



# Raspberry Pi 3 as a Simple WiFi Access Point

Pi as a wifi bridge providing safe subnet to wifi and Ethernet

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## Description

The Raspberry Pi 3 has a built in WiFi radio. This makes using it easier than ever. This guide will start with a basic Raspbian build, connected to a wired network, and add WiFi access point capabilities. I sometimes use this approach for building an IoT subnet.

## Next up?

After reading this guide, you may be interested in reading:

- [IoT hub](#)

## Parts List

- Raspberry Pi 3

- 16GB (or larger) class 10 MicroSD card
- Mini-USB power
- Ethernet cable

## Overview

Start with a Raspberry Pi image. This is an image saved after following the [RPI Initial Setup Guide](#). This may be either a Lite image or a full desktop image.

1. [Write the image to the MicroSD.](#)
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## Procedures

This guide mostly follows the guide from [frillip](#). If this is not available, [try this PDF version](#).

### Write the image

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Write the image to the MicroSD as described in the [RPI Initial Setup Guide](#). Insert the MicroSD into the Pi and boot.

### Connect Pi to your Internet

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Use an Ethernet cable to connect the pi to the network. DHCP will assign the pi an IP address. Find the address of your pi from your network's DHCP server.

- SSH to the pi at that IP address or yourpiname.local

## Install dnsmasq and hostapd

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More about [dnsmasq](#) and [hostapd](#).

- `sudo apt-get update`
- `sudo apt-get upgrade`
- `sudo apt-get install dnsmasq hostapd`

## Configure wlan0

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- Inform dhcpd to ignore wlan0 by editing `sudo nano /etc/dhcpd.conf`
  - To the end add `denyinterfaces wlan0`
  - This must be ABOVE any interface lines you may have added
- Configure the wlan IP, `sudo nano /etc/network/interfaces`
  - the wlan0 section should be changed to:

```
allow-hotplug wlan0
iface wlan0 inet static
    address 192.168.220.1
    netmask 255.255.255.0
    network 192.168.220.0
    broadcast 192.168.220.255
```

- Restart dhcpd with `sudo service dhcpd restart`
- Reload wlan0 with `sudo ifdown wlan0; sudo ifup wlan0`

# Setup hostapd

- `sudo nano /etc/hostapd/hostapd.conf`
  - add the following

```
interface=wlan0
driver=nl80211

hw_mode=g
channel=6
ieee80211n=1
wmm_enabled=1
ht_capab=[HT40][SHORT-GI-20][DSSS_CCK-40]
macaddr_acl=0
ignore_broadcast_ssid=0

# Use WPA2
auth_algs=1
wpa=2
wpa_key_mgmt=WPA-PSK
rsn_pairwise=CCMP

# Change these to your choice
# This is the name of the network
ssid=Pi3-AP
# The network passphrase
wpa_passphrase=raspberry
```

TIP: If the passphrase is too short, hostapd won't start.

- Now edit the default configuration, `sudo nano /etc/default/hostapd`
  - Replace `#DAEMON_CONF=""` with `DAEMON_CONF="/etc/hostapd/hostapd.conf"`

## Configure dnsmasq

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- Rename the current configuration,  
`sudo mv /etc/dnsmasq.conf /etc/dnsmasq.conf.orig`
- Create and edit the new configuration, `sudo nano /etc/dnsmasq.conf`
  - Add the following

```
interface=wlan0      # Use interface wlan0
listen-address=192.168.220.1 # Specify the address to listen on
bind-interfaces      # Bind to the interface
server=8.8.8.8       # Use Google DNS
domain-needed        # Don't forward short names
bogus-priv           # Drop the non-routed address spaces.
dhcp-range=192.168.220.50,192.168.220.150,12h # IP range and lease time
```

## Iptables forwarding

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*IMPORTANT: This section is optional.*

Forwarding is required if any devices connected to your this access point need to connect to the Internet. I do not forward for many IoT devices which I expect to act as an isolated network.

- Enable IP Forwarding
  - `sudo nano /etc/sysctl.conf` at bottom add `net.ipv4.ip_forward=1`
  - `sudo sh -c "echo 1 > /proc/sys/net/ipv4/ip_forward"`
- If you have not already completed [Persistant iptables](#), do so now
- **Required** View [WiFi Access Point rule set](#) to complete iptables setup

## Load, Test and Reboot

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Load the services and test availability, connection and forwarding.

- `sudo service hostapd start`
- `sudo service dnsmasq start`
- Use any WiFi client to connect to your new rpi3 access point
- Verify connection of various services such as SSH
- If you chose IP Forwarding, verify that your connected device is able to connect to the Internet
- Once you have verified everything, `sudo reboot now`
- Retest everything with the rebooted pi

## Conclusion

You now have a working WiFi access point which may be used to extend your wired network or as a hub for local IoT devices.

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