

# Setup and Operation of a Pi-Star Hotspot



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# What we will discuss & show

- ▶ Why do you need or want a hotspot?
- ▶ Supported Digital Voice modes
- ▶ Hardware
- ▶ Software
- ▶ Configuration
- ▶ Demo

ASK  
QUESTIONS  
ANYTIME

These slides are on our web site – [www.charlottedigitalradio.org](http://www.charlottedigitalradio.org)



# Why do you need or want a hotspot?

- ▶ A hotspot can take the place of an internet connected digital voice repeater.
- ▶ Local repeaters may be out of range for the mode you want to operate - especially for antenna restricted communities or when using an HT.
- ▶ Repeater owners may restrict what you are allowed to do with the repeater.
- ▶ You can make the hotspot totally your own and have full control of it's operation.
- ▶ Hotspots can be assembled inexpensively.
- ▶ It is fun project to do and can be done by most hams.

# Supported Digital Voice Modes

- ▶ Today's hotspots usually support more than one DV mode
  - ▶ D-STAR
  - ▶ DMR
  - ▶ C4FM (Yaesu's System Fusion)
  - ▶ P25
  - ▶ NXDN (Nexedge)
- ▶ Like a repeater a hotspot connects via the internet to a:
  - ▶ Reflector
  - ▶ Talk Group
  - ▶ Room

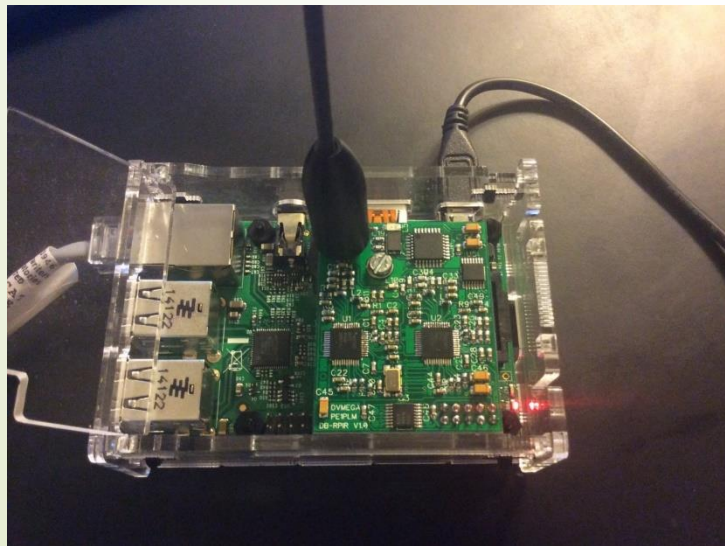
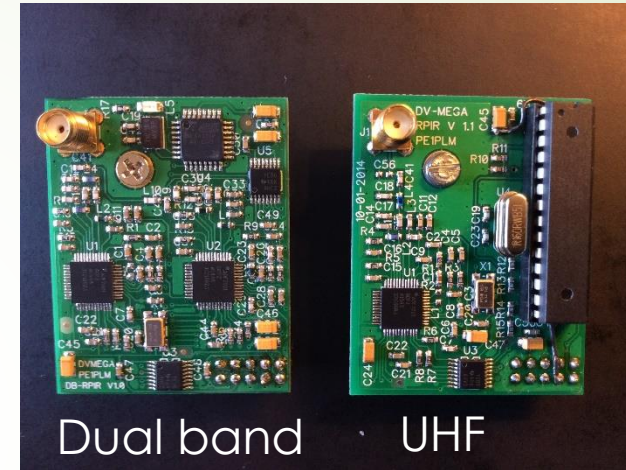
# Hardware

- Most hotspots are built on a small form factor computer such as a Raspberry Pi although there are others that work such as the Odroid and Beagle Bone Black
- A low power radio board mounted on the computer has evolved from the DVAP and DV4Mini to the DVMega by Guus van Dooren, PE1PLM and most recently the ZUMspot by Jim McLaughlin, KI6ZUM
- If you don't want to build a hotspot you can buy them from SharkRF (OpenSPOT) or Micro-Node (NanoSpot).
- For every mode you want to use you will need a radio and the hotspot must support that radio's mode.



# Hardware - DVMEga

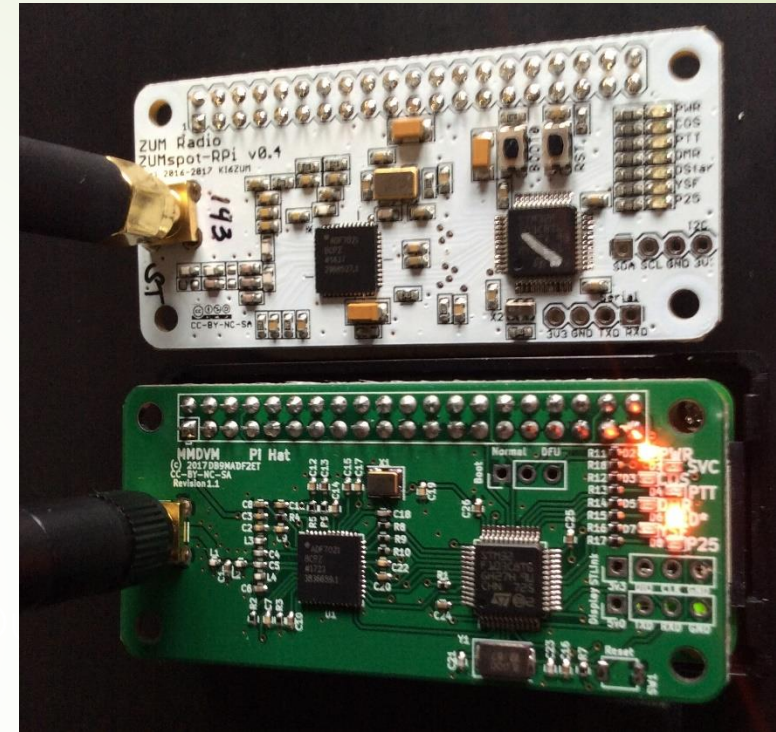
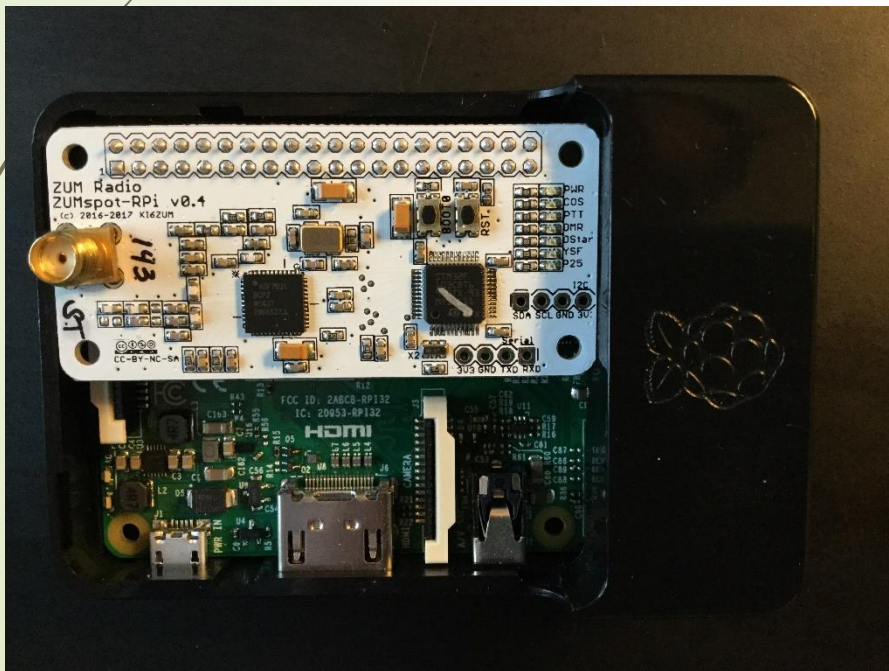
- Developed by Guus van Dooren, PE1PLM - <http://www.dvmega.nl/>
- UHF and dual band versions plug into the Raspberry Pi's GPIO pins
- Also available is a dual band version for the Arduino Uno



- Can be purchased from Gigaparts.
- Modes: D-STAR, DMR, C4FM
- Dual band board has two ADF 7021 radio chips - \$169
- UHF board has one ADF 7021- \$129

# Hardware - ZUMspot

- Developed by Jim McLaughlin, K16ZUM (top)
- MMDVM Pi Hat (bottom) is a Chinese copy
- Plugs into the Raspberry Pi's GPIO pins
- Uses ADF 7021 radio chip and Atmel STM32F32 bit microprocessor chip



- ZUMspot can be purchased from HRO - \$115 with display, \$140 with display and Pi Zero W
- MMDVM and Duplex Hotspot can be purchased on Alibaba and Ebay
- Modes: D-STAR, DMR, C4FM, P25 & NXDN



# Software

- Credit must go to Jonathan Naylor, G4KLX, for his multi-year development of dstarepeater, ircddbgateway and MMDVM (Multi-mode Digital Voice Modem). <https://github.com/g4klx/>
- Many have created Digital Voice Raspberry Pi images, but the latest and best is Pi-Star assembled by Andy Taylor, MW0MWZ, <https://github.com/AndyTaylorTweet> and Andy Uribe, CA6JAU <https://github.com/juribeparada>
- Others too numerous to mention have contributed to the effort of these three hams. See the contributor list on each github.
- Additionally there is an alternate platform for use on a smart phone. David Grootendorst, PA7LIM, has written BlueDV for Android, iOS and Windows. He has also written Peanut for Android. <http://www.pa7lim.nl/bluedv/>



# Demo – Let's Start

- ▶ Where to start? <http://www.pistar.uk/>
  - ▶ Downloads for various platforms
  - ▶ Instructions, how to videos and lots of help
- ▶ You will need some utilities installed on your PC:
  - ▶ SD Card Formatter <https://www.sdcard.org/>
  - ▶ Zip File extractor <https://www.7-zip.org/download.html> (optional)
  - ▶ SD Card Image Writer <https://www.balena.io/etcher/> or Win32 Disk Imager <https://sourceforge.net/projects/win32diskimager/>

# Setup steps

- On your PC:
  - Download the Pi-Star image for your computing device
  - Unzip the file
  - Format the SD card
  - Flash Pi-Star image to the card
  - Set up WiFi using tool if not direct connecting to a router
- Insert SD card into the Pi and power up
- Start browser and enter <http://pi-star/admin/>
- Follow the prompts to configure Pi-Star
  - Pick a frequency outside of the 435-438 MHz satellite band
  - As you add configuration data review prior sections as additional lines may appear
  - If you will run multiple pi-star hotspots, change Hostname

# Flashing Firmware

- Refer to the instructions at <https://github.com/juribeparada> located in the MMDVM\_HS repository.
- Scroll down to “Binary firmware installation”
- On the next line click on “here” to see if there is a new firmware release. The most recent will be first, older releases follow.
- If there is a newer release, refer to the command on the previous page to update your supported device.
- On the Pi-Star web page click on Configuration / Expert / SSH Access
- Log in, type rpi-rw to make read/write.
- Type the proper command from the instructions and follow the prompts including a reboot.

# General Information Sources

- <http://www.charlottedstar.org/> – This is our web site. Use Registration link at the bottom of the page to register your call sign for D-STAR.
- <https://groups.io/g/CharlotteDigitalRadio> – This is our group. Please join to keep up with what we are doing. Post a message or question.
- [www.dstar101.com](http://www.dstar101.com) – good beginner's web site to learn about D-STAR.
- [www.dstarinfo.com](http://www.dstarinfo.com) – download repeater lists to import into your D-STAR radio.
- [www.dstarusers.org](http://www.dstarusers.org) – Official D-STAR repeater directory.
- [www.ncprn.net](http://www.ncprn.net) – Web site for our area DMR repeaters. Code plugs for several DMR radios are available for download.
- <https://radioid.net/register#!> – Register your call sign here for DMR.
- [www.trbo.org/docs/Amateur Radio Guide to DMR.pdf](http://www.trbo.org/docs/Amateur%20Radio%20Guide%20to%20DMR.pdf) – Basic DMR guide.
- <https://brandmeister.network/> - Home page for Brandmeister DMR network activity and info.
- <https://wp.hamoperator.com/> – learn about System Fusion and WIRES-X. Look for the WIRES-X bible under Fusion Help.

