:	42.329627 degrees (positive value for North, negative for South)
Longitude:	-122.8385 degrees (positive value for East, negative for West)
Town:	Medford. CN82NH99

Whats missing

Things MMDVM/Pi-Star don't do

- Decode audio codecs (AMBE)
- Ease of understanding



Others

<https://www.sharkrf.com/products/>

<https://www.dvmega.nl/>

<https://github.com/dg9vh/MMDVMHost-Dashboard>

<https://mmdvm.cc/hambox/>

