Assumption
You have Raspian installed on your Pi and that its primary LAN (_eth0_) is configured to use DHCP. It will likely get its address information from your Internet modem/routers. I assume you can connect to it over _eth0_.

Install dnsmasq
From the command line, run `sudo apt install dnsmasq` to install dnsmasq. Stop it, for now, with `sudo systemctl stop dnsmasq`

Static IP for eth1
Now set a static IP address for the second ethernet connection (_eth1_). Edit _/etc/dhcpcd.conf_ with `sudo nano /etc/dhcpcd.conf`. Go to the end of the file and edit it so that it looks like the following:
```
interface eth1
    static ip_address=192.168.7.1/24
```

Configure dnsmasq
Discard the old conf file and create a new configuration:
```
sudo mv /etc/dnsmasq.conf /etc/dnsmasq.conf.orig
sudo nano /etc/dnsmasq.conf
```
Add these lines:
```
interface=eth1
dhcp-range=192.168.7.100,192.168.7.120,255.255.255.0,24h
```
This will define a new DHCP range 192.168.7.x which will be administered by the Pi via _eth1_.

Now start dnsmasq with `sudo systemctl start dnsmasq`

Note
To see clients connected to _eth1_ use `cat /var/lib/misc/dnsmasq.leases`

The output will be something like
```
574256399 00:10:a7:0c:a2:c1 192.168.7.109 rpi3a 01:00:10:a7:0c:a2:c1
```

IP forwarding
Edit _/etc/sysctl.conf_ with `sudo nano /etc/sysctl.conf` and this add line (for persistence)

```
net.ipv4.ip_forward=1
```
Activate forwarding now with `sudo sysctl -w net.ipv4.ip_forward=1`

Add a masquerade for outbound traffic on eth0

```
sudo iptables -t nat -A  POSTROUTING -o eth0 -j MASQUERADE
```

Save the iptables rule.

```
sudo sh -c "iptables-save > /etc/iptables.ipv4.nat"
```
Edit _/etc/rc.local_ with `sudo nano /etc/rc.local` and add this just above "exit 0" to install these rules on boot.

```
iptables-restore < /etc/iptables.ipv4.nat
```

Now the router is working. Connect a wired device to the _eth1_ network. From that device you will have access to the network attached to _eth0_ and _eth1_ and if _eth0_'s network has Internet, you will get Internet access as well.

Now add a third network over Wi-Fi!

Static IP for wlan0
Now set a static IP address for the Wi-Fi (wlan0). Edit _/etc/dhcpcd.conf_ with `sudo nano /etc/dhcpcd.conf`. Go to the end of the file and add these lines:
```
interface wlan0
    static ip_address=192.168.17.1/24
    nohook wpa_supplicant
```

This will give it a static address of _192.168.17.1_

Now restart the DHCP server with `sudo service dhcpcd restart`

Install hostapd
```
sudo apt install hostapd
sudo systemctl stop hostapd
```

Edit the dnsmasq.conf file with `sudo nano /etc/dnsmasq.conf` and add

```
interface=wlan0
dhcp-range=192.168.17.100,192.168.17.120,255.255.255.0,24h
```

Reload the configuration file with `sudo systemctl reload dnsmasq`

Configure hostapd
To use the 5 GHz band, you can change the operations mode from hw_mode=g to hw_mode=a. Possible values for hw_mode are:

* a = IEEE 802.11a (5 GHz)
* b = IEEE 802.11b (2.4 GHz)
* g = IEEE 802.11g (2.4 GHz)

Edit `sudo nano /etc/hostapd/hostapd.conf` and add these line:
```
interface=wlan0
driver=nl80211
ssid=PiNet
hw_mode=g
channel=7
wmm_enabled=0
macaddr_acl=0
auth_algs=1
ignore_broadcast_ssid=0
wpa=2
wpa_passphrase=raspberry
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
```

```
rsn_pairwise=CCMP
```

PiNet will be the network SSID and the password will be _raspberry_. Change accordingly.

We now need to tell the system where to find this configuration file.

Edit this file `sudo nano /etc/default/hostapd` and find the line with #DAEMON_CONF, and replace it with this:

```
DAEMON_CONF="/etc/hostapd/hostapd.conf"
```

Now enable and start hostapd:

```
sudo systemctl unmask hostapd
sudo systemctl enable hostapd
sudo systemctl start hostapd
```

You will now have a PiNet Wi-Fi network which has access to the network on _eth0_

General note

If things aren't working as expected after you configured routing with eth1 or after you added Wi-Fi support, then a good old fashioned reboot will likely fix the problem. Or in the words of the TV show 'IT Crowd', "Have you tried turning it off and on again?"