02-Configuring Internet for the BeagleBone Black

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There are three options for setting up an internet connection to your BeagleBone: ethernet, sharing laptop's connection via USB, and using the wifi dongle. **A direct ethernet connection is by far the easiest method.** Each of the methods requires the following initial setup:

1. SSH into your BeagleBone over USB.
2. Add some nameservers (these instructions use the Google DNS servers as generic defaults) to the resolvconf system

   ```
   sudo sh -c "echo 'nameserver 8.8.8.8' >> /etc/resolvconf/resolv.conf.d/tail"
   sudo sh -c "echo 'nameserver 8.8.4.4' >> /etc/resolvconf/resolv.conf.d/tail"
   ```

   (a) **If you get permission denied errors**, go to the root directory `cd /` then use nano to manualy edit the file:

   ```
   sudo nano /etc/resolvconf/resolv.conf.d/tail
   ```

   and add following two lines:

   ```
   nameserver 8.8.8.8
   nameserver 8.8.4.4
   ```

3. Restart the resolvconf service

   ```
   sudo service resolvconf restart
   ```

4. Check that 8.8.8.8 and 8.8.4.4 are added to the end of your resolv.conf using:

   ```
   cat /etc/resolv.conf
   ```

1 Setup internet over ethernet

1. Plug an ethernet cable into the BeagleBone
2. Test ethernet connection using `ping google.com`

2 Share host laptop internet over USB (Only works in Ubuntu)

1. Add a connection to your host laptop's computer. Note this must be done every time you boot up the machine and wish to share network over the USB connection.

   ```
   sudo route add default gw 192.168.7.1
   ```

2. Use `ifconfig` to view your host computer's connections to the internet and to the BeagleBone. The connection with an ip address of `192.168.7.1` will be your connection to the BeagleBone.
3. On your host laptop running ubuntu, run the following (NOTE: replace `eth1` and `wlan0` with whatever interfaces your laptop is actually using to connect to the BeagleBone and wifi, respectively.

```
sudo iptables --table nat --append POSTROUTING --out-interface wlan0 -j MASQUERADE
sudo iptables --append FORWARD --in-interface eth1 -j ACCEPT
sudo bash -c "echo 1 > /proc/sys/net/ipv4/ip_forward"
```

These commands create a forwarding bridge between the wireless network on your laptop and the USB network connecting you to the Beaglebone.

(a) **Note:** These changes are not likely to persist through a power cycle, especially on virtual machines.

4. Once the kernel iptables are set, you should be able to ping things like google.com on the Beaglebone using `ping google.com`.

3 Setup wifi using dongle

3.1 Requirements

These instructions require the following items/tools in order to properly enable to wireless connection on the BeagleBone Black.

1. A BeagleBone Black, running Ubuntu 14.04.3 LTS and the 3.8.13-bone78 kernel. Getting the current kernel version can be done with:

   ```
   uname -r
   ```

   If the kernel version is incorrect, you can switch to it to the proper version by executing:

   ```
   sudo apt-get update
   sudo apt-get install linux-image-3.8.13-bone78
   sudo apt-get remove linux-image-4.1.*
   sudo reboot
   ```

2. A wall adapter capable of powering the BeagleBone Black. While the USB connection is capable of powering the board in normal operation, wireless can consume more power than the USB connector can provide.

3. A USB wireless adapter compatible with Ubuntu 14.04. This has been tested with the Edimax EW–7811Un[1], which is based on the RTL8192cu chipset.

4. A computer capable of SSHing into the BeagleBone Black. These instructions will provide instructions based on using SSH over the USB connection, with the default information.

5. Account information for logging into the BeagleBone Black with sudoers access. The default ubuntu username suffices and will be used in these instructions, but if a custom account is used, it must have sudoers access.

3.2 Initial Setup

1. Power on the BeagleBone Black, with the wireless adapter plugged in.

2. SSH into the BeagleBone Black by opening your SSH application of choice. Log into 192.168.7.2 using the ubuntu username, and the matching password (default is temppwd).

3. Ensure that wpa_supplicant is installed by executing

   ```
   sudo apt-get install wpasupplicant
   ```

4. Once the connection is complete, edit the file /etc/wpa_supplicant.conf to include the following text:

[1] http://www.amazon.com/Edimax-EW-7811Un-150Mbps-Raspberry-Supports/dp/B003MTTJOY/ref=sr_1_1?ie=UTF8&qid=1439573954&sr=8-1

```
ctrl_interface=/var/run/wpa_supplicant
```

5. For each wireless connection with WPA or WPA2 encryption, execute the following command:

   ```
   sudo sh -c "wpa_passphrase 'SSID' 'Passphrase' >> /etc/wpa_supplicant.conf"
   ```

   where SSID is the name of the wireless access point, and Passphrase is the password to enter the encryption.

6. Edit "/etc/network/interfaces" file to activate the wireless adapter. Ensure that no other part of the file references wlan0, then add the following block to the file:

   ```
   # Turn on wifi when connected
   auto wlan0
   # Use DHCP on the wifi system to attempt to access the internet
   iface wlan0 inet dhcp
     wpa-driver wext
     wpa-conf /etc/wpa_supplicant.conf
   ```

7. In order to test that the wireless network is correctly configured, you can execute:

   ```
   sudo ifup wlan0
   ifconfig wlan0
   ```

   and verify that wlan0 lists a valid IP address.

3.3 Reducing Electrical Noise

If you have trouble connecting to wireless networks, you may need to disable the HDMI connection on the BeagleBone Black in order to reduce electrical noise near the USB wireless adapter. The simplest method would be to use a USB cable to physically move the USB wifi adapter away from the BeagleBone Black. The alternate method is to disable the HDMI connection to reduce electrical noise. This can be done by editing /boot/uEnv.txt and adding in the following line:

```
cape_disable=capemgr.disable_partno=BB-BONELT-HDMI,BB-BONELT-HDMIN
```