**Introduction**

Wireless home networks are common place in today’s world and Wi-Fi is a must to connect your devices. The purpose of this project was to find a low cost method of solving issues such as, extending your home Wi-Fi coverage and improving your home network security. Range may be an issue due to the size of one’s house and security may be an issue when a large amount of people are asking for access to your network. The issue of range can be solved by configuring a Raspberry Pi to function as a wireless bridge and extend your existing network’s coverage. Security can be increased by setting up a guest network and limiting who has access to your main home network. A Raspberry Pi can solve both of these problems and at a low cost.

**Extend your home Wi-Fi coverage**

By configuring a Raspberry Pi to act as an access point to the home router this extends its coverage. Which in turn allows the Pi to pass along any incoming internet traffic and pass it along through the Pi to the home router. The Pi becomes an extension of the current Wi-Fi router allowing for a larger coverage range. There is no noticeable drop in performance when using this method making it a viable choice for someone looking to extend their coverage area. Figure 1 illustrates how the Pi keeps the same SSID and IP address range of the main home router.

**Implementation**

**Installing bridge utils and hostapd on Raspberry Pi**

```
sudo apt-get install -y bridge-utils hostapd
```

**Creation of the Bridge**

```
#auto br0
iface br0 inet static
  bridge_ports eth0
  address 192.168.2.13
  netmask 255.255.255.0
  network 192.168.2.0
  broadcast 192.168.2.255
```

**Configuration of Bridge which will be called using using the command: sudo ifup br0**

```
httpd=0
ignore_broadcast_ssid=1
wpa=2
wpa_passphrase=aco-rpi-wifi
wpa_key_mgmt=WPA-PSK
wpa_pairwise=CCMP
```

**Settings used to extend your current set-up**

```
sudo /etc/hostapd/hostapd.conf
```

```
ssid=wiﬁ
wpa_passphrase=wiﬁ_password
bridge=br0
```

**Adding bridge to the configuration**

```
sudo /usr/sbin/hostapd /etc/hostapd/hostapd.conf
```

**Raspberry Pi 3 Specs**

- **CPU**: 1.2GHz 64-bit quad-core ARMv8 CPU
- **GPU**: Broadcom VideoCore IV @ 400 MHz
- **System on chip**: Broadcom BCM2837
- **Network**: 10/100 Mbit/s Ethernet, 802.11n Wireless LAN, Bluetooth 4.0
- **USB ports**: 4
- **Cost**: $35

**Conclusion**

A Raspberry Pi is small and at a low cost allows for a wide range of things to be done. The wireless bridge allows someone to extend the Wi-Fi coverage of their home at a low cost and without having to set up anything very obstructive in your house. Most importantly it does not compromise your networks performance to such a degree that this would become a hassle allowing this to solve and not create problems. This small board solves your home netowrk needs.

**Create your guest network**

```
sudo ifup br0
```

**Configure the Raspberry Pi to act as a guest network that is separate from your home network improves security. This would allow for greater control over who has access to your network and the devices or files stores on it.**

**Improve home network security**

Configuring the Raspberry Pi to act as a guest network that is separate from your home network improves security. This would allow for greater control over who has access to your network and the devices or files stores on it. Both of these things would be safely out of reach from those you don’t want having access to. At $35 a Raspberry Pi will act as another router and at a lower cost. Keeping access to your things under your control while still allowing guests access to the internet. Figure 2 illustrates how the Raspberry Pi acts independent of your main home router.

**Raspberry Pi Access Point settings**

```
/subnet 192.168.10.0 netmask 255.255.255.0 {
  range 192.168.10.10 192.168.10.50;
  option routers 192.168.10.1;
  default-lease-time 600;
  max-lease-time 7200;
  option domain-name "local";
  option domain-name-servers 8.8.8.8, 8.8.4.4;
}
```

**Commands to save and launch configuration upon reboot**

```
sudo sh -c "iptables-save > /etc/iptables/rules.v4"
```

```
sudo iptables -A FORWARD -o wlan0 -m state --state NEW,ESTABLISHED -j ACCEPT
```

```
sudo iptables -A FORWARD -i eth0 -o wlan0 -m state --state RELATED,ESTABLISHED -j ACCEPT
```

```
sudo sh -c "iptables-save > /etc/iptables/rules.v4"
```

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