

Digital Mobile Radio

HOTSPOTS
VS
REPEATERS

HotSpots vs Reapeaters

- The Amateur Radio DMR Universe
- Access to the DMR Universe
- What is a DMR HotSpot?
- What is DMR Repeater?
- Summary

The Amateur DMR Universe

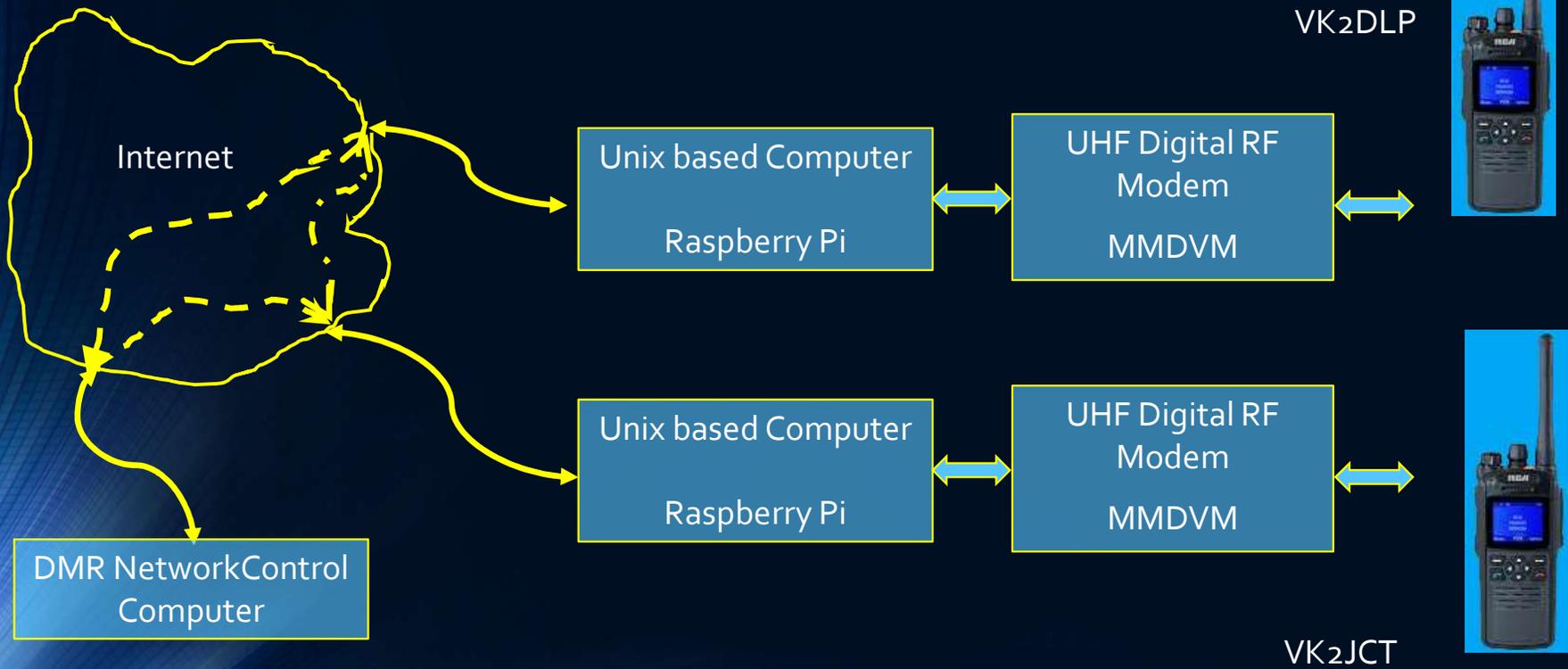
- Digital Mobile Radio (DMR) a commercial world-wide standard
- Amateur use resulted in separate networks (Brandmeister, DMARC, DMR+, Phoenix, TGIF)
- Each network attracted different access technologies
- Brandmeister -> HotSpots
- DMARC -> Repeaters
- Blended networks now becoming a reality Brandmeister, DMR+

What is a DMR HotSpot?

Why

- Need for a low cost easy to configure access method
- Interface for a DMR radio to the Internet
- Low cost computer technology Raspberry Pi (Pi Zero WH \$10)
- Low cost simplex UHF radio modem (MMDVM \$40)
- Software to integrate these 2 components Pi-Star (free, open source)
- Open source hardware and software availability to all

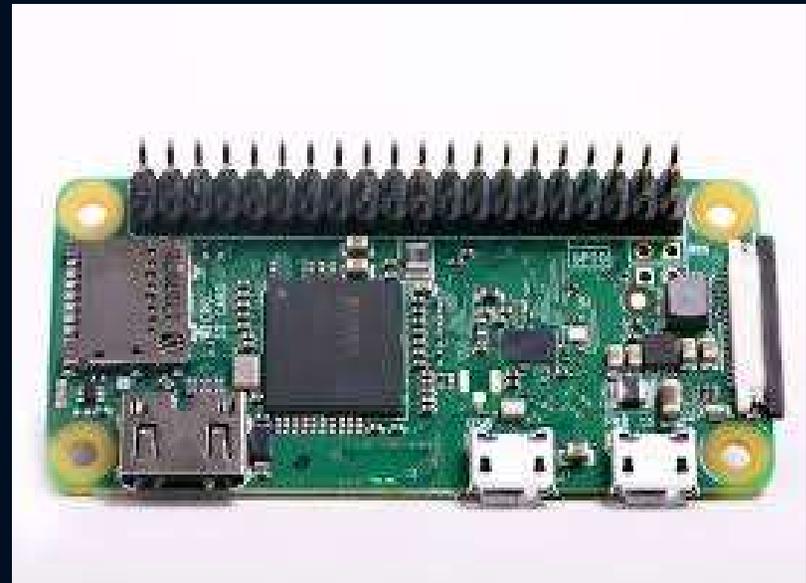
What is a DMR HotSpot? Architecture



What is a DMR HotSpot? Hardware



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What is a DMR HotSpot? Software

PiStar.UK - Pi-Star Digital Voice Software

Home

Home

Pi-Star is a software image built initially for the Raspberry Pi (produced by the Raspberry Pi Foundation). The design concept is simple, provide the complex services and configuration for Digital Voice on Amateur radio in a way that makes it easily accessible to anyone just starting out, but make it configurable enough to be interesting for those of us who cant help but tinker.

Pi-Star would not be here today, were it not for the software made by Jonathan Naylor (**G4K LX**), we started with his DStarRepeater and ircDDBGateway and now support the full G4K LX MMDVM suite, including the extra cross-mode gateways added on by Andy (**CA6JAU**), I cannot thank these guys for the vast amount of time and effort that they continue to put into their projects.

Pi-Star can be what ever you want it to be, from a simple single mode hotspot running simplex providing you with access to the increasing number of Digital Voice networks, up to a public duplex multimode repeater!

The world is at your fingertips, and the choices are yours!

If you like to get your hands dirty, delve beneath the simple to use web based dashboard, Pi-Star provides some unique tools to make administration easy, but we also encourage those who want to understand what the system is and how it works to be as involved as they want to be!

Most importantly, have fun using Pi-Star!

Information
 Help
 Pi-Star Tools
 Multi Reflector
 BrandMeister Tools
 DMR+ Tools
 D-Star Tools
 YSF/FCS Tools
 P25 Tools
 NXDN Tools
 Downloads
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Print PDF

Pi-Star Digital Voice Dashboard for MW0MWZ

Dashboard | Admin | Config

Modes Enabled	
D-Star	DMR
YSF	P25

Network Status	
D-Star Net	DMR Net
YSF Net	P25 Net
Internet	

Radio Info	
Tx	131840Hz
Rx	431.187500 MHz
ZuntLibre	20170414

D-Star Repeater	
RPT1	MW0MWZ_B

Active Starnet Groups				
CollIdgr	LogPFT	Info	UTOT	GTOT
PISTAR_B	PISTAR_U	PI-Star User Group on D-Star	30	30
DMR_B	DMR_U	Blackwood Club Members Group	30	30

Last 20 calls heard via this Gateway						
Time (CST)	Mode	CollIdgr	Target	(Src DurCS)	Loss	BER
2017-05-30 16:30:19	D-Star	DAVE	COCCQ via REF001 C	Net	0.8	0%
2017-05-30 16:27:55	DMR Slot 2	DAVE	TG 91	Net	0.5	0%
2017-05-30 16:25:15	DMR Slot 2	DAVE	TG 91	Net	10.5	0%
2017-05-30 16:24:52	DMR Slot 2	DAVE	TG 91	Net	18.1	0%
2017-05-30 16:19:35	DMR Slot 2	DAVE	TG 91	Net	1.6	0%
2017-05-30 16:17:56	D-Star	DAVE	COCCQ via REF001 C	Net	11.8	0%
2017-05-30 16:17:23	D-Star	DAVE	COCCQ via REF001 C	Net	1.4	0%
2017-05-30 16:16:56	D-Star	DAVE	COCCQ via REF001 C	Net	0.7	0%
2017-05-30 16:11:39	D-Star	DAVE	COCCQ via REF001 C	Net	1.9	0%
2017-05-30 16:10:44	D-Star	DAVE	COCCQ via REF001 C	Net	7.1	0%

What is a DMR HotSpot?

Advantages

- Simple in concept and simple to operate
- Low cost of entry
- You control the access point to the network
- Supported by all major networks
- Use of cellular phone/modem makes DMR available anywhere there is cellular radio service
- Access to a DMR network from anywhere there is Internet access

What is a DMR Repeater

Why

- Access to a DMR network without local Internet access
- Local calls possible without DMR network intervention
- Controlled and well defined talkgroup access
- Wider area coverage than hotspots (45 W vs 10 mW power output)
- Access dependent only on codeplug definition
- Generally very reliable commercial hardware re-purposed

What is a DMR Repeater?

Why

- Repeater linking allows groups of repeaters to be setup at virtually no cost other than Internet traffic
- Beacons possible to allow repeater roaming (Motorola, Hytera)
- Multiple (2) QSOs possible at the same time due to TDMA full duplex operation (TS1 & TS2)
- Talkgroup configuration is the prerogative of the repeater owner/sponsor
- Multi-mode digital operation is possible (DMR, C4FM, D-Star, P25, NXDN, POCSAG)

What is a DMR Repeater?

Sample VK DMR (DMR+) Repeater Talkgroup Configuration

Time Slot 1	Time Slot 2
3809 – VK Chat	3801 – ACT
3810 – VK Chat	3802 – NSW
113 – English Chat #1	3803 – VIC
123 – English Chat #2	3805 – QLD
13 – World Wide English	3805 – SA
9 – Local to repeater	3806 – WA
8 – State-Based Grouping	3807 – TAS
5 – Australia Wide	3808 – NT
	505 – Australia Wide

What is a DMR Repeater?

Sample VK DMR (DMR+) Repeater Channel Configuration

<i>Channel</i>	<i>BW</i>	<i>Tx Freq</i>	<i>Rx Freq</i>	<i>Access Criteria</i>	<i>T/O</i>	<i>TG ID</i>	<i>Rx Group</i>	<i>CC</i>	<i>TS</i>
ACT	12.5	431.825	438.825	Colour Code Free	180	TG3801 ACT	TG3801	1	2
NSW	12.5	431.825	438.825	Colour Code Free	180	TG3802 NSW	TG3802	1	2
Vic	12.5	431.825	438.825	Colour Code Free	180	TG3803 Vic	TG3803	1	2
Qld	12.5	431.825	438.825	Colour Code Free	180	TG3804 Qld	TG3804	1	2
SA	12.5	431.825	438.825	Colour Code Free	180	TG3805 SA	TG3805	1	2
WA	12.5	431.825	438.825	Colour Code Free	180	TG3806 WA	TG3806	1	2
Tas	12.5	431.825	438.825	Colour Code Free	180	TG3807 TAS	TG3807	1	2
NT	12.5	431.825	438.825	Colour Code Free	180	TG3808 NT	TG3808	1	2
3809	12.5	431.825	438.825	Colour Code Free	180	TG3809	TG3809	1	1
AUS	12.5	431.825	438.825	Colour Code Free	180	Australia	TG505	1	2
113 UA	12.5	431.825	438.825	Colour Code Free	180	TG113 UA Eng 1	TG113	1	1
123 UA	12.5	431.825	438.825	Colour Code Free	180	TG123 UA Eng 2	TG123	1	1
WWE	12.5	431.825	438.825	Colour Code Free	180	TG13 WWE	TG13	1	1
3810	12.5	431.825	438.825	Colour Code Free	180	TG3810 AU	TG3810	1	1
9	12.5	431.825	438.825	Colour Code Free	180	TG9 Local	TG9	1	1
8	12.5	431.825	438.825	Colour Code Free	180	TG8 StateLnkd	TG8	1	1
5	12.5	431.825	438.825	Colour Code Free	180	TG5	TG5	1	1

What is a DMR Repeater? Hardware

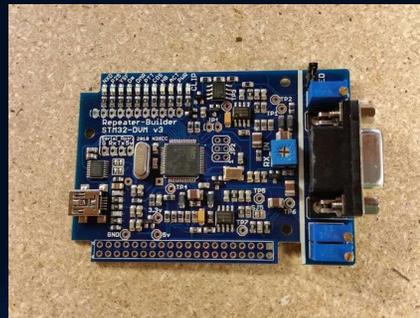


What is a DMR Repeater? Hardware

- Sometimes analogue repeaters can be re-purposed for DMR (but not a KL-450)
- Interface is via a DMR modem similar to a hotspot modem but without any RF components which are supplied by the RF deck
- A combined analogue FM and digital DMR system can be set-up with appropriate hardware



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What is a DMR Repeater? Software

- Commercial DMR repeater software used to program the repeater for amateur use
- Generally this software is complex due to the commercial world's diverse requirements
- Re-purposed analogue repeater hardware plus DMR modem requires repeater manufacturer's configuration software as well as Pi-Star software to configure the modem and its Raspberry-Pi
- Once set up generally can be left alone in operation

Digital Mobile Radio

HOTSPOTS
VS
REPEATERS

Your Decision