**Setting Up Pi-hole**

**Recommended Setup**

- Raspberry Pi Zero 2 W + 16-32GB microSD card (larger capacity is better for longer use)
- Power Requirement: Minimum 5V/1A, but use a 5V/2.5A or 5V/3A micro USB power supply (like the official Raspberry Pi power supply) to ensure stability for 24/7 operation

**Tutorial Resources:**

- Block Ads ANYWHERE You Go — The Pi-hole + Tailscale Setup Nobody Talks About
  https://youtu.be/LXIL4qxN3lE?si=PiKsFBnljlhWbptp
- Block Ads on ALL DEVICES (Smart TVs) — Simplest Pi-hole Tutorial
  https://youtu.be/d_3h5n9mPdI?si=QddwtIa29XbqV_6k

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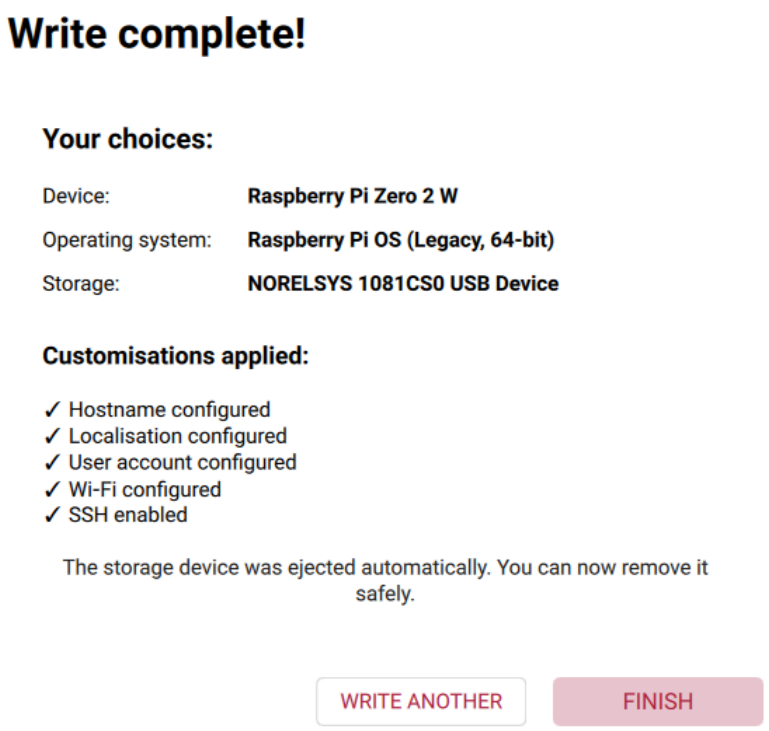
**Installation Steps:**

In Raspberry Pi Imager, download **RASPBERRY PI OS (LEGACY, 64-BIT) LITE** to the microSD card.




a. Remember your username, hostname, and password
b. Once Pi-hole boots up (LED light shows), SSH from another device using: `username@hostname`, then enter your password
c. Follow the installation instructions at https://docs.pi-hole.net/main/basic-install/
    - In terminal, type: `curl -sSL https://install.pi-hole.net | bash`
d. Follow the YouTube tutorial until the "set up static IP" part, then go to your router admin page (192.168.1.1) to reserve an IP for your Pi-hole (check the router's back or bottom for admin credentials if needed)
e. Choose Cloudflare as the DNS server for Pi-hole. Cloudflare DNS (1.1.1.1) is generally superior to Google DNS (8.8.8.8) due to faster query speeds, enhanced privacy, and stronger built-in security features
f. Continue following the YouTube tutorial

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**Configuring DNS on Devices**

**For iPhone:**

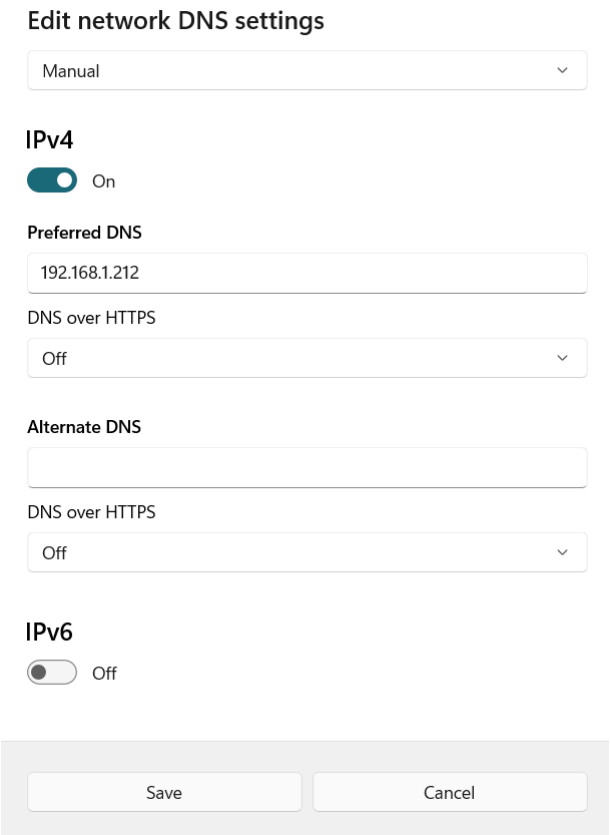
1. Go to Settings → Wi-Fi → click on your current Wi-Fi network
2. Scroll down to DNS (Configure DNS) → change Automatic to Manual
3. Click Add Server → enter your Pi-hole's IP

4. Remove the old DNS server (192.168.1.1) - there must only be one DNS server
5. Done

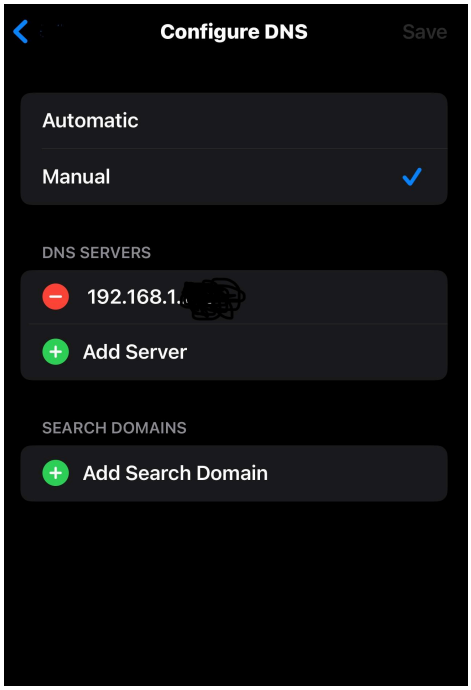
**For Windows:**

1. Go to Settings → Network & Internet → Wi-Fi → click on your current Wi-Fi network
2. Scroll down to DNS server assignment → click Edit
3. Change Automatic to Manual
4. Enable IPv4 and disable IPv6 (if not used in Pi-hole)
5. In Preferred DNS, add your Pi-hole's IP and leave Alternate DNS blank
6. Disable DNS over HTTPS option
7. Save & Done

Here is on Window




Here is on the Iphone

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# Pi-hole Troubleshooting Summary

**1. Initial Diagnosis:**

bash

```
sudo pihole -d
```

Generates debug report showing errors, system health, and configuration.

**2. DNS Connectivity Tests:**

bash

```
# Test upstream DNS
ping -c 4 1.1.1.1
dig @1.1.1.1 google.com

# Test TCP specifically (fallback method)
dig +tcp @1.1.1.1 google.com
```

**3. WiFi Stability Check:**

bash
```
# Test packet loss and latency to router
ping -c 100 192.168.1.1

# Check for WiFi driver issues
sudo journalctl -u wpa_supplicant --since "1 hour ago"
```

**4. Channel Analysis:**

bash
```
# See which SSID you're connected to
iwconfig wlan0 | grep ESSID

# Scan all nearby networks and their channels
sudo iwlist wlan0 scan | grep -E "ESSID|Channel"
```

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**WiFi & Channel Concepts:**

**2.4GHz Channels:**

- Only 3 non-overlapping channels: **1, 6, 11**
- Channels 2-5 overlap with 1 and 6
- Channels 7-10 overlap with 6 and 11
- **Best practice:** Use only 1, 6, or 11

**Channel Congestion:**

- Multiple networks on same channel = interference
- Causes: packet loss, high latency, connection drops
- **Solution:** Switch to least-used channel (1, 6, or 11)

**Multiple SSIDs on One Router:**

- Remember if you set up Two SSIDs on the same router = it will use **same physical radio** = make sure to set both SSIDs to the same channel
- Cannot broadcast on different channels simultaneously
- Both move together when you change channel