Enabling the CDC-ECM Connection for Skywire CAT1 On A BeagleBone Black

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1. Introduction

1.1 Orderable Part Numbers

Orderable Device	Description	Carrier	Network Type
NL-SW-LTE-GELS3	Skywire CAT1 LTE	Verizon	LTE
NL-AB-BBBC	Skywire BeagleBone Black Cape	Any	Any

1.2 Overview

The Skywire ™ CAT1 LTE modem supports CDC_ETHER, an Ethernet over USB protocol that allows for an easy data connection. This application note provides a working example of setting up the CDC_ETHER connection on a BeagleBone Black.

1.3 A Note on CDC_ETHER

For CDC_ETHER to work, the Linux kernel needs to have support for the CDC_ETHER USB device class built in. If it does, then when the modem is connected via USB, an ethernet device will simply appear (usually as “usb0”, “usb1”, etc.). If it does not appear, then chances are the Linux kernel version you have does not support CDC_ETHER.

1.4 Testing

This procedure was tested on the following OSs and hardware:

Hardware
BeagleBone Black Rev. 3

Operating Systems Supported
Debian 8.3 (Kernel 4.1.15-ti-rt-r43)

Operating Systems NOT Supported
Debian 7.x (Kernel 3.8.x)

2. BeagleBone Black Setup

2.1 Overview

Setting up the CDC_ETHER connection on the BeagleBone Black allows for automatic setup and connection, providing an easy way to get a data connection to your BeagleBone Black.

2.2 BeagleBone Black Setup

Start your BeagleBone Black and log in as `root`.

Edit the following file with your favorite text editor. This example uses `nano`:

```
# nano /etc/network/interfaces
```

There will be setup for having the USB port share internet with your workstation, and unless it has been edited, will read as follows:

```
# Ethernet/RNDIS gadget (g_ether)
# Used by: /opt/scripts/boot/autoconfigure_usb0.sh
iface usb0 inet static
    address 192.168.7.2
    netmask 255.255.255.252
    network 192.168.7.0
    gateway 192.168.7.1
```

By default, this enables sharing internet access over the USB port. Unfortunately, it interferes with the CDC_ETHER connection. Comment out the lines that set up this connection:

```
# Ethernet/RNDIS gadget (g_ether)
# Used by: /opt/scripts/boot/autoconfigure_usb0.sh
#iface usb0 inet static
#    address 192.168.7.2
#    netmask 255.255.255.252
#    network 192.168.7.0
#    gateway 192.168.7.1
```

Save and close the file, and reboot your BeagleBone Black:

```
# reboot
```

2.3 Verify and Test The Connection

Once the BeagleBone Black has rebooted, log in. The CDC_ETHER connection will automatically come up as `usb1`:

```
# ifconfig
```



```
eth0      Link encap:Ethernet  HWaddr 68:9e:19:8f:eb:0d
          UP BROADCAST MULTICAST DYNAMIC  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:177

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:180 errors:0 dropped:0 overruns:0 frame:0
          TX packets:180 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:14888 (14.5 KiB)  TX bytes:14888 (14.5 KiB)

usb1      Link encap:Ethernet  HWaddr 02:10:81:64:82:60
          inet addr:192.168.15.144  Bcast:192.168.15.255  Mask:255.255.255.0
          inet6 addr: 2600:1014:b058:dacd:10:81ff:fe64:8260/64 Scope:Global
          inet6 addr: fe80::10:81ff:fe64:8260/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST DYNAMIC  MTU:1500  Metric:1
          RX packets:145 errors:0 dropped:0 overruns:0 frame:0
          TX packets:204 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:15402 (15.0 KiB)  TX bytes:26119 (25.5 KiB)
```

You can now test the connection:

```
# ping google.com
PING google.com (63.84.3.23) 56(84) bytes of data.
64 bytes from 63.84.3.23: icmp_seq=1 ttl=52 time=45.0 ms
64 bytes from 63.84.3.23: icmp_seq=2 ttl=52 time=51.0 ms
64 bytes from 63.84.3.23: icmp_seq=3 ttl=52 time=62.3 ms
64 bytes from 63.84.3.23: icmp_seq=4 ttl=52 time=54.9 ms
64 bytes from 63.84.3.23: icmp_seq=5 ttl=52 time=307 ms
64 bytes from 63.84.3.23: icmp_seq=6 ttl=52 time=55.3 ms
64 bytes from 63.84.3.23: icmp_seq=7 ttl=52 time=59.8 ms
^C
--- google.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 20066ms
rtt min/avg/max/mdev = 45.068/90.920/307.869/88.724 ms
```

Your CDC_ETHER connection is now setup.