

Connect BBG Device to WiFi via Realtek RTL8188CUS USB Dongle: A How-to Guide

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References:

https://wiki.archlinux.org/title/wpa_supplicant

<https://github.com/kelebek333/rtl8188fu>

<https://linux.die.net/man/8/iwconfig>

Introduction:

This guide aims to provide you with instructions for connecting your Beaglebone (BBG) to WiFi using the Edimax/Realtek RTL8188CUS USB Dongle. While there were guides available for connecting Wifi dongles to BBG, such as [Network Manager Guide](#) (for this dongle) and [Wifi Adapter on Beaglebone Guide](#), these methods unfortunately did not yield the desired results to have the dongle successfully connected to WiFi. That being said, we have an alternative solution that allows the dongle to work with your BBG. More details will be provided in this guide.

Required Parts:

- Beaglebone
- Edimax/Realtek RTL8188CUS Wifi USB dongle

Getting Started

- Insert the dongle to your BBG's USB slot.
- To check if your BBG recognizes the USB, run this in the terminal:
 - **lsusb** (lower-case 'l' for Larry)

If you see the vendor's name (Edimax) and the USB's model number, that means your BBG has recognized the USB, and you can proceed to the next steps. Your terminal should display the following information for the USB:

```
debian@BeagleBone:~$ lsusb
Bus 001 Device 003: ID 0424:ec00 Edimax Technology Co.,
Ltd EW-7811Un 802.11n Wireless Adapter [Realtek
RTL8188CUS]
...
```

- Update your BBG's package lists, as well as installing all the essential tools:
 - **sudo apt-get update**
 - **sudo apt-get install build-essential git**

Dongle's Driver Installation

- “Download” and install the driver for the RTL8188CUS dongle to your BBG by following the Installation steps [HERE](#)

- Direct Link:

<https://github.com/kelebek333/rtl8188fu?tab=readme-ov-file#how-to-install>

NOTE:

- The installation process may take a while to finish.
- Check your BBG's kernel version to verify whether the Configuration steps (i.e. Blacklist) are needed:
 - **uname -r**

- Enable the driver module by running the following command(s):

- **sudo modprobe rtl8188fu** (Up to kernel 6.1)

OR

- **sudo modprobe -r rtl8188fu**

sudo modprobe rtl8188fu (Kernel 6.2 and up)

Reference:

<https://github.com/kelebek333/rtl8188fu?tab=readme-ov-file#enable-rtl8188fu-module>

Setting Up wpa_supplicant

We will be utilising the *wpa_supplicant* library to set up and configure the WiFi connection for the dongle.

- Get wpa_supplicant on your BBG by running:
 - **sudo apt-get install wpa_supplicant**
- Create a configuration file named *wpa_supplicant.conf*. This file will contain the wifi network information that the dongle connects to.
 - **sudo nano /etc/wpa_supplicant/wpa_supplicant.conf**
 - Paste the following into the file (Replace *wifi_ssid* and *wifi_password* with the actual values of the wifi network):

```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
country=US
```

```
network={
    ssid="wifi_ssid"
    psk="wifi_password"
}
```

Run Wpa_supplicant

- Stop currently running instances of `wpa_supplicant`:
 - **`sudo killall wpa_supplicant`**
- Start `wpa_supplicant` in the background, while pointing to your configuration file and wireless interface:
 - **`sudo wpa_supplicant -B -i wlan0 -c /etc/wpa_supplicant/wpa_supplicant.conf`**
- Lastly, use `dhclient` to get an IP address from your WiFi network's DHCP server:
 - **`sudo dhclient wlan0`**
- IMPORTANT NOTE:
 - These commands must be run each time your BBG is booted, rebooted, or whenever the `wpa_supplicant.conf` file is updated with new network information.
 - (Recommended) To make the commands easier to execute, save them in a `.sh` file. This way, instead of retyping all the commands, you can simply run the executable file.

Bring Up the WiFi interface

- Bring up the WiFi interface using `ifconfig`:
 - **`sudo ifconfig wlan0 up`**

Verification & Testing

- Verify the connection by running:
 - **ifconfig wlan0** – Check if your BBG has received an IP address

- Or run **ip addr** (look for wlan0's inet)

```
4: usb1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 3c:e4:b0:e3:57:23 brd ff:ff:ff:ff:ff:ff
    inet 192.168.6.2/24 brd 192.168.6.255 scope global usb1
        valid_lft forever preferred_lft forever
    inet6 fe80::3ee4:b0ff:fee3:5723/64 scope link
        valid_lft forever preferred_lft forever
5: can0: <NOARP,ECHO> mtu 16 qdisc noop state DOWN group default qlen 10
    link/can
6: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 74:da:38:ea:82:74 brd ff:ff:ff:ff:ff:ff
    inet 192.168.68.131/24 brd 192.168.68.255 scope global dynamic wlan0
        valid_lft 6841sec preferred_lft 6841sec
    inet6 fe80::76da:38ff:feea:8274/64 scope link
        valid_lft forever preferred_lft forever
```

- **ping google.ca** – Simple ping test

```
debian@BeagleBone:~$ ping google.ca
PING google.ca (142.250.217.67) 56(84) bytes of data:
64 bytes from sea09s29-in-f3.1e100.net (142.250.217.67): icmp_seq=1 ttl=118 time=27.6 ms
64 bytes from sea09s29-in-f3.1e100.net (142.250.217.67): icmp_seq=2 ttl=118 time=17.4 ms
64 bytes from sea09s29-in-f3.1e100.net (142.250.217.67): icmp_seq=3 ttl=118 time=20.8 ms
64 bytes from sea09s29-in-f3.1e100.net (142.250.217.67): icmp_seq=4 ttl=118 time=13.5 ms
^C
--- google.ca ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt_min/avg/max/mdev = 13.499/19.827/27.617/5.179 ms
```

Troubleshooting:

1. If there is no internet connection after bringing up the interface (i.e. no ping from external website despite having an IP address), reboot the BBG's network by running:
 - a. **sudo reboot**Then, repeat the steps in Run Wpa_supplicant, and perform another simple ping test to see if the connection is successful after rebooting.
2. If you want to change to a different WiFi network, simply update the `wpa_supplicant.conf` file:
 - a. **sudo nano /etc/wpa_supplicant/wpa_supplicant.conf**And rerun `wpa_supplicant`
3. In addition to **ifconfig wlan0** and **ip addr** commands, you can also run **iwconfig** if you prefer to check only your wireless network interface.
 - a. To install `iwconfig`, run: **sudo apt-get install --reinstall wireless-tools**
4. Run either **ip addr** / **ifconfig** / **iwconfig** command to confirm the dongle's connection is under the network interface name of `wlan0`. If it appears under a different name (e.g. `wlan1`), you'll need to modify the commands in this guide accordingly, replacing `wlan0` with the actual network interface name.
Example: **sudo ifconfig wlan1 up** (instead of `wlan0`)