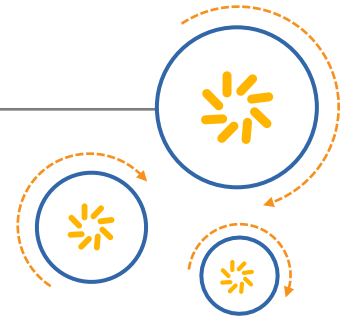




Qualcomm Technologies, Inc.



# DragonBoard™ 410c based on Qualcomm® Snapdragon™ 410E processor

## USB to Ethernet Adapter Application Note

September 2016

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Questions or comments: <https://www.96boards.org/DragonBoard410c/forum>

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## Revision history

Revision	Date	Description
B	September 2016	Update to 'E' part
A	July 2, 2015	Initial release.

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# 1 Introduction

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## 1.1 Purpose

This application note explains how to enable the USB to Ethernet adapter on the DragonBoard™ 410c.

## 1.2 Acronyms and abbreviations

**Table 1 Acronyms and abbreviations**

Acronym	Definition
DNS	Domain Name System
GND	Ground
GUI	Graphical User Interface
MFR	Manufacturer
NDC	Network Destination Code
QTI	Qualcomm Technologies, Inc.
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus

## 1.3 USB to Ethernet adapters used

The USB to Ethernet adapters shown below were used during testing, Apple USB to Ethernet adapter A1277 and Cable Matters USB to Ethernet adapter



Figure 1-1 USB to ethernet adapters

# 2 Configuring the Kernel

---

## 2.1 Rebuilding the kernel

1. Follow the instructions in the guide at this link to get the latest Android build:  
<https://developer.qualcomm.com/download/db410c/linux-android-software-build-and-installation-guide.pdf>

## 2.2 Commands to modify and rebuild kernel

1. Change the directory to the source root:  

```
cd $BUILDROOT
```

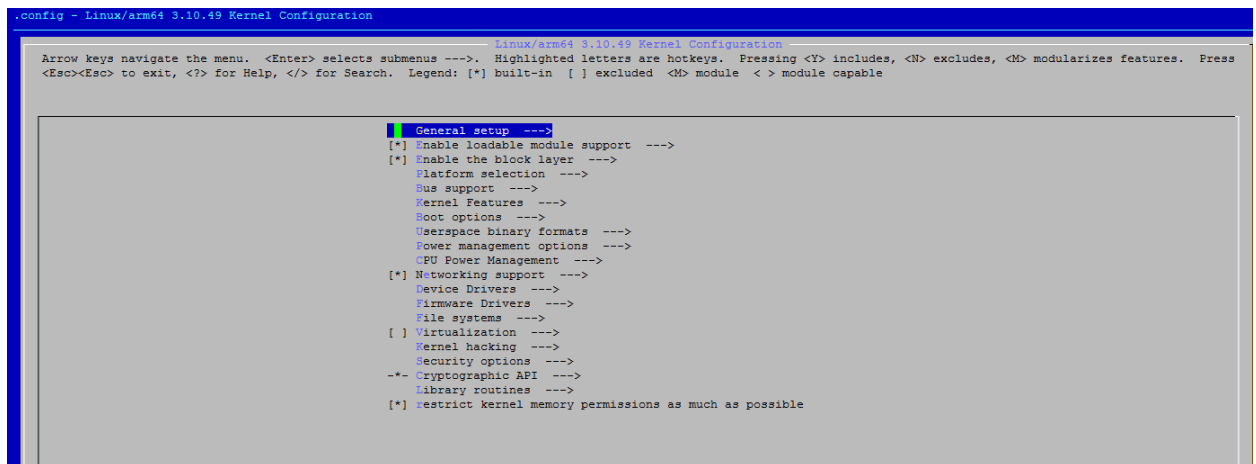
```
source build/envsetup.sh
```

```
lunch msm8916_64-userdebug
```
2. Launch the kernel config run the command:

```
make -j8 kernelconfig
```

Where -j8 depends on the Linux machine cores; change accordingly.

You should see the configuration window as shown below:



3. Select Device Drivers-> Network device support -> USB Network Adapters

```

.config - Linux/arm64 3.10.49 Kernel Configuration
> Device Drivers > Network device support > USB Network Adapters
                                     USB Network Adapters
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes features. Press
<Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded <M> module <> module capable

< > USB CATC NetMate-based Ethernet device support
< > USB KLSI KLSUSB101-based ethernet device support
< > USB Pegasus/Pegasus-II based ethernet device support
< > USB RTL8150 based ethernet device support
< > Realtek RTL8152 Based USB 2.0 Ethernet Adapters
< * > Multi-purpose USB Networking Framework
< * > ASIX AX88xxx Based USB 2.0 Ethernet Adapters
< * > ASIX AX88179/178A USB 3.0/2.0 to Gigabit Ethernet
- - - CDC Ethernet support (smart devices such as cable modems)
< > CDC EEM support
< * > CDC NCM support
< > CDC MBIM support
< > Davicom DM9601 based USB 1.1 10/100 ethernet devices
< > RMSC LAN75XX based USB 2.0 gigabit ethernet devices
< > RMSC LAN95XX based USB 2.0 10/100 ethernet devices
< > GeneSys GL620USB-A based cables
< * > NetChip 1080 based cables (EaplLink, ...)
< > Prolific PL-2301/2302/25R1 based cables
< > M=Chip MCS7830 based Ethernet adapters
< > Host for RNDIS and ActiveSync devices
< * > Simple USB Network Links (CDC Ethernet subset)
[ ] Ali M5632 based 'USB 2.0 Data Link' cables
[ ] AnchorChips 2720 based cables (Xircom FGUNET, ...)
[*] eTEK based host-to-host cables (Advance, Belkin, ...)
[*] Embedded ARM Linux links (IPaq, ...)
[ ] Ipson 2888 based firmware (DEVELOPMENT)
[ ] T Technology KC2190 based cables (InstaNet)
< * > Sharp Zaurus (stock ROMs) and compatible
< > Conexant CX82310 USB ethernet port
< > Samsung Kalmia based LTE USB modem
< > MI WWAN driver for Qualcomm MSM based 3G and LTE modems
< > Option USB High Speed Mobile Devices

```

#### 4. Choose the kernel built in option for:

- < \* > Multi-purpose USB Networking Framework
- < \* > ASIX AX88xxx Based USB 2.0 Ethernet Adapters
- < \* > ASIX AX88179/178A USB 3.0/2.0 to Gigabit Ethernet
- < \* > CDC NCM support

**NOTE:** You may need to select other drivers for USB to Ethernet adapters that are different from the picture above.

5. Save and exit from the kernel config menu.
6. Run the following command:

```
make -j8 bootimage
```

**booti.img** will be generated at **out/target/product/msm8916\_64/boot.img**

## 2.3 Flashing the kernel to DragonBoard 410c and testing ping

1. Bring the DragonBoard 410c into fastboot by holding VOL- during power up. Once in fastboot, you can flash the **boot.img** using the following command:

```
fastboot flash boot boot.img
```
2. Reboot the device
3. You can keep the USB to Ethernet adapter connected at bootup or connect when device boots into Android.

check the following prints or log messages using `dmesg` on serial console when the USB Ethernet adapter is detected and registered when you connect to one of the USB2.0 ports on DragonBoard 410c. Note that you need to have USB to UART TTL 1.8V cable connected to J8 to pin 1 (GND),11 (UART1\_TX),13 (UART1\_RX) to see console trace messages. Set the

baud rate to 115200. You cannot use adb shell as only device mode or host mode is supported at anytime on DragonBoard 410c.

**usb 2-1: new high-speed USB device number 2 using msm\_ehci\_host**

**usb 2-1: New USB device found, idVendor=05ac, idProduct=1402**

**usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3**

**usb 2-1: Product: Apple USB Ethernet Adapter**

**usb 2-1: Manufacturer: Apple Inc.**

**usb 2-1: SerialNumber: 1CBF36**

**asix 2-1:1.0: eth1: register 'asix' at usb-msm\_ehci\_host.1-1, ASIX AX88772**

4. To get networking working you need to run the following commands on shell according to your network configuration:

```
su
```

```
netcfg → should list eth0
```

```
netcfg eth0 up
```

```
netcfg eth0 dhcp
```

```
ndc network create 100
```

```
ndc network interface add 100 eth0
```

```
ndc network route add 100 eth0 xx.xx.xx.x/xx
```

→ ip route show will list the address that you can use

```
ndc resolver setnetdns eth0 8.8.8.8 8.8.4.4
```

```
route add default gw xx.xxx.xx.xx dev eth0
```

→ gw is the gateway address of your network

```
netcfg
```

Will list eth0 and its IP address

5. You can test ping between your PC and DragonBoard 410c  
ping [www.google.com](http://www.google.com) should succeed as well.

**NOTE:** Please note that on console DNS resolution succeeds, by default other GUI applications on Android Lollipop may not use eth0 interface. This feature is being considered to be added in the next Android release for DragonBoard 410c.



## EXHIBIT 1

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