Pi ZERO

To set up a **Raspberry Pi Zero** for use with **DMR** (Digital Mobile Radio) and **D-STAR** (Digital Smart Technologies for Amateur Radio), you'll typically be creating a **digital voice hotspot** using software like **Pi-Star**. Here's a step-by-step guide:

🔧 What You Need

Hardware:

- **Raspberry Pi Zero W** (with WiFi)
- **MicroSD card** (at least 8GB, Class 10 recommended)
- **Power supply** for Pi Zero
- **USB OTG cable** (to connect USB peripherals)
- **DVMEGA**, **ZUMspot**, **MMDVM_HS Hat**, or similar MMDVM board (sits on GPIO or connects via USB)
- Optional: **Case with cooling** and **OLED screen** for status display

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💾 Step 1: Download and Flash Pi-Star

1. Go to the Pi-Star website
2. Download the latest **Pi-Star image** for **Raspberry Pi Zero W**.
3. Use Raspberry Pi Imager or Balena Etcher to flash the image onto the microSD card.
4. After flashing, **eject and reinsert** the card.

🌐 Step 2: Configure WiFi (headless setup)

1. Open the **boot partition** on your computer.
2. Create a file named `wpa_supplicant.conf` with the following content:

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ini
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```
country=US
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
network={
    ssid="YourWiFiSSID"
    psk="YourWiFiPassword"
    key_mgmt=WPA-PSK
}
```

3. Save the file into the **boot** partition.
4. Optionally, enable SSH by creating an empty file named `ssh` in the boot partition.

🚀 Step 3: Boot Pi-Star

1. Insert the SD card into your Pi Zero W.
2. Connect your MMDVM hat (ZUMspot or similar).
3. Power on the Pi. Wait a few minutes to boot.

🌍 Step 4: Access Pi-Star Dashboard

1. Connect your computer to the same WiFi network.
2. Open a browser and visit:
   `http://pi-star.local`
   (or find the IP address via your router and use `http://<ip_address>`*)*
3. Log in to the dashboard:
   - **Username**: `pi-star`
   - **Password**: `raspberry`

⚙️ Step 5: Configure Pi-Star for DMR & D-STAR

1. **Go to Configuration page**
2. Set your **callsign**, **DMR ID**, **frequency**, and other relevant info.
3. Choose the correct **MMDVMHost modem type** (e.g., ZUMspot/PiHat).

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4. Enable **DMR** and **D-STAR** modes (and any others you want like YSF).
5. Under **DMR Configuration**, set:
    - **DMR Master** (e.g., BrandMeister)
    - **BM Hotspot Security Password** if applicable
6. Under **D-STAR**, set:
    - **Gateway** settings (usually automatic)
    - **Reflector** or default D-STAR connection

Click **Apply Changes** after each major configuration section.

🔄 Step 6: Update & Upgrade

From the Expert menu (or SSH):

- Run **Update** and **Upgrade** options to ensure everything is current.

✅ Final Notes

- **DMR ID** is required – get one at: https://radioid.net/
- You can run both **DMR and D-STAR simultaneously** using Pi-Star.
- **Pi-Star logs and dashboard** are great for monitoring and troubleshooting.
- Backup your config from the Pi-Star dashboard once it's working.

Would you like help setting up **TG/reflector routing**, **D-Star linking commands**, or **custom dashboard themes** next?

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Setting up a Raspberry Pi for ham radio use is a popular and flexible option for amateur radio operators. The Raspberry Pi can be used for a wide range of ham radio applications such as digital modes, APRS, SDR, logging, rig control, and even as a full-fledged remote station.

Here's a step-by-step guide to help you get started:

☑ 1. Choose Your Raspberry Pi and Accessories

- **Raspberry Pi 4** or **Raspberry Pi 3 B+** recommended for best performance.
- **microSD Card** (at least 16GB, Class 10 or better)
- **Power Supply** (5V, 3A recommended)
- **USB Keyboard & Mouse** (for setup)
- **HDMI Cable & Monitor** (for initial setup)
- **Internet Access** (Wi-Fi or Ethernet)
- **Case** with cooling (recommended for continuous operation)

☑ 2. Install Raspberry Pi OS

- Download the **Raspberry Pi Imager**: https://www.raspberrypi.com/software/
- Choose **Raspberry Pi OS (32-bit)** or **Raspberry Pi OS Lite** for headless operation
- Write it to your SD card, insert it into the Pi, and boot up

Optional: Enable SSH and Wi-Fi before first boot:

- Create a file named **`ssh`** (no extension) on the boot partition
- Create a **`wpa_supplicant.conf`** file with Wi-Fi credentials if needed

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✅ 3. Update the System

Open a terminal and run:

```bash
bash
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sudo apt update
sudo apt upgrade -y
```

✅ 4. Install Ham Radio Software

Here are some popular ham radio tools for Raspberry Pi:

📡 Fldigi (for digital modes like PSK31, RTTY, etc.)

```bash
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sudo apt install fldigi
```

📻 WSJT-X (for FT8, FT4, WSPR, etc.)

Available via package or direct download:

- Raspberry Pi build: https://physics.princeton.edu/pulsar/k1jt/wsjtx.html

🗺 Xastir (for APRS)

```bash
bash
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sudo apt install xastir
```

📝 CQRLOG (advanced logging software)

Requires MySQL or MariaDB setup:

```bash
bash
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sudo apt install cqrlog
```

🌐 Direwolf (APRS soundcard TNC & AX.25 modem)

```bash
bash
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sudo apt install direwolf
```

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🔊 GNU Radio (for SDR work)

```
bash
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sudo apt install gnuradio
```

☑ 5. Connect Ham Radio Hardware

Depending on what you're doing, you may need:

- **USB Sound Card** (e.g., SignaLink USB or basic C-Media chip dongle)
- **CAT Cable** (for rig control via CI-V, RS-232, etc.)
- **RTL-SDR Dongle** (for receiving with SDR)
- **TNC (Hardware or Software)** for packet radio
- **GPS Module** (for APRS or timing applications)
- **PTT Control** (via GPIO, VOX, or USB serial)

☑ 6. Configure Audio and Rig Control

- Use `alsamixer` to adjust audio levels
- Configure serial ports for rig control using `rigctl` (Hamlib):

```
bash
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sudo apt install hamlib
rigctl -m <model_number> -r /dev/ttyUSB0
```

Find model numbers with:

```
bash
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rigctl -l
```

☑ 7. Remote Access (Optional)

- **SSH** for headless operation

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- **VNC** for GUI control remotely

```
bash
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sudo raspi-config
# Enable SSH or VNC under "Interface Options"
```

✅ 8. Set Time Correctly

Accurate time is essential for digital modes:

```
bash
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sudo timedatectl set-ntp true
```

Consider adding a **GPS module** or **DS3231 RTC** if no internet is available.

🔄 Optional Projects

- **PiGate**: Emergency email over HF (Winlink)
- **Build a Digital Repeater Node** (e.g., AllStar, EchoLink, DMR, D-Star)
- **APRS iGate/Digipeater**
- **SDR Receiver Station**

If you want help with a **specific ham radio application** or hardware (e.g., Yaesu FT-891 rig control, APRS iGate, or FT8 on WSJT-X), I can provide a detailed setup guide tailored to that. Just let me know.

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