

# **BraxRouter Software for Raspberry PI 4, 3B+ Version 3.1 User Guide**

## **PART I - STARTING YOUR BRAX ROUTER**

1. Insert the Micro-SD card with the BraxRouter Software into the Micro-SD Slot of the Pi. The case may vary for each Rasp Pi device. If there is an existing Micro-SD card, use a thin object like a paper click to push the old card out. Note that there is a lip on the Micro-SD card.

The current version uses a 16GB Micro-SD card. Some brands of 16GB cards do not have 16GB available so if you are burning your own card, we recommend a Sandisk 16GB or larger.



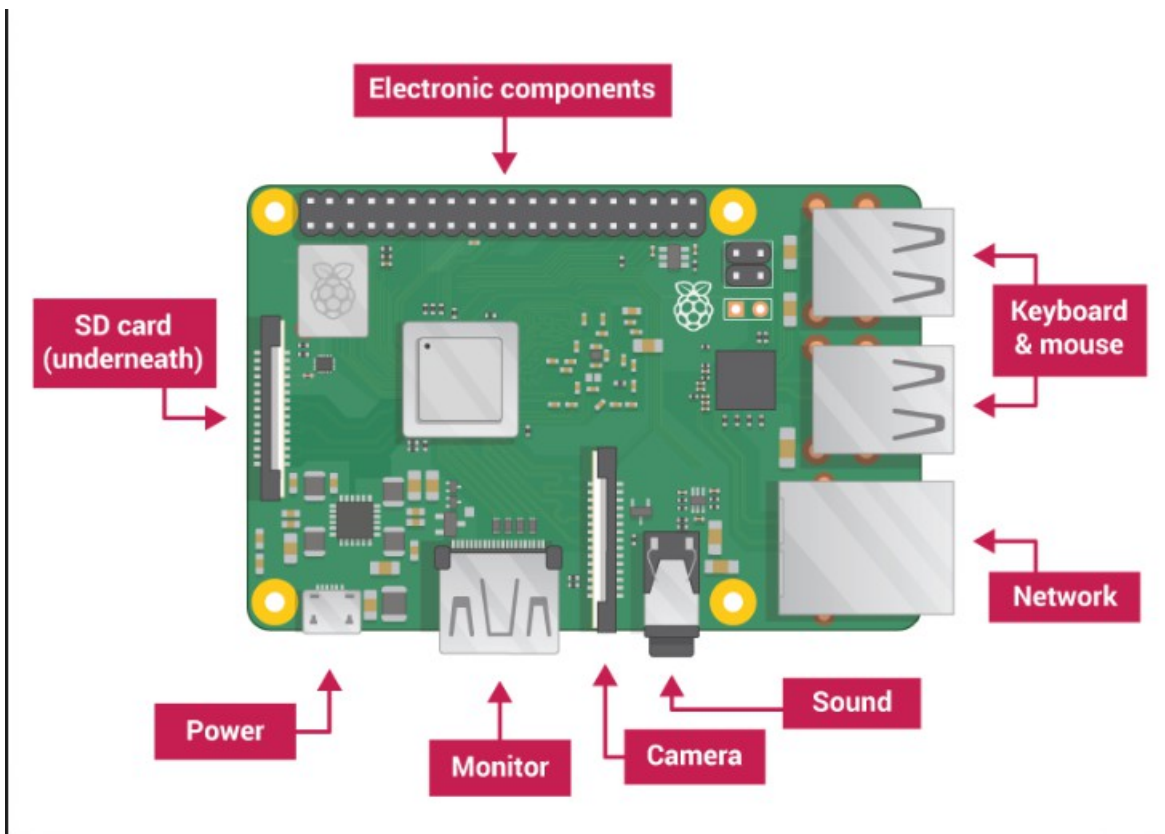
2. Attach all the desired accessories on the Raspberry Pi. For unattended operation, all you need is to plug in the Ethernet cable into the built in Ethernet slot, and as the last thing (always the last thing), you plug in the Power Supply. This will boot the Raspberry Pi.

If you want to actually control the Raspberry Pi directly and use it like a computer, simply plug in a monitor with an HDMI cable, and a USB Keyboard. Here is the layout of a Raspberry Pi 3 B+. The Raspberry Pi 4 has some differences. The Ethernet port is located on the opposite side. The power supply is a USB-C instead of Micro-USB and the HDMI port uses Micro-HDMI connectors.

Since the Raspberry Pi Router is intended as a secondary Wifi router, you can plug the other end of the Ethernet cable to another Wifi router. Do not plug it into the WAN slot. It can be used as a primary router as well but you'd have to plug it into the Modem provided by your DSL provider. I

It is not recommended to use the BraxRouter as the only router if you will be using VPN or TOR mode. This is because some websites and platforms ban VPN and TOR so you will not have an open routing option.

There are special instructions of this device will be used in Wired mode (no Wifi). See Part IX.



3. Once the boot process is completed on the Raspberry Pi (which can take over 1-2 minutes), the device will be operational. There may be additional delays when starting in TOR mode for the first time or after switch from another mode.
4. If you are using an Ethernet USB dongle or a Wifi Adapter dongle, please reboot the device TWICE. The first boot will detect the device. Wait at least 2 minutes before rebooting. You can also notice that the status lights on the device will just be a steady green light.
5. If you are using a Raspberry PI 4, the following needs to be installed on it. There should be heat sinks, particularly on the CPU and the Memory (which is adjacent to the CPU). Also the Raspberry PI 4 cannot use the charger for the Pi 3B+. It needs 3A 5V instead of the 2.5a 5V of the 3B+. Though it may start with the other power supply, it will shut down intermittently. So it is important to get the correct parts.

## **PART II – CONNECTING TO YOUR BRAX ROUTER**

To begin using your BraxRouter, simply connect to the Wifi using the regular Wifi features of your device.

Use these default credentials.

**SSID (Wifi Name): HomeWifi**  
**Password: hidemyzuckingass**

If you made a mistake when entering the password, the best way to correct is to first use the option “Forget the Network” on your computer or mobile device: so you can start again cleanly.

If you have a BytzVPN account, the BraxRouter will be shipped with a VPN account that's already active.

It may not be your own account however so at some point, perform the settings to set up or modify your account as instructed below in the next section. This will ensure you have the full term of use for the VPN.

## PART III – CONFIGURING YOUR BRAX ROUTER VIA HOMEWIFI

To configure your BraxRouter, we will need to access it via an IP Address. There will be 3 ways of doing this. Normally the first method described here will be easiest and simplest but the other methods will be discussed as well if you are not able to access the device due to a prior misconfiguration.1.

If you followed the instructions to connect to 'HomeWifi' as your Wifi, you will automatically have a connection to the device and the BraxRouter will have a fixed IP address of **192.168.42.1**

Again, this IP address is fixed but only if you are connected to the BraxRouter via Wifi.

*Note: If you are going to be using a wired connection instead of Wifi, you will have different instructions and a different IP address and it will be explained in Part IX.*

Using a browser, type the above IP address on the URL or address bar and it will display the page similar to that shown below.

If you want extra security, prefix the IP address with https as shown below:

<https://192.168.42.1>

*This may generate some certificate errors, depending on the browser, all of which you can ignore. The only purpose is to encrypt the traffic.*

Note that the displayed BraxRouter webpage will show another IP address that you can use to access the device if you're not connected to the 'HomeWifi' network. Make a note of that and stick a label on the router itself. This could be useful if you are not able to login due to a mistake.

Select the Login option to proceed.



# BraxRouter v3.2 4B

IP Addresses: 192.168.1.34  
Temperature: 44.303 C - Normal  
PI4 arm=948M volt=0.8419V

This device can be accessed from a browser using the IP addresses above on your local network.

Login

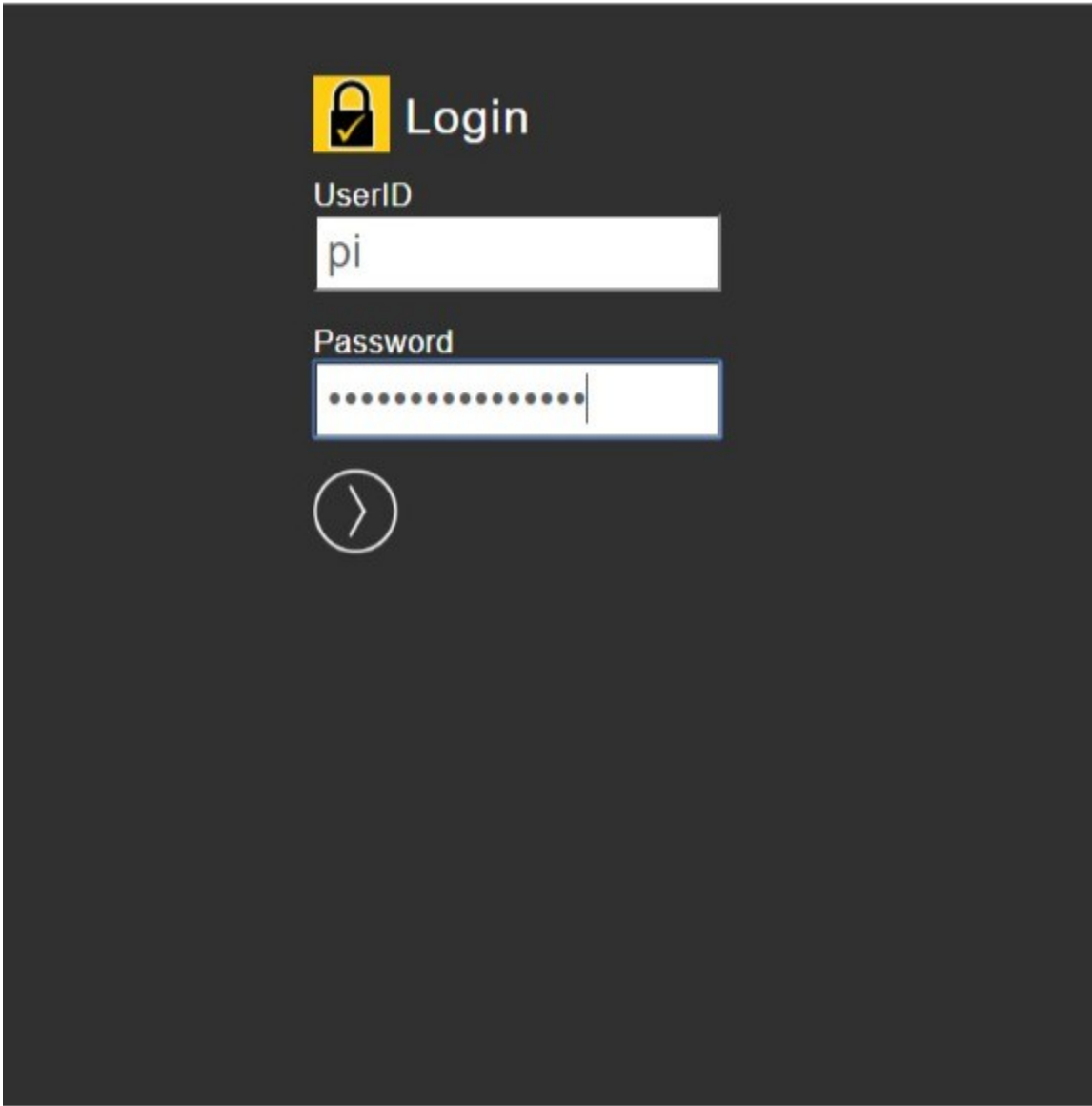
Refresh

Enter your device login and password and tap on the arrow to proceed.

By default the login credentials are:

Userid : pi

Password: hidemyzuckingass



After logging in, the following menu will be displayed



# BraxRouter Main Menu



Setup Router



Change Admin Password



Logout

## 1. MAIN MENU - Setup Router

Click on Setup Router to modify router settings. This will display the page below. Change the desired values and click on Save. The settings will only take effect after a reboot.



## Router Properties

*Changes take effect after reboot. Change of network hardware requires two reboots.*

Router Mode  
VPN Router ▾

### Wifi Setup

Wifi Name  
HomeWifi

Wifi password  
hidemyzuckingass

Wifi Mode  
2.4 gHZ ▾

Wifi Channel  
6 ▾  
*Leave blank for default*


### VPN Setup

VPN Username  
myuser

VPN Password  
mypassword

VPN Private Key Phrase  
myprivatekeypassword

VPN Profiles  
Router-West1-NoAds.ovpn ▾

Save 

Below is a guide to the values you can modify on the setup.

**Router Mode** – this gives you the option to operate the device as (a) An Open Router – a Regular wifi router with no subscriptions required. (b) a TOR Router – no subscriptions required, (c) a VPN Router – VPN subscription is required.

**Wifi Setup** – this section allows you to change the Wifi SSID or network name, the Wifi password, and whether to use 2.4 GHz or 5 GHz mode. The default is 2.4GHz and is best for

speed and range. Also you are able to select a channel for use. If you leave the channel blank it will default to channel 6 for 2.4 GHz and channel 48 for 5 GHz. For 2.4 GHz you should limit the channels to 1, 6 or 11 only for best performance. 5 GHz channels are from 36-161.

**VPN Setup** – this section allows you to enter your VPN credentials. Your VPN credentials are always available on your Brax.Me account which you used to subscribe to the VPN. It is visible in SETTINGS – MY ACCOUNT SETTINGS – Show BytzVPN Credentials.

**VPN Profile** entry allows you to choose VPN profile which selects the servers to which you will connect to. Select a VPN profile closest to you in region and you can use the No-Ads or standard version as desired. You can change this anytime you want. Note that changes only take effect after a reboot.

Unplug the Raspberry Pi and plug back in to reboot.

## **2. MAIN MENU - Change Password**

The other option available to you from the main menu is to change the password used when accessing via a browser. If you select Change Admin Password from the menu, you will see this page which allows you to enter a new password and confirm it. This only affects the browser setup page.

## PART IV – ACCESSING YOUR BRAX ROUTER VIA LAN

There are times when you cannot connect to your router using the regular HomeWifi connection. One of the reasons is a misconfiguration (like forgetting the Wifi password). You can still control your device but you will need to know the IP address of the device on your Local Area Network (LAN).<sup>1</sup>

For your convenience, the BraxRouter will report its LAN IP address to Brax.Me and it will show up in SETTINGS – MY ACCOUNT SETTINGS. Near the top of the page, tap on Show BytzVPN Credentials.

And it should show up on there as 'BraxRouter Local IP Address'. This assumes that the BraxRouter has connected to the network at least once. Then follow the same instructions to configure your device as discussed in Part III but connect to it using the IP address shown on Brax.Me or the IP address you have remembered or written on the router itself as instructed earlier.

Another way to find the IP address on the LAN is to plug in an HDMI monitor to the Router (like your TV), then you will see a status screen with an IP address shown after it boots.

Let's say your Local IP address is shown as 192.168.1.30 (it will vary for you). This means that your router can easily be accessed using that IP address.

Then proceed to follow the same instructions on configuring the device using the Browser method as discussed in Part III above.

Or continue below to directly configure the router using the direct method shown below. For more advanced configuration, and internal access to the BraxRouter file system, you will need to attach a USB keyboard and an HDMI monitor to the device. Upon booting, it will display the follow status screen when the booting process is complete.

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BRAX ROUTER for Raspberry PI 3B+ or 4B 3.2  
Updated 1/3/2020

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WIFI SETTINGS  
ssid=HomeWifi  
channel=6  
Wifi Mode: 2.4GHZ  
Wlan0 - Internal Wifi in Use

Active VPN Profile: Router-West1-NoAds.ovpn

IP Address in LAN: 192.168.1.34/24

Router Mode: VPN Routing

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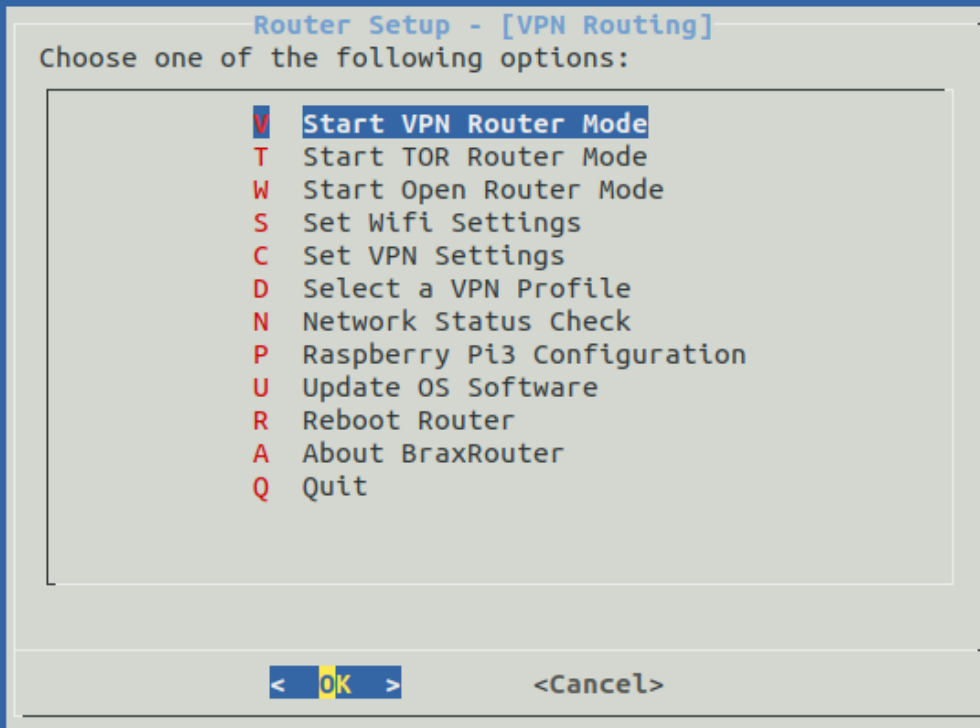
---

---

Press ENTER to continue

Note: The version information will be different for each version of the software and some of this is updated automatically.

Press ENTER to continue to the main menu which is shown below.



This will then display the menu above and from here on you can set it up and change settings. If you type in a wrong command and you find yourself in some unfamiliar spot inside the Raspbian OS in the Raspberry Pi, simply reboot the device (by unplugging and plugging in the power supply connector – Micro-USB).

Following is a description of each menu option.

(A) VPN Router mode turns the Raspberry Pi into a Wifi router that routes all traffic to BytzVPN. This is the default configuration and is preshipped with this and with temporary settings that already make the VPN active. So it is plug and play.

But several settings can be modified and will be explained below.

(B) TOR Router mode turns the Raspberry Pi into a Wifi router that routes all traffic to TOR. Basically making it a TOR Router. No configuration is necessary to use this mode.

(C) Open Router mode turns the device into a regular Wifi Router and it will route the traffic to the internet like any normal Wifi Router. The Rasp Pi has a built in Wifi internally. You can set up a different Wifi name (SSID) and password. By default, the

Wifi (SSID) name is:

(S) Select Set Wifi Settings from the Menu and this will allow you to make changes as shown below:

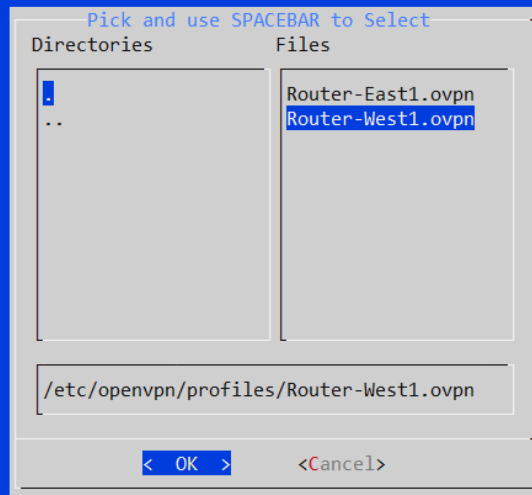
```
-----  
Raspberry PI Router Wifi Setup  
-----  
(Leave entries blank to use default settings)  
  
Wifi SSID [Default: HomeWifi]: HomeWifi  
  
Wifi Password [Default: hidemyzuckingass]: hidemyzuckingass  
  
802.11 AP Type [2.4 or 5]: 2.4  
  
Wifi Channel [1-11]: 6
```

- **Wifi SSID** – This is the name of your network. By default or if left blank, it will use the name HomeWifi.
- **Wifi Password** – if left blank or the password as shipped is 'hidemyzuckingass'
- **802.11 AP Type** - The channel range will be different depending on which AP Type was used. “2.4” corresponds to 2.4GHz wifi “5” corresponds to 5GHz wifi. If you are further away from the PI, use 2.4GHZ for more range.

A Rasp PI has a small antenna so it is really intended for short range use.

(C) Set VPN Settings - You can set your VPN Login credentials from the menu option Set VPN Settings. That menu option will display the entry options below. Those should match your VPN settings from BytzVPN. Changing Wifi settings takes effect only after a reboot.

(D) Select a VPN Profile - The BraxRouter automatically downloads all the available VPN Profiles from BytzVPN when you select the option SELECT VPN PROFILE. It will then give you a selection of VPN Pools to choose from: East, South or West currently. There are also versions that have Ad-blocking.



The interface for using this is as follows. Use the up and down arrow keys to move inside each rectangular area. Use the TAB key to change to another section. Tab to the section marked FILES. Use the up/down arrow to highlight your desired profile, then hit the SPACE BAR to make the selection. This should change the file name at the bottom section to be a complete file name instead of just a directory name.

Then hit ENTER and a confirmation window will appear. This change takes effect immediately.

The other options on the menu allow you to do more advanced things like update the OS, modify Raspberry PI Configuration settings, and view the version information. We do not recommend that you change any Raspberry PI Configuration as that may render the device inoperable.

However, you may update the OS anytime you wish. It is not something that needs to be done frequently however. Usually it is essential if some security flaw has been announced for the Raspberry PI (none has occurred in years).

The option to check Network Status is for tech support purposes. The IP address that you need to do SSH is already displayed at the top of the menu.

## PART V – ACCESSING YOUR BRAX ROUTER VIA SSH

You can access the BraxRouter in “headless mode” meaning with no HDMI monitor attached. You will need to access the device using SSH from the LAN. You will need the IP address of the device which you can acquire using the techniques discussed in Part IV.

If you have a GNU/Linux computer or a Mac OSX computer, you can use SSH from the terminal command line. If you are running Windows, you can use the program PuTTY to do SSH, or on Windows 10, you can install the Linux Subsystem so you can use Linux on Windows.

On IOS you can install an SSH Client app such as Termius -SSH Client. This way you can control the device from your iPhone or iPad. Once you have access to a Linux or Mac OSX command line type this (the IP address will be whatever is appropriate for your device as explained in prior instructions).

The IP address below is just an example)

```
ssh pi@192.168.42.1
```

Then you will be prompted for a password.

```
password: hidemyzuckingass
```

If you are using Termius or PuTTY, then you can break down the required SSH login credentials into:

```
userid: pi
```

```
IP address: 192.168.x.x
```

```
password: hidemyzuckingass
```

After logging in you will see the same menus as shown in Part IV



# PART VI – BURNING AN SD CARD FOR YOUR BRAX ROUTER

Some of you may have obtained an “img” file from Braxmobile which will allow you to burn your own MicroSD card. Here are the quick steps to accomplish this on a Windows or Mac.

1. Download SDFormatter from <https://www.sdcard.org>. There is a Windows version and a Mac version.
2. For Windows, download the software win32diskimager from <https://sourceforge.net/projects/win32diskimager/>
3. For a Mac, download Balena Etcher <https://etcher.en.softonic.com3>.
4. Format the SD card using SDFormatter. The provided BraxRouter img file will be in zip format. Unzip that to its full size.
5. Then use that file to write the img to the SD card using the software for your platform (Mac or Windows)

## **PART VII – EXTENDING THE WIFI RANGE OF YOUR BRAX ROUTER**

The regular Raspberry Pi 4 or 3B+ which is the basis of the BraxRouter has a built in Wifi and that has an internal antenna.

The antenna on a PI 4 or 3B+ is fairly small and thus the range of operation of the Wifi could be limited, particularly in 5GHz.

You can extend the range by using 2.4GHz. If you want to have a significant increase in range, this version of BraxRouter can accept an external Wifi Adapter called:

Panda Wireless PAU09 N600 Dual Band (2.4GHz and 5GHz) Wireless N USB Adapter  
W/Dual 5dBi Antennas

Here's an Amazon link (USA) <https://amzn.to/33eNXDU>

To use this device, simply plug it in to the router and reboot the router. After all activity ceases on the status lights (indicating a successful boot), reboot it again. So the device needs to be rebooted twice. The first boot detects the new device and makes configuration changes to the software. The second boot makes the device active.

At this time, this is the only device tested. Not all USB Wifi adapters work. There may not be a driver available for other models. The Panda PAU09 supports both 5GHZ and 2.4GHZ. In actual testing the signal increase is greater than 10db (more than double the power).

The Panda Wireless is a USB 2.0 device so on the Raspberry PI 4, it must be plugged into the black USB ports. Do not use the blue USB ports (those are USB 3.x).

## PART VIII – CHANGING THE MAC ADDRESS

Normally you do not have to change anything related to the Mac address of the router as the default is just fine for privacy. However, if you install several of the routers in the same location, then the MAC Addresses may cause a conflict since by default, each device will have the same MAC address and Wifi name.

The mac address used during the boot process is defined in the the root folder of the MicroSD card which you can examine on any computer that can read the card.

Open the file /update/macaddress.conf. It will display the data below.

[Match]

OriginalName=wlan0

[Link]

MACAddress=00:00:0c:01:02:03

NamePolicy=kernel database onboard slot path

Change the last number “03” of the mac address to another unique one for your extra router(s) in the same 2 digit format (e.g. “04”). Save it back to the SD card. It will be used on reboot.

## PART IX – WIRED ROUTING MODE

This version of the BraxRouter has the ability to act as a wired router. To use this mode, you will need to have a USB Ethernet Adapter.

For a Raspberry PI 4, you need to get a USB 3.0 Gigabit Ethernet Adapter.

For a Raspberry PI 3B+, you can use a USB 2.0 10/100 Ethernet Adapter. Because of the slower performance of this Ethernet adapter, the use of a PI3B+ is not recommended.

On a Raspberry PI 4, there are two sets of USB ports. The blue ones are USB 3.0 so use that with the Gigabit Ethernet Adapter.

Some other considerations for wired routing use: On a PI4, wired routing at gigabit speeds is CPU and memory intensive so the PI 4 will get hot. So ensure that the PI4 is equipped with heat sinks particularly on the CPU, and Memory module (adjacent to the CPU). You will also need a 3A power supply. The adapter will draw additional power and it will shut down if you don't have the correct power supply.

The wired routing mode is an advanced mode so some advanced terminology will be used. Do not use wired mode if you don't understand what is being discussed.

The BraxRouter requires a DHCP server. Usually, the DSL modem acts as a DHCP server and will give you a single IP address. And it will be up to the Wifi router to allocate more IP addresses using NAT (Network Address Translation).

The problem will be if connect the BraxRouter directly to your DSL Modem. This will mean that all Internet traffic will be routed to the BraxRouter. If the router is set to VPN mode, then all traffic will be in VPN mode. If the router is set to TOR mode, then all traffic will be in TOR mode.

This is not a recommended configuration. Some websites do not allow a VPN or TOR, and you will not have any alternative connection option.

The best solution is to have BraxRouter set up as a secondary network. Your original Wifi router can be your main router and gateway as well as the DHCP provider. Then you plug in the BraxRouter to that. It will then route all traffic through the original router.

The advantage of this setup is that there will be two networks available to you, one will be an open network and the other will be VPN/TOR.

If you use wired mode on the BraxRouter (i.e. you plugged in an Ethernet USB adapter), then the Wifi mode of that router will be disabled. Only one mode can be active.

The IP address of the BraxRouter in wired mode is:

192.168.43.1

If you want to still have a wireless network on the VPN, you will need to get another router that you will plug into the BraxRouter.

Note that an Ethernet adapter only has one Ethernet port. In order to plug in multiple devices with Ethernet cable, you will need to expand the number of ports. A device that does this is called an Ethernet Switch. Ethernet switches can expand typically to 4-8 available ports.

Note that Ethernet switches come in 10/100 and Gigabit flavors so make sure they match the Ethernet adapter that you are using. On a Raspberry PI 3B+, you have to use an Ethernet switch 10/100. Use a Gigabit Ethernet Switch if you are using a PI4 or it will cause a bottleneck and slow the network down.

# PART X – USING BRAX ROUTER WITH OTHER VPNs

BraxRouter can work with most VPN's without any special setup.

Before you start, make sure to download the VPN profiles (.ovpn files) from your VPN provider.

Remove the Micro-SD card from the Raspberry PI, and then insert it into your computer's card reader. Then copy the .ovpn files to to Micro-SD card BOOT partition under the directory \update\profiles.

BOOT

\update\profiles

Make sure the ovpn file is complete and that certificates are included inside the ovpn and not delivered as separate files. If they are separate, they need to be copy and pasted into the ovpn file using these tags.

Not all of these certificates may be present.

CA – Certificate Authority

<ca></ca>

User Certificate

<cert></cert>

Private Key

<key></key>

TLS Key

<tls-auth></tls-auth>

You can ask your VPN provider to help you with this if necessary. We do not provide support for other VPNs.

# PART XI – TROUBLESHOOTING

## Connecting to BraxRouter but No Internet

1. If you are able connect to the BraxRouter via Wifi but it shows “No Internet”, the most common reason is that you have a Modem/Wifi Router combo from your ISP. Often these combo units are shipped with the Modem/Wifi configured to do IPV6.

BraxRouter specifically does not route any traffic to IPV6 even though the ISP Wifi-1 (the first Wifi in the chain) enforces it and the BraxRouter will appear to connect to it. The reason that IPV6 is not allowed is that it will leak your individual device IP addresses which is exactly what we are avoiding. The way we set up the router using IPV4 prevents an outside computer from accessing a device inside your network directly.

So we do not want to use IPV6 whatsoever. You may have to manually turn off IPV6 on the ISP Wifi Router 1. Or, what I recommend is to return the Modem/Wifi to your ISP. They charge you a monthly fee to have it. Use a separate modem and separate Wifi router. It is preferable to use your own Wifi Router 1. For example a Netgear Nighthawk is available for \$50.

If you want to quickly check to see if this is the issue, put another spare Wifi router in between your ISP Modem/Wifi 1 and BraxRouter. Make sure the in between Wifi router is set to factory defaults. Then BraxRouter will work.

2. An extremely common issue with no Internet access is that there's an incorrect username and password for the VPN credentials. This is very easy to verify. Switch the BraxRouter to Open Routing Mode (Router Mode selection), which skips the VPN. If you get Internet access on Open Mode then the VPN is the issue.

Sometimes there's a temporary issue with accessing a particular VPN region. If so, you can test this shifting to another region temporarily. If your password is complex, a common reason is just upper/lower case errors.

3. Another problem but not so frequently encountered is that DHCP is turned off on the upstream router (Wifi 1). Typically it's because BraxRouter is connected to a router in Bridge mode (No DHCP). The upstream router needs to be in access point mode with a normal DHCP service.

4. If you are using an Ethernet Dongle with the BraxRouter, anytime the device is booted with a change in the Ethernet dongle status, you need to reboot it twice (2 minutes per start). The reason is that the BraxRouter is set to to autodetect the device attached. It will detect the device and first boot and then it will use the device on the second boot.

If you're having temporary issues after plugging in an Ethernet dongle, this is often the reason.

5. Remember that BraxRouter requires an upstream router Wifi 1 in order to work. Meaning an upstream router must provide DHCP services (to give BraxRouter an IP address). You cannot connect BraxRouter directly to the ISP modem. If you do this, then the entire network will be VPN'd 100% of the time which is not a workable setup. Some sites do not allow VPN's.

## **Not Connecting to BraxRouter**

1. If you're unable to connect to the BraxRouter or any downstream Wifi attached to BraxRouter, it could mean that BraxRouter Wifi settings have been modified and is set to an invalid value. Typical reasons include using an unsupported Wifi mode and channel. By default, in Wifi mode, the fastest setting is 802.11n (which is 2.4GHZ) and it is set to channel 6. This is the best setting. Some 5 ghz channels may not work with the Raspberry PI model.

The easiest way to fix this is to find the network IP address of the BraxRouter. This means you have to log in to Wifi one and find the connected devices and figure out which one BraxRouter is.

Then you can ssh or use the Browser configuration interface using the instructions earlier in this manual. But you cannot use the fixed IP addresses (192.168.42.1 or 192.168.43.1). You have to find the IP address being used by the router through the wired connection. Typically you will find the IP address on the Wifi 1 setup.

2. If you do not know how to use the Wifi 1 setup to figure out the IP address, you can also guess. If you plug in a computer in a wired configuration, you can look at the IP address assigned. For example if the IP of the computer is 192.68.1.27, then all you have to do is try out all the IP's from 192.168.1.1 – 192.168.1.254. Lots of tries there but it will eventually work.



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