

Setting up a Zumspot HotSpot for System Fusion (by K7VTT)

Items you will need:

- 1) A Zumspot HotSpot (several “styles” are available from HRO or from a variety of sources on the Internet)
- 2) A micro USB equipped power source (either a “wall wart” or battery pack)
- 3) A micro SD card of at least 16 Gigs capacity (if your Zumspot “kit” doesn’t already include one) and a card adapter (often included with micro SD cards)
- 4) A computer equipped with an SD card slot or an external USB SD card “reader” and WiFi
- 5) A WiFi network (You need to know your WiFi network’s specific ID/name and password as well)
- 6) The FREE Pi-Star software downloaded to your computer (unless your Zumspot “kit” already has it pre-loaded)
- 7) “Etcher” software for installing Pi-Star to an SD Card. Link: <https://www.balena.io/etcher/>
- 8) A System Fusion capable radio (model doesn’t matter)
- 9) Some PATIENCE and PERSISTENCE!

Here are some links to assist you in finding where to purchase some of the items listed above:

- 1- Zumspot KIT from HRO (I strongly recommend this one because it includes a micro SD card pre-loaded with Pi-Star software on it:

<https://www.hamradio.com/detail.cfm?pid=H0-016491>

Also includes an OLED display built-in and Raspberry Pi Zero computer. No case is included, but you can buy or make one. HRO sells them, and they are widely available on Amazon and eBay as well.



- 2- USB micro power unit (the one below, from Amazon is \$8 – I recommend it because it has an inline on/off switch):

https://www.amazon.com/gp/product/B073JDFML5/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1

NOTE: I recommend using this item because the power connector on the Pi Zero is a small, somewhat delicate micro USB port, and it’s better to have this inline switch to power-cycle it, since power cycling of the Pi is often required during setup and configuration, and it’s required repeatedly.



3- Radio:

For those of you who are just getting started and want the best “bang-for-the-buck” entry level Fusion-capable radio, I recommend the excellent and affordable Yaesu FT-70D:

<https://www.gigaparts.com/yaesu-ft-70dr.html>



CONNECTING TO YOUR ZUMSPOT VIA WiFi

On your computer, go to the following web site address:

<http://www.pistar.uk>

Along the left side, under “Pi-Star Tools”, select “**WiFi Builder**”. From the pop-up next to “WiFi Country Code” select **US**. In the “SSID” box enter your WiFi network’s **name/ID**. In the “PSK” box enter your WiFi network’s **password**. Click on “Submit”, and this will automatically download a file named “**wpa_supplicant.conf**” to your computer, most likely into your “Downloads” folder. Go to your Downloads folder and find this file. I recommend dragging it out on to your desktop.

If you purchased a HotSpot with a micro SD card with Pi-Star software already loaded on it, make sure the HotSpot is **POWERED OFF**, and then remove the micro SD card from the slot on the Pi Zero.

Insert your micro SD card with Pi-Star already loaded on it into the internal or external SD card reader on your computer.

Find the **wpa_supplicant.conf** file you created using WiFi Builder on your Desktop, and drag it to the “root” of your micro SD card (that means it shouldn’t be inside any folder(s) on the card). **NOTE:** The SD card will usually have a label of **boot**. Eject and remove the micro SD card from the computer.

With the power **TURNED OFF** on your Zumspot, insert the micro SD card into the Pi Zero’s micro SD card slot.

CRITICAL WARNING! There are **TWO** USB micro ports on the Zumspot/Pi Zero. The last one, which is opposite the end where the micro SD card goes, is the power port. It is **ESSENTIAL** that you plug the power into the correct port! Not doing so will destroy the Pi Zero. Once you’ve identified the correct port, plug your power unit into the Zumspot.

If you have the power unit with the inline power switch, you may need to press it to turn on the HotSpot. Once it’s powered on, a small green LED near the power port on the Zumspot will “flicker” as the Pi-Star software loads – **BE PATIENT!** The boot up of a Raspberry Pi can be painfully slow compared to modern computers. Recommend you wait a **FULL 5 MINUTES** before proceeding to the next phase (the LED should eventually stop “flickering” when it’s ready).

NOTE: If you need to download the latest **STABLE** version of the Pi-Star software, here’s a link:

https://www.pistar.uk/downloads/Pi-Star_RPi_V4.1.2_20-May-2020.zip

After you unZip it, burn the .img file to your micro SD card using a program like “Etcher”. (See Link in para. 7 on page 1).

CONFIGURING YOUR Pi-Star SETTINGS for SYSTEM FUSION

If you followed the instructions given so far, your Zumspot should be ready to be connected to and be configured via your WiFi network.

On the computer that is on the SAME WiFi network as the info you used in the previous “WiFi Builder” instructions, open a web browser (Firefox, Safari, Chrome, IE, Edge, etc.) and enter:

<http://pi-star.local/configuration> (on a Mac) or,

<http://pi-star/configuration> (on a Windows PC) press Enter/Return on your keyboard.

You should see the following Pi-Star “login screen”:

Log in to pi-star.local:80
Your password will be sent unencrypted.

User Name

Password

Remember this password

In the User Name box, enter **pi-star** and in the Password box, enter **raspberrypi** and then hit Enter/Return on your keyboard. The Pi-Star “Dashboard” appears. Click on “Admin” at the top of the Dashboard window, and you should be presented with the Pi-Star “Admin Dashboard” similar to that below (wait a few seconds after you see the “No Mode Defined” message, and it should go to the screen below):

Pi-Star:4.1.2 / Dashboard: 20200520

Pi-Star Digital Voice - Configuration

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

Gateway Hardware Information

Hostname	Kernel	Platform	CPU Load	CPU Temp
pi-star	4.19.97+	Pi Zero W Rev 1.1 (512MB)	1.73 / 1.84 / 1	44.4°C / 111.9°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 Node <input type="radio"/> Duplex Repeater (or Half-Duplex on Hotspots)

General Configuration

Setting	Value
Hostname:	pi-star Do not add suffixes such as .local
Node Callsign:	M1ABC
Radio Frequency:	438.800.000 Mhz
Latitude:	50.00 degrees (positive value for North, negative for South)
Longitude:	-3.00 degrees (positive value for East, negative for West)
Town:	Town, LOC4TOR
Country:	Country
URL:	<input type="text" value="http://www.mw0mwz.co.uk/pi-star/"/> <input type="radio"/> Auto <input checked="" type="radio"/> Manual
Node Type:	<input checked="" type="radio"/> Private <input type="radio"/> Public
APRS Host:	<input type="text" value="euro.aprs2.net"/>
System Time Zone:	<input type="text" value="Europe/London"/>
Dashboard Language:	<input type="text" value="english_uk"/>

Firewall Configuration

Setting	Value
Dashboard Access:	<input checked="" type="radio"/> Private <input type="radio"/> Public
ircDDBGateway 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 Note: Reboot Required if changed
uPNP:	<input checked="" type="radio"/> On <input type="radio"/> Off

Wireless Configuration

Wireless Information and Statistics

Interface Information	Wireless Information
Interface Name : wlan0 Interface Status : Interface is up IP Address : 192.168.0.119 Subnet Mask : 255.255.255.0 Mac Address : b8:27:eb:0a:81:9f	Connected To : MAC-2 AP Mac Address : 70:4f:57:6e:23:cf Bitrate : 72.2 Mbit/s Signal Level : -2 dBm
Interface Statistics Received Packets : 85516 Received Bytes : 124697427 (118.9 MiB) Transferred Packets : 13151 Transferred Bytes : 1529820 (1.4 MiB)	Transmit Power : 31 dBm Link Quality : 100 % Channel Info : 2.4GHz Ch2 (2.417 GHz) WiFi Country : GB

Information provided by ifconfig and iwconfig

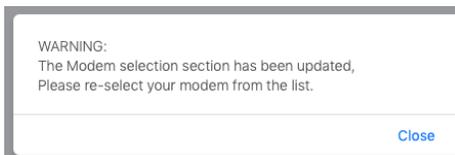
This is the Pi-Star “Configuration” screen. We will be concentrating primarily on the General Configuration section.

Fill in the following boxes with your own information:

- Node Callsign
- Radio Frequency (the UHF frequency you plan to use to connect from your Fusion radio to the Zumspot)
- Latitude and Longitude
- Town, Locator (the latter is your “Maidenhead grid square” location – mine is DM42mk) Link to find yours: https://www.levinecentral.com/ham/grid_square.php
- Country – enter **USA**
- Set URL to **Auto**
- Set APRS Host to **noam.aprs2.net**
- Set Time Zone to **America/Phoenix**
- Set Dashboard Language to **english_us**

Finally, click on the “**Apply Changes**” button right under that section, and **WAIT WAIT WAIT while it updates and refreshes the page.**

You will most likely get the following message:

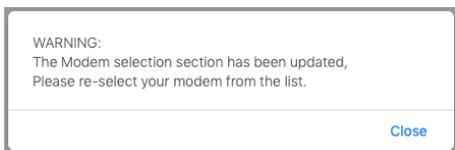


Click “close”.

You will now see the Pi-Star Configuration screen again, but this time there is a whole new section labeled “**MMDVMHost Configuration**”. That’s where we’re going to work next.

- Click on the “slider” next to “**YSF Mode**”: to enable it (turns red when “on”).
- NOTE: If you have a Zumspot with the small OLED display, on the line where it says “**MMDVM Display**”, select “**OLED Type 6**” where it says “None”, leave the “Port” set to `/dev/ttyAMA0`, “Nextion Layout” set to **G4LX**.
- Click on the “**Apply Changes**” button right under that section, and **WAIT WAIT WAIT while it updates and refreshes the page again.**

You will most likely get the following message:



- Click “Close”. Under the section we previously configured labeled “General Configuration”, there’s a new line labeled “**Radio/Modem Type**”. Click on that and select “**ZUMspot Dual Band Raspberry Pi Hat (GPIO)**”. Once again, click on the “**Apply Changes**” button right under that section, and **WAIT WAIT WAIT while it updates and refreshes the page again.**
- We now have another section labeled “**Yaesu System Fusion Configuration** we need to modify.
- On the line labeled “**YSF Startup Host**”, select from the (LONG) scrolling list (scroll way up the list to “U” to find it – they’re shown in alphanumeric order): **YSF74158 – US-ORO-VALLEY-AZ – Oro Valley ARC**
- Optionally, you can enable “**WiresX Passthrough**” by clicking on its “slider” to enable it (turns red when on).
- Click on the “**Apply Changes**” button right under that section, and **WAIT WAIT WAIT while it updates and refreshes the page again.**

If all went well and was done correctly, you should now be ready to test your Zumspot with a Fusion radio!

The following instructions are for connecting to your Zumspot using a Yaesu FT-70D:

Turn on the radio, press the V/M button and ensure the radio is NOT in “Memory” mode. Press the “Band” button until you are on the UHF frequency band. Press the “Mode” button until the display shows “DN”. On the keypad, enter the same frequency as we set in the Zumspot (in the previous instructions, we set it to 438.800 MHz). NOTE: You do not need to enter the last “zero” on the keypad. Simply enter 4-3-8-8-0 and you will hear a “confirmation” beep after the “0”.

In the Pi-Star software screen on your computer, click on “Admin” at the top of the screen. You should see the Pi-Star “Dashboard” similar to that shown below. On your radio, press the PTT button, and you should see your call sign appear under both the “Gateway Activity” and “Local RF Activity” sections. It should also show on the Zumspot’s OLED screen. If it does – **CONGRATULATIONS!** You now connected to OVARC’s linked repeater system via your Zumspot and its connection to the Internet!

If it doesn’t show up, please go back and review the information we previously covered in this tutorial. It also sometimes helps to power cycle the Zumspot – REMEMBER to **WAIT WAIT WAIT!** for it to fully re-boot. You can monitor the OLED display (if yours has one) and when it is ready to use, it will momentarily display “Fusion” on the OLED screen when you key up your radio.

Hostname: pi-star
Pi-Star:4.1.2 / Dashboard: 20200520

Pi-Star Digital Voice Dashboard for K7VTT

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

Gateway Hardware Information

Hostname	Kernel	Platform	CPU Load	CPU Temp
pi-star	4.19.97+	Pi Zero W Rev 1.1 (512MB)	1.14 / 1.17 / 0.73	40.1°C / 104.2°F

Service Status

MMDVMHost	DMRGateway	YSFGateway	YSFParrot	P25Gateway	P25Parrot
DStarRepeater	ircDDBGateway	TimeServer	PiStar-Watchdog	PiStar-Remote	PiStar-Keeper

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 YSF
Tx	438.800000 MHz
Rx	438.800000 MHz
FW	ZUMspot:v1.4.16
TCXO	14.7456 MHz

YSF Network

Room:	US ORO VALL..
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YSF Link Manager

Reflector	Link / Un-Link	Action
YSF74158 - US ORO VALLEY AZ - ORO VALLEY ARC	<input checked="" type="radio"/> Link <input type="radio"/> UnLink	Request Change

Gateway Activity

Time (MST)	Mode	Callsign	Target	Src	Dur(s)	Loss	BER
20:09:21 Aug 4th	YSF	K7VTT	ALL	RF	29.8	0%	0.4%
20:08:48 Aug 4th	YSF	WS2IT	ALL	Net	41.6	0%	0.0%

Local RF Activity

Time (MST)	Mode	Callsign	Target	Src	Dur(s)	BER	RSSI
20:09:21 Aug 4th	YSF	K7VTT	ALL	RF	29.8	0.4%	S9+46dB (-47 dBm)

Pi-Star / Pi-Star Dashboard, © Andy Taylor (MW0MWZ) 2014-2020.
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](#).