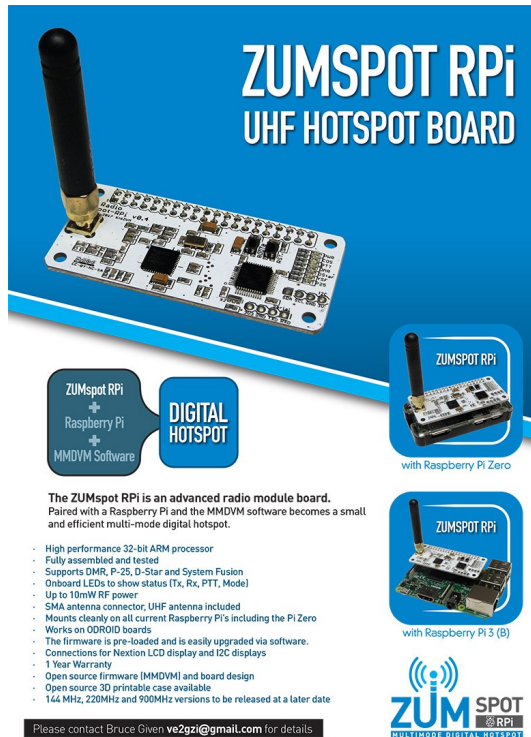


Digital Radio Hot Spot



ZUMSPOT RPi
UHF HOTSPOT BOARD

ZUMspot RPi
+
Raspberry Pi
+
MMDVM Software

**DIGITAL
HOTSPOT**

The ZUMspot RPi is an advanced radio module board. Paired with a Raspberry Pi and the MMDVM software becomes a small and efficient multi-mode digital hotspot.

- High performance 32-bit ARM processor
- Fully assembled and tested
- Supports DMR, P-25, D-Star and System Fusion
- Onboard LEDs to show status (Tx, Rx, PTT, Mode)
- Up to 10mW RF power
- SMA antenna connector, UHF antenna included
- Mounts cleanly on all current Raspberry Pi's including the Pi Zero
- Works on ODROID boards
- The firmware is pre-loaded and is easily upgraded via software.
- Connections for Nexion LCD display and I2C displays
- 1 Year Warranty
- Open source firmware (MMDVM) and board design
- Open source 3D printable case available
- 144 MHz, 220MHz and 900MHz versions to be released at a later date

Please contact Bruce Given ve2gzi@gmail.com for details

ZUM SPOT
MULTIMODE DIGITAL HOTSPOT

If you're like me, deciding to embark upon the world of digital radio, confusion is likely to be the result, likely to make you abandon the whole idea, going back to what you know and understand.

However the digital mode experiencing rapid growth is DMR, but like all the others, requires a radio that uses that specific protocol. The same applies to the other modes such as D-Star etc. The exception to this is Echo Link, this mode can be operated with just a computer or mobile phone. If wanting to use a radio it with, a simple analogue interface will get you operational on that mode.

So you decide to get a Digital Radio, this could be one of the available protocols, DMR, D-Star, Yaesu System fusion (Also known as C4FM) etc.

Usually the decision on the mode is driven by what your local club provides as a mode, in my case it's the Yaesu system (C4FM)

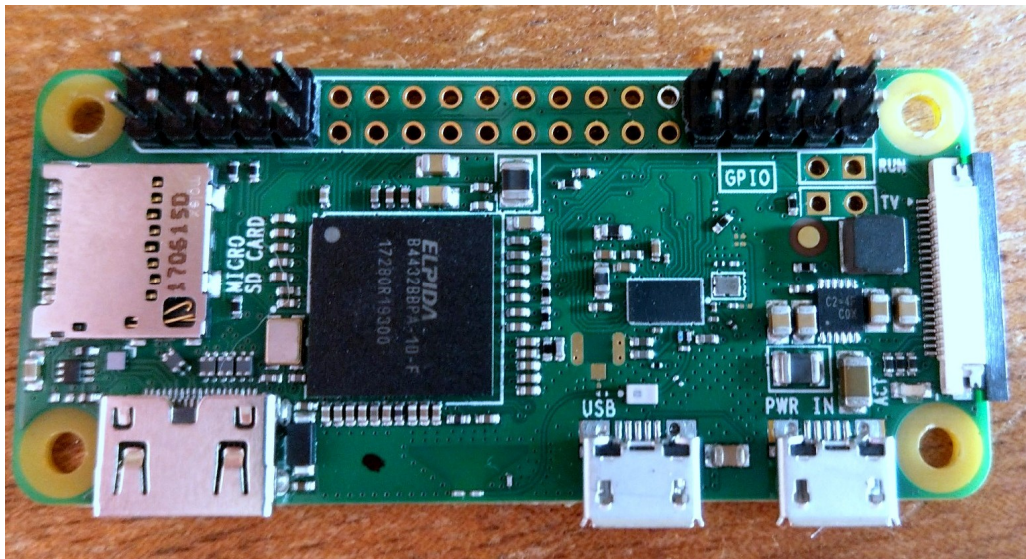
If you reside within reach of the digital repeater, you will be up and running, but if out of range you will have a very expensive analogue radio, with digital mode that you can't use locally at your QTH, only when in range of the repeater.



You get told to get a HotSpot, (The fun starts now), there are so many options, from a dongle that attaches to your computer to dedicated devices such as the Shark RF Open Spot. What all these devices do basically is to allow your radio to connect to the digital networks for the protocol your radio uses. So if you have a portable using DMR or a Mobile using the Yaesu system, you can now operate on the digital mode of your choice.

There is only one device that I am aware of, that allows one mode to cross to another mode, this is the SharkRF pictured above, the device allows you to use one mode and talk to another mode, for example DMR to D-Star, the only issue I am aware of is that the audio quality is not the best, (More to do with CPU speed used in the device). The device is not cheap, will cost over \$260 plus shipping.

Aside from other devices that are available, the present most cost effective accepted device is the ZumSpot RPi, this works in conjunction with a Raspberry Pi computer.



Raspberry Pi Zero

The Raspberry Pi can be found for less than \$30, this makes it an affordable platform.

The ZumSpot was designed to piggy back the board providing a device that allows many things that I will point out later in the article.

ZumSpot was designed a group of amateurs across the world, it will cost about \$120

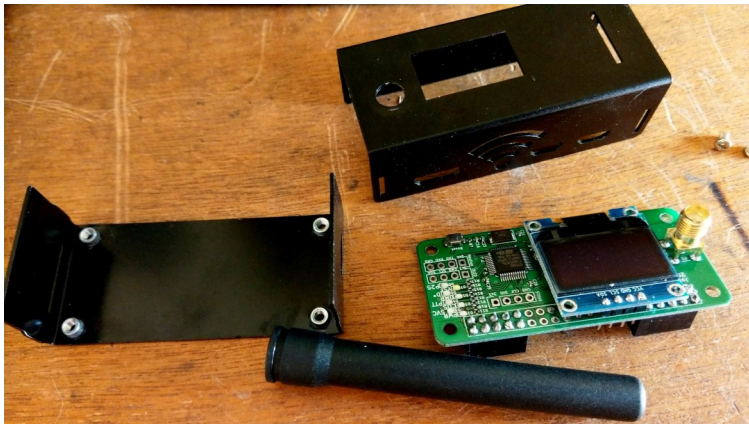
With the Raspberry Pi you get all required to make the hot spot.

There is another board called the JumboSpot, that is also called a MMDVM Hot spot.

This board is an exact clone of the ZumSpot, at first glance the price differential from the original to the clone is not very great but when you include a case and a OLED display, what I am next providing makes financial sense.

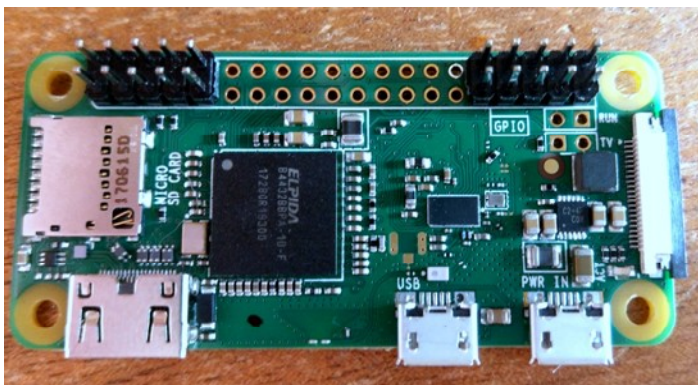
Fully assembled device is available (eBay) from \$150 to \$170 only thing to add is an SD card with the required Raspberry Pi software. Or you can go the way I have, Raspberry Pi Zero for \$23.00, a JumboSpot kit that includes Case OLED display, Antenna, and ZumSpot clone, all for \$74, so for a total of \$97 a functional hot spot is built.

The only other thing required is an SD card; the files on the card are 63 MB so any card to accommodate this will be fine.



OK you have chosen to get the kit, Raspberry Pi board with OLED display, case antenna. Be careful here, some vendors don't include the display, look carefully at what is offered to you.

You can assemble by soldering the supplied pins to the Raspberry Pi board.



On some kits you may also need to solder the OLED to the HotSpot board. Assemble the boards into the case. Make sure that you align the case so that the SD card slot aligns with the slot in the case. (It's the thin slot).

So you have the thing assemble and that is all there is as far as the hardware is concerned.

What is left to do is to load the operating system (Boot) to the SD card, and then load the WiFi patch so that your device can communicate with the internet, followed with configuration of the HotSpot

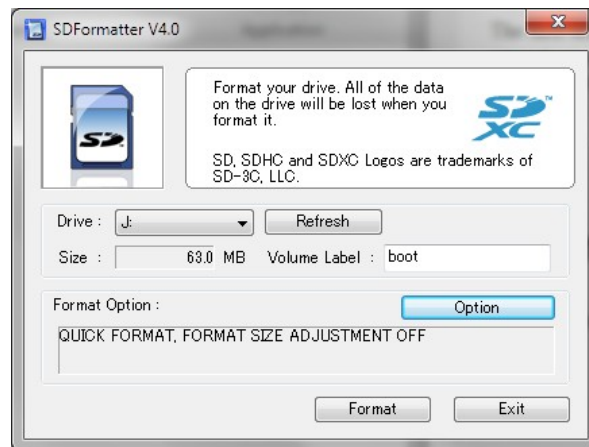
Preparing the SD card

All following instruction will be done on a Windows Computer, be aware that the Raspberry Pi operates with Linux, so we need to follow procedures that bypass any constraints that the windows system can introduce. All software required I will provide links for your ease to download, please don't diverge or use something else, it could work or it could not, I am only giving you what I have used with no issues.

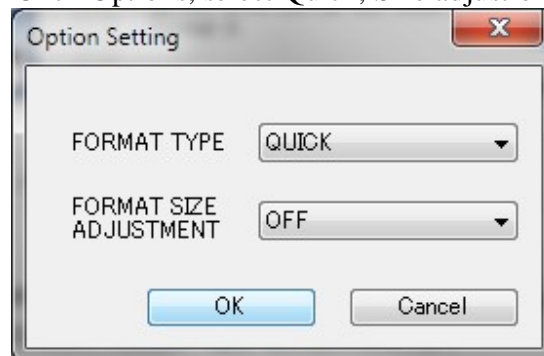
The first task is to format your SD card, use a program called "SD Card Formatter" the current version at the time of writing this article is Version 4

<https://sd-card-formatter.en.uptodown.com/windows/download>

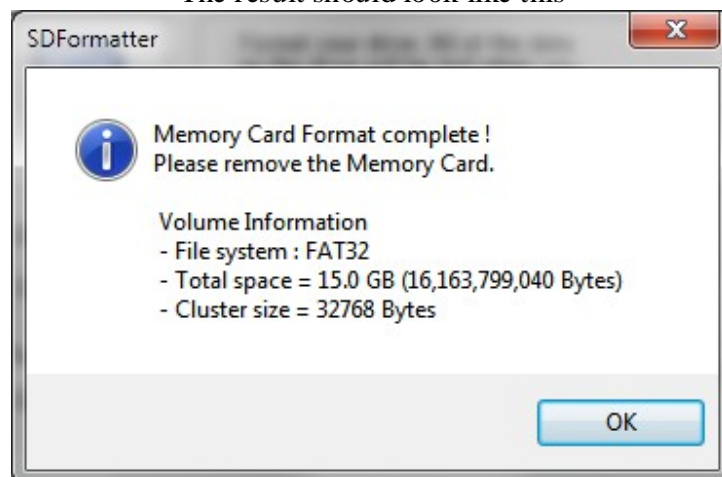
Start the Formatter



Click Options, select Quick, Size adjust off



The result should look like this

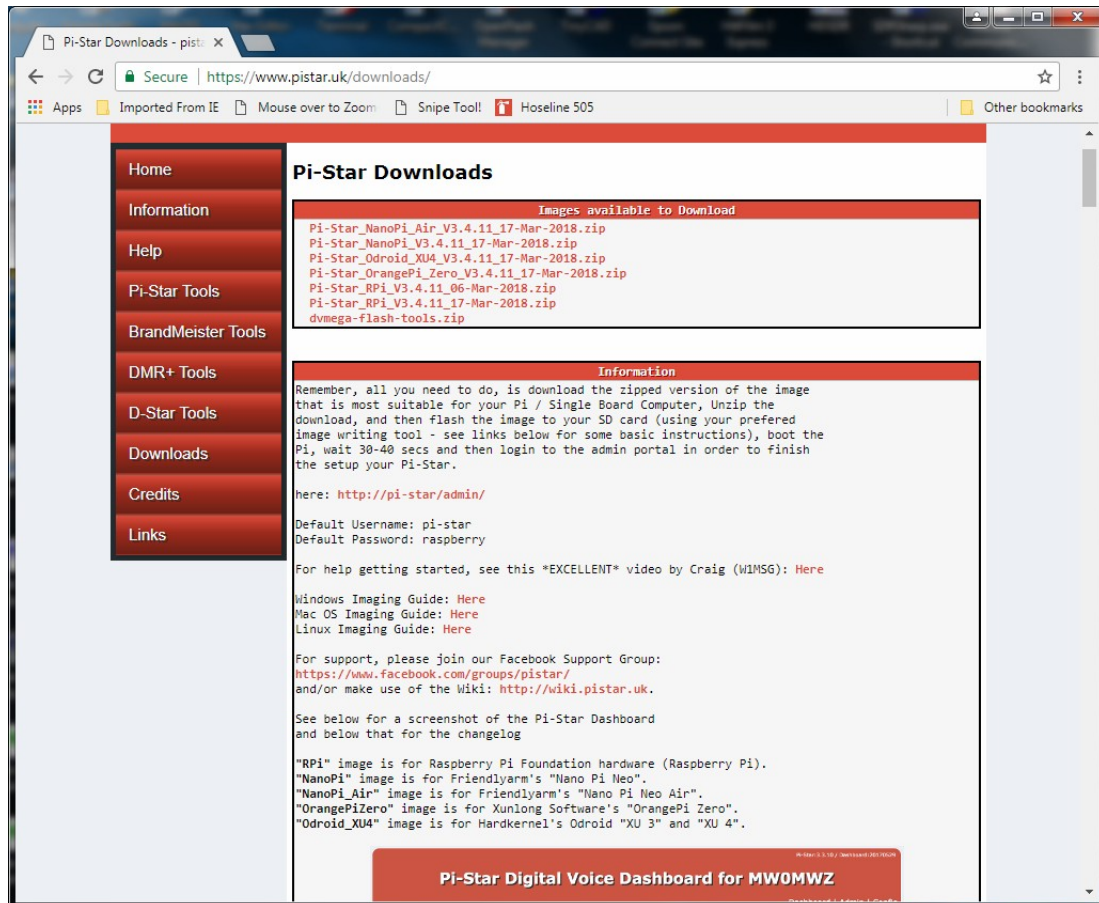


The Total space will depend on the card you are using

The Open Spot Operating System

We now need to download the program for the Raspberry Zero, the Software is called Pi-Star, it's on the site. <https://www.pistar.uk>

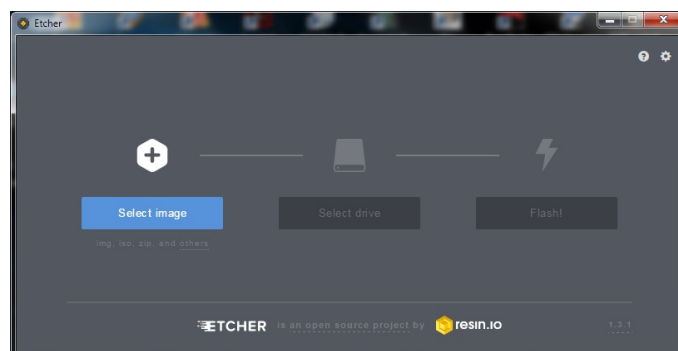
Go to the download page, select "Pi-Star_RPI" the others are for different boards.



Having downloaded the file, extract same in another folder, don't try to install from the zipped folder.

The next program you need to download is the one that will copy a Linux image on your SD card. This program is called "Etcher" <https://etcher.io>

Launch the program



Next click on Select Image, point to the folder you unzipped the image file
Click on the file. Then click Open.

Next you will be asked to select the drive, select your SD card. Followed with clicking the Flash Icon. This process is not fast so go and make a coffee.

Once done you can now place the SD card into your hot spot.
Next you need to make the Open spot talk to your network WiFi

Go back to the " <https://www.pistar.uk/index.php>"

Select PI-Star Tools, Click on WiFi Builder

What you will need if your WiFi SSID (This is the name that is reported to your attached to WiFi device, The PSK is the password that allows connecting to your WiFi

Click submit and the system will download a file for you called " wpa_supplicant.conf"
Remove the SD card from the device and using your computer copy the file to the root of the SD card. (Not in Overlay)

You will now be able to communicate to your computer to the HotSpot
on your browser type either the IP address that you can retrieve from your router or using this address " <http://pi-star/admin/> "

Your log in details are by default

Default Username:	pi-star
Default Password:	raspberrry

Your hot spot is now up and running.

There are many tutorials on the net for this, any queries get in touch with me.
(Don't Forget to add the offset to you radio frequency, this is stated on your kit
Eg 432.220.000 make it 432.220.500

VK2YMU - Digital Voice

pi-star/admin/configure.php

Mouse over to Zoom

Snake Tool

Hoseline 505

Other bookmarks

MMDVMHost Configuration

Apply Changes

Setting	Value
DMR Mode:	<input type="checkbox"/> RF Hangtime: 20 <input type="checkbox"/> Net Hangtime: 20
D-Star Mode:	<input type="checkbox"/> RF Hangtime: 20 <input type="checkbox"/> Net Hangtime: 20
YSF Mode:	<input checked="" type="checkbox"/> RF Hangtime: 20 <input type="checkbox"/> Net Hangtime: 20
P25 Mode:	<input type="checkbox"/> RF Hangtime: 20 <input type="checkbox"/> Net Hangtime: 20
NCON Mode:	<input type="checkbox"/> RF Hangtime: 20 <input type="checkbox"/> Net Hangtime: 20
YSF2DMR:	<input type="checkbox"/>
MMDVM Display Type:	OLED <input type="checkbox"/> Port: /dev/ttyAMA0 <input type="checkbox"/> Flexion Layout: G4KLX <input type="checkbox"/>

Apply Changes

General Configuration

Apply Changes

Setting	Value
Hostname:	pi-star <input type="text"/> Do not add suffixes such as .local
Node Callsign:	VK2YMU
Radio Frequency:	432.225-500 <input type="text"/> Hz
Latitude:	-35.88289 <input type="text"/> degrees (positive value for North, negative for South)
Longitude:	146.57431 <input type="text"/> degrees (positive value for East, negative for West)
Town:	Balldale, QF34GC
Country:	Australia
URL:	http://www.qz.com/db/VK2YMU <input type="text"/> <input checked="" type="radio"/> Auto <input type="radio"/> Manual
Radio/Modem Type:	ZumSpot - Raspberry Pi Hat (GPIO) <input type="text"/>
Node Type:	<input type="radio"/> Private <input checked="" type="radio"/> Public
System Time Zone:	Australia/Melbourne <input type="text"/>
Dashboard Language:	english_uk <input type="text"/>

Apply Changes

Yaesu System Fusion Configuration

Apply Changes

Setting	Value
YSF Startup Host:	77353 - CA Canada - C4FM Ontario <input type="text"/>
APRS Host:	aunz.aprs2.net <input type="text"/>

Apply Changes

Firewall Configuration

Apply Changes

Setting	Value
Dashboard Access:	<input checked="" type="radio"/> Private <input type="radio"/> Public
ircDDBateway Remote:	<input checked="" type="radio"/> Private <input type="radio"/> Public
SSH Access:	<input checked="" type="radio"/> Private <input type="radio"/> Public
Auto AP:	<input checked="" type="radio"/> On <input type="radio"/> Off <input type="text"/> Note: Reboot Required if changed

Apply Changes

Wireless Configuration

Refresh

Reset WiFi Adapter

Configure WiFi