

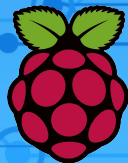
Intro To Pi-Star And MMDVM

McKinney Amateur Radio Club
March 2019

KG5EIU - David

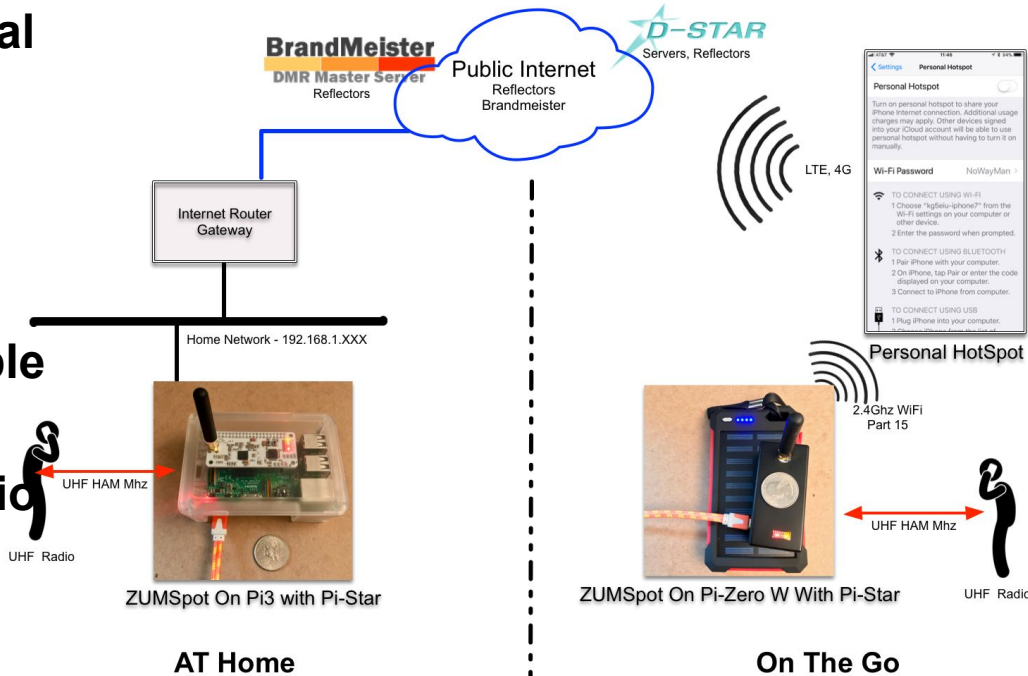


DAPNET
decentralized amateur paging network



Why HotSpots/Pi-Star - System Diagram/Use

- Gives Operator fast easy digital access globally
- High Quality Digital Audio Experience
- No Repeater Access Needed
- Multiple Digital Modes Available with Pi-Star (6 total)
- Most still require operator radio
- Most require a computer or Raspberry Pi



Two HotSpot Types/Categories

No Operator Radio Needed (usually USB dongles and a computer)

- Uses a computer + hardware dongle/vocoder + software
- Requires computer mic and headset plus USB port to power dongle
- Requires “good” Internet connection to/from computer

Operator Radio Needed (HT or mobile/base) (Pi-Star systems need a radio)

- Uses computer + hardware dongle and software + Operator RADIO
- Uses hotspot/appliance/transceiver + Operator RADIO
- Requires “good” internet to/from computer and/or hotspot/appliance

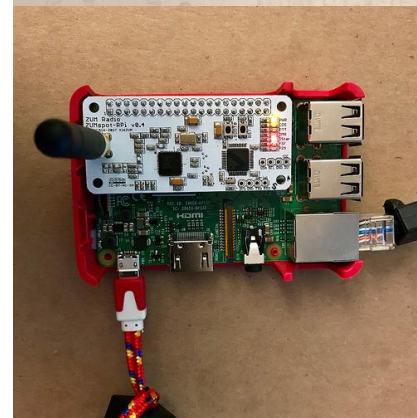
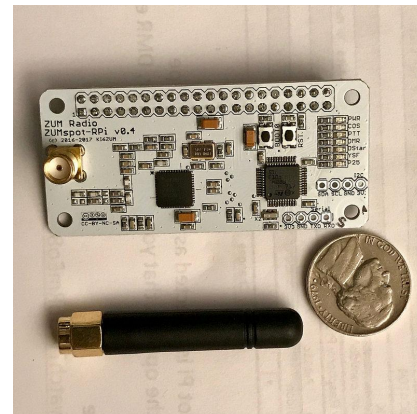
HotSpots: Software + Hardware + Op Radio

- MMDVM - Open Source Multi-Protocol Digital Voice Modem
- ZUMSpot - Radio Module Board (UHF Transceiver) For Pi Hat
- Raspberry Pi - Credit-Card-Sized Computer (Pi3B+, P2, Pi3, Pi-ZeroW)
- Pi-Star - Custom Software Image For Pi (Raspbian + MMDVM)



ZUMSpot Board - UHF Transceiver Pi-Hat

- 32-bit ARM Processor, 10mW RF Power
- “Open” design
- SMA Antenna Connectors
- DMR, P-25, D-Star, System Fusion, NXDN, POCSAG
- Firmware pre-loaded, upgradable
- Display support: NEXTION, I2C Support
- Status LEDs, USB powered
- Needs operator radio's
- YSF2DMR Gateway Support



ZumSpot Kit

<https://www.hamradio.com/detail.cfm?pid=H0-015993>

ZUMSpot Board - HotSpot Examples



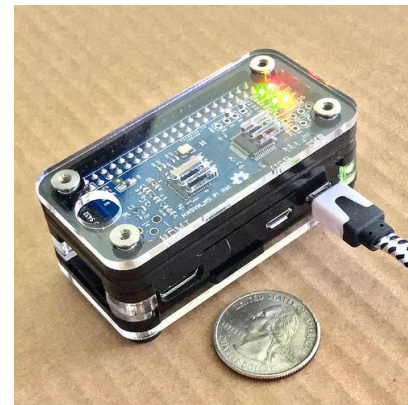
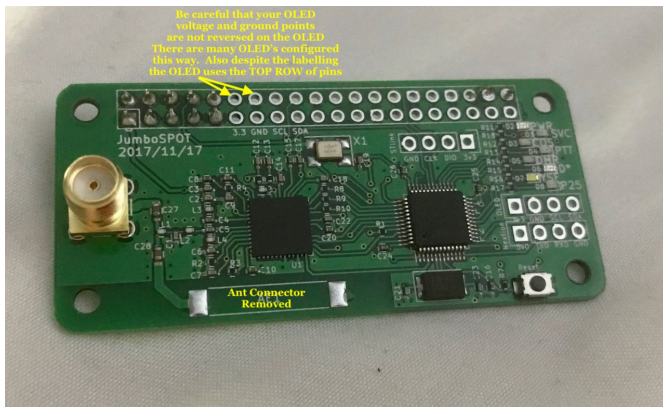
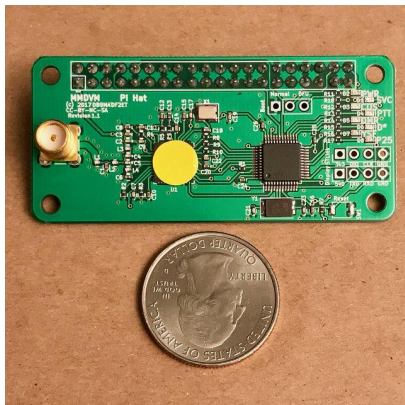
More Photos In The Flickr Gallery - <https://flic.kr/s/aHsm3gQNuo>

Jumbo Spot/China Spot/MMDVM_HS_HAT

- Clone/knock-off of MMDVM PiHat (all open source design)
- UHF or VHF Transceiver Raspberry Pi-Hat
- eBay.com, tindie.com (<https://www.tindie.com/stores/dave31418/>)
- Now upgradable (firmware)

Setup Guide

http://www.hagensieker.com/blog/page/?post_id=99&title=jumbospot-dmr-hotspot



Software And Firmware For HotSpots

Dongles and USB Sticks - Usually A Closed System

- Custom software and firmware provided by hardware vendor

RPI “images” Completely Open Source

- Pi-Star - Hardened Raspberry Pi OS with included MMDVM - Open Source Multi-Protocol Digital Voice Modem code + POCSAG
- Firmware open sourced
- Several choices but Pi-Star most popular and easy

Pi-Star - Software Image/Appliance

Pi-Star Digital Voice - Configuration

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

Gateway Hardware Information

Hostname	Kernel	Platform	CPU Load	CPU Temp
zum-star	4.9.35+	PI Zero W Rev 1.1 (S12MB)	4.67 / 3.05 / 1.41	46°C / 114.8°F

Control Software

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

MMDVMHost Configuration

Setting	Value
DMR Mode:	<input type="radio"/> RF Hangtime: 20 Net Hangtime: 20
D-Star Mode:	<input checked="" type="radio"/> RF Hangtime: 20 Net Hangtime: 20
YSF Mode:	<input type="radio"/> RF Hangtime: 50 Net Hangtime: 20
P25 Mode:	<input checked="" type="radio"/> RF Hangtime: 20 Net Hangtime: 20
MMDVM Display Type:	None Port: /dev/ttyUSB0

General Configuration

Setting	Value
Hostname:	zum-star Do not add suffixes such as .local
Node Callsign:	KG5EU
CC57/DMR ID:	31482893
Radio Frequency:	431.500.000 Mhz
Latitude:	32.815005 degrees (positive value for North, negative for South)
Longitude:	-96.78502 degrees (positive value for East, negative for West)
Town:	Dallas, TX
Country:	US
URL:	http://www.qrz.com/db/KG5EU <input type="radio"/> Auto <input checked="" type="radio"/> Manual
Radio/Modem Type:	ZumSpot - Raspberry Pi Hat (GPIO)
Node Type:	<input type="radio"/> Private <input checked="" type="radio"/> Public
System Time Zone:	America/Chicago
Dashboard Language:	english_us

Pi-Star Digital Voice Dashboard for KG5EU

Dashboard | Admin | Live Logs | Power | Update | Configuration

Gateway Hardware Information

Hostname	Kernel	Platform	CPU Load	CPU Temp
zum-star	4.9.35+	PI Zero W Rev 1.1 (S12MB)	1.12 / 1.56 / 1.63	44.4°C / 111.9°F

Gateway Activity

Time (CST)	Mode	CollSign	Target	Src	Dur(Cs)	Loss	BER
12:56:32 Nov 13th	D-Star	KG5EU/S100	CCCCQ	via W5FC B	Net	2.6	0%
12:55:37 Nov 13th	P25	NB0IG	TG 10200	Net	2.9	0%	
12:54:14 Nov 13th	P25	NXBL	TG 10200	Net	66.2	0%	
12:30:00 Nov 13th	D-Star	KG5EU/TIME	CCCCQ	Net	4.3	0%	
11:44:22 Nov 13th	P25	NB0Y	TG 10200	Net	1.6	0%	
11:18:12 Nov 13th	P25	NZ6D	TG 10200	Net	5.6	0%	
10:54:48 Nov 13th	P25	N5SJM	TG 10200	Net	8.8	0%	
10:54:37 Nov 13th	P25	KG5EU	TG 1	RF	4.0	0.5%	
07:58:42 Nov 13th	P25	KSLPD	TG 10200	Net	0.5	0%	
05:12:41 Nov 13th	P25	MX2T	TG 0	Net	0.4	22%	
02:58:23 Nov 13th	P25	VKATUL	TG 10200	Net	1.4	0%	
18:32:33 Nov 12th	P25	VE3RKK	TG 10200	Net	3.4	0%	
17:35:52 Nov 12th	P25	KAKMKL	TG 10200	Net	1.4	0%	
17:30:44 Nov 12th	P25	V43CZK	TG 10200	Net	0.7	0%	
16:38:59 Nov 12th	P25	VE3OC	TG 10200	Net	0.7	0%	

Local RF Activity

Time (CST)	Mode	CollSign	Target	Src	Dur(Cs)	BER
10:54:37 Nov 13th	P25	KG5EU	TG 1	RF	4.0	0.5%

Radio Info

Trx	TX P25
TX	431.500000 Mhz
Rx	431.500000 Mhz
FW	ZUMspot-v1.0.2

D-Star Repeater

RPT1	KG5EU D
RPT2	KG5EU G
APRS	Texas.aprs2.net
TGC	rr.openquad.net
Linked to W5FC B	(DPlus Outgoing)

P25 Radio

NAC	293
P25 Network	Linked to: TG10200

Pi-Star Digital Voice Dashboard for KG5EU

Dashboard | Admin | Configuration

Modes Enabled

Mode	Enabled
D-Star	<input checked="" type="checkbox"/>
DMR	<input type="checkbox"/>
YSF	<input type="checkbox"/>
P25	<input checked="" type="checkbox"/>

Network Status

Network	Net
D-Star	<input checked="" type="checkbox"/>
YSF	<input type="checkbox"/>
P25	<input checked="" type="checkbox"/>
Internet	<input checked="" type="checkbox"/>

Gateway Activity

Time (CST)	Mode	CollSign	Target	Src	Dur(Cs)	Loss	BER
12:40:42 Nov 13th	P25	WXBL	TG 10200	Net	56.3	0%	
12:39:37 Nov 13th	P25	NB0IG	TG 10200	Net	4.3	0%	0.0%
12:30:00 Nov 13th	D-Star	KG5EU/TIME	CCCCQ	Net	1.6	0%	
11:44:22 Nov 13th	P25	NB0Y	TG 10200	Net	1.6	0%	
11:18:12 Nov 13th	P25	NZ6D	TG 10200	Net	5.6	0%	
10:54:48 Nov 13th	P25	N5SJM	TG 10200	Net	8.8	0%	
10:54:37 Nov 13th	P25	KG5EU	TG 1	RF	4.0	0.5%	
07:58:42 Nov 13th	P25	KSLPD	TG 10200	Net	0.5	0%	
05:12:41 Nov 13th	P25	MX2T	TG 0	Net	0.4	22%	
02:58:23 Nov 13th	P25	VKATUL	TG 10200	Net	1.4	0%	
18:32:33 Nov 12th	P25	VE3RKK	TG 10200	Net	3.4	0%	
17:35:52 Nov 12th	P25	KAKMKL	TG 10200	Net	1.4	0%	
17:30:44 Nov 12th	P25	V43CZK	TG 10200	Net	0.7	0%	
16:38:59 Nov 12th	P25	VE3OC	TG 10200	Net	0.7	0%	

Local RF Activity

Time (CST)	Mode	CollSign	Target	Src	Dur(Cs)	BER
10:54:37 Nov 13th	P25	KG5EU	TG 1	RF	4.0	0.5%

D-Star Repeater

RPT1	KG5EU D
RPT2	KG5EU G
APRS	Texas.aprs2.net
TGC	rr.openquad.net
Linked to W5FC B	(DPlus Outgoing)

P25 Radio

NAC	293
P25 Network	Linked to: TG10200

Current Version as of Mar 10, 2019: v3.4.17_20
Updated frequently! (get the Beta!!)

Pi-Star Digital Voice Software - <http://www.pistar.uk>

Hardware Support With PiStar

PiStar (download from <http://www.pistar.uk/downloads/>)

- Custom RPI software, free and open source.
- New Icom radio terminal mode support
- Lots of dongles, boards, and USB sticks supported. (as of Feb 2019 ver 4.0 RC3)



PiStar Software Features

Digital Modes As Of Mar 2019

- DMR
- D-Star
- Fusion (YFS, FCS)
- P25
- NXDN
- POCSAG (paging)



PiStar Features As Of Mar 2019

- YSF 2 DMR
- YSF 2 NXDN
- YSF 2 P25
- DMR 2 YSF
- DNR 2 NXDN
- DAPNET Paging - hampager.de
- Icom Terminal Mode (RC4 beta)

Handy Network Portals and Dashboards

Great way to see “what is going on” - in the Internet side
BrandMeister Dashboard (DMR) Self Help and more

- <https://brandmeister.network>

Xreflector.net

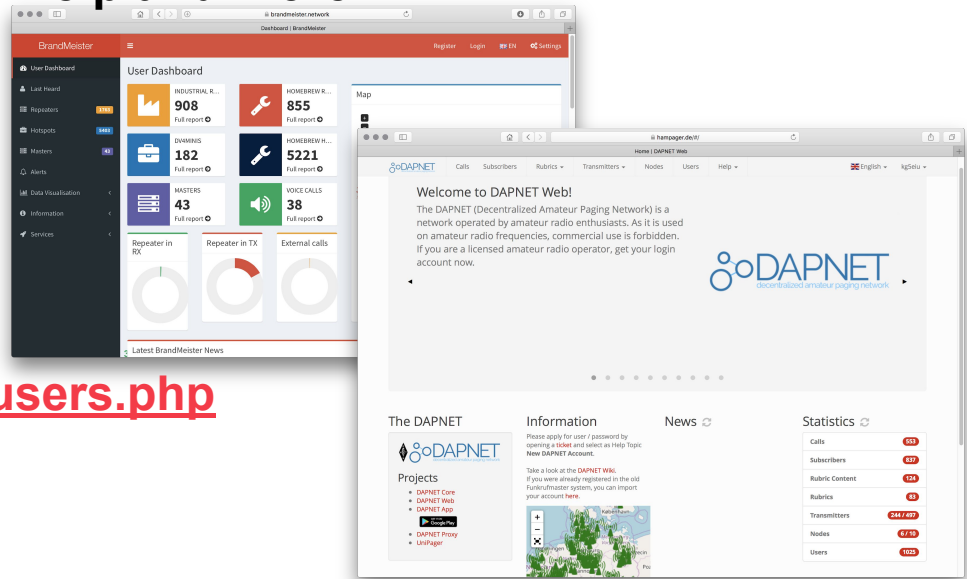
- <http://xreflector.net/neu3/>

DMR Plus CCS7 User Database

- <http://www.mw0mwz.co.uk/dmrusers.php>

DAPNET (Paging)

- <https://hampager.de/#/>



Get Started Quickly With A HOTSpot:

You Will Need:

Digital Radio (Fusion, D-Star, DMR, NXDN, P25) base, mobile or HT
WiFi Internet Connection (L3 no good need L2 ie. password)

Acquire/Purchase:

HotSpot: ZUMspot Kit - HRO <https://www.hamradio.com/detail.cfm?pid=H0-015993>

MMDVM_HS_HAT - https://www.tindie.com/products/dave31418/mmdvm_hs_hat-rev-15-simplex/

Case: <https://www.hamradio.com/detail.cfm?pid=H0-016096>

Read/Follow:

Well Done Setup Guide: <https://www.toshen.com/ke0fhs/pi-star.htm>

ZUMSpot Board - Reference Links

- MMDVM - <https://github.com/g4klx>
- ZUMSpot - (hamradio.com)
- MMDVM_HS_HAT rev 1.5 - [tindie.com N5BOC Store](https://www.tindie.com/products/N5BOC)
- Raspberry Pi - <https://www.raspberrypi.org/products/>
- Pi-Star (and forums) - <http://www.pistar.uk>
- Support/Latest Info - <https://www.facebook.com/groups/pistarusergroup/>
- Initial Setup Videos W1MSG - <https://youtu.be/B5G4gYDdJeQ>
- BrandMeister Network - <https://brandmeister.network>
- KG5EIU Photo Gallery - <https://flic.kr/s/aHsm3gQNuo>
- DAPNET - Decentralized Amateur Paging Network <https://hampager.de/#/>

Thank You!



Comments And Questions?

KG5EIU - David

