

ESE 2025 Lab Report - Booting The Beagle Bone Black

Instructor: dr. Takis Zourntos

Student: Vy Nguyen - C0776242

Introduction:

This report showing the process of booting a BeagleBone Black via minicom and the FTDI serial debug cable.

Discussion:

The booting process comes into play when there is a problem when the USB cable is not working.

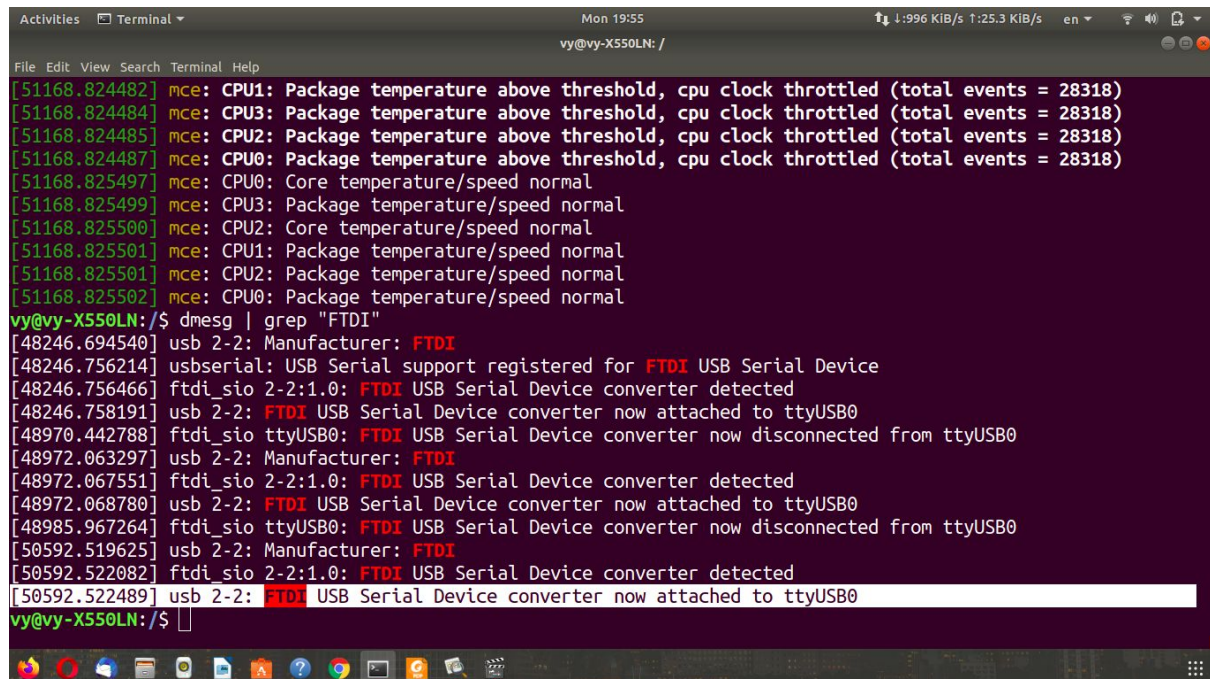
Before the process of booting, the host machine need to install the minicom first, by doing:

```
$sudo apt install minicom
```

Then after connecting the BBB to host machine, we need to define the FTDI port on minicom. To do that, we have to find the “tag” of the FTDI port, running:

```
$dmesg | grep "FTDI"
```

with grep “FTDI” as a filter

A screenshot of a Linux terminal window. The title bar shows 'Mon 19:55' and network status. The terminal output shows a series of messages from the mce (Machine Check Exception) subsystem regarding CPU temperatures and clock throttling. Following these, the user runs the command 'dmesg | grep "FTDI"'. The output shows several USB-related messages from the FTDI (Future Technology Devices International) driver, including device detection, attachment to ttyUSB0, and disconnection events. The terminal window has a dark background with light-colored text. The bottom of the window shows a taskbar with various application icons.

```
vy@vy-X550LN: /  
File Edit View Search Terminal Help  
[51168.824482] mce: CPU1: Package temperature above threshold, cpu clock throttled (total events = 28318)  
[51168.824484] mce: CPU3: Package temperature above threshold, cpu clock throttled (total events = 28318)  
[51168.824485] mce: CPU2: Package temperature above threshold, cpu clock throttled (total events = 28318)  
[51168.824487] mce: CPU0: Package temperature above threshold, cpu clock throttled (total events = 28318)  
[51168.825497] mce: CPU0: Core temperature/speed normal  
[51168.825499] mce: CPU3: Package temperature/speed normal  
[51168.825500] mce: CPU2: Core temperature/speed normal  
[51168.825501] mce: CPU1: Package temperature/speed normal  
[51168.825501] mce: CPU2: Package temperature/speed normal  
[51168.825502] mce: CPU0: Package temperature/speed normal  
vy@vy-X550LN:/$ dmesg | grep "FTDI"  
[48246.694540] usb 2-2: Manufacturer: FTDI  
[48246.756214] usbserial: USB Serial support registered for FTDI USB Serial Device  
[48246.756466] ftdi_sio 2-2:1.0: FTDI USB Serial Device converter detected  
[48246.758191] usb 2-2: FTDI USB Serial Device converter now attached to ttyUSB0  
[48970.442788] ftdi_sio ttyUSB0: FTDI USB Serial Device converter now disconnected from ttyUSB0  
[48972.063297] usb 2-2: Manufacturer: FTDI  
[48972.067551] ftdi_sio 2-2:1.0: FTDI USB Serial Device converter detected  
[48972.068780] usb 2-2: FTDI USB Serial Device converter now attached to ttyUSB0  
[48985.967264] ftdi_sio ttyUSB0: FTDI USB Serial Device converter now disconnected from ttyUSB0  
[50592.519625] usb 2-2: Manufacturer: FTDI  
[50592.522082] ftdi_sio 2-2:1.0: FTDI USB Serial Device converter detected  
[50592.522489] usb 2-2: FTDI USB Serial Device converter now attached to ttyUSB0  
vy@vy-X550LN:/$
```

Remember the “ttyUSB0”

Now we can go to the minicom setting:

```
$sudo minicom -s
```

Then save the setting below as default:

```
Activities  Terminal  Mon 19:56  1:1012 KIB/s 1:24.7 KIB/s  en  [network icon] [sound icon] [battery icon]
vy@vy-X550LN: /

File Edit View Search Terminal Help

+-----+
| A -   Serial Device       : /dev/ttyUSB0 |
| B - Lockfile Location    : /var/lock     |
| C -   Callin Program      :               |
| D -   Callout Program     :               |
| E -   Bps/Par/Bits        : 115200 8N1   |
| F - Hardware Flow Control : No           |
| G - Software Flow Control : No           |
|                                     |
| Change which setting? [ ]              |
+-----+
| Screen and keyboard |
| Save setup as dfl   |
| Save setup as..     |
| Exit                |
| Exit from Minicom   |
+-----+
```

Now we run

```
$sudo reboot
```

We will see the process of BBB booting before starting the Kernel:

```
Activities  Terminal  Mon 20:01  1:576 KIB/s 1:11.8 KIB/s  en  [network icon] [sound icon] [battery icon]
vy@vy-X550LN: /

File Edit View Search Terminal Help

debian@beaglebone:~$ sudo reboot
[sudo] password for debian:
Sorry, try again.
[sudo] password for debian:
[ 494.097192] watchdog: watchdog0: watchdog did not stop!
[ 494.303680] reboot: Restarting system

U-Boot 2019.04-00002-gf15b99f0b6 (Oct 01 2019 - 09:28:05 -0500)
Trying to boot from MMC2
Loading Environment from EXT4... Card did not respond to voltage select!

U-Boot 2019.04-00002-gf15b99f0b6 (Oct 01 2019 - 09:28:05 -0500), Build: jenkins-github_Bootloader-Builder-131

CPU : AM335X-GP rev 2.1
I2C:  ready
DRAM:  512 MiB
No match for driver 'omap_hsmmc'
No match for driver 'omap_hsmmc'
Some drivers were not found
Reset Source: Global warm SW reset has occurred.
Reset Source: Power-on reset has occurred.
RTC 32KCLK Source: External.
MMC:  OMAP SD/MMC: 0, OMAP SD/MMC: 1
Loading Environment from EXT4... Card did not respond to voltage select!
```

```
Activities Terminal Mon 20:01 1.0 MiB/s 1:25.9 KiB/s en
vy@vy-X550LN: /

File Edit View Search Terminal Help
uboot_overlays: loading /lib/firmware/BB-HDMI-TDA998x-00A0.dtbo ...
5049 bytes read in 323 ms (14.6 KiB/s)
uboot_overlays: loading /lib/firmware/BB-ADC-00A0.dtbo ...
867 bytes read in 273 ms (2.9 KiB/s)
uboot_overlays: loading /lib/firmware/AM335X-PRU-RPROC-4-14-TI-00A0.dtbo ...
3675 bytes read in 159 ms (22.5 KiB/s)
loading /boot/initrd.img-4.14.108-ti-r119 ...
4640514 bytes read in 314 ms (14.1 MiB/s)
debug: [console=tty00,115200n8 bone_capemgr.uboot_capemgr_enabled=1 root=/dev/mmcblk1p1 ro rootfstype=ext4 root.
debug: [bootz 0x82000000 0x88080000:46cf02 88000000] ...
## Flattened Device Tree blob at 88000000
Booting using the fdt blob at 0x88000000
Loading Ramdisk to 8fb93000, end 8ffffff02 ... OK
Loading Device Tree to 8fb07000, end 8fb92fff ... OK

Starting kernel ...

[ 0.002141] timer_probe: no matching timers found
[ 0.964540] wkup_m3_ipc 44e11324.wkup_m3_ipc: could not get rproc handle
[ 1.270949] omap_voltage_late_init: Voltage driver support not added
[ 1.278171] PM: Cannot get wkup_m3_ipc handle
[ 1.476504] hdmi-audio-codec hdmi-audio-codec.1.auto: ASoC: no source widget found for Playback
[ 1.485488] hdmi-audio-codec hdmi-audio-codec.1.auto: ASoC: Failed to add route Playback -> direct -> TX
```

Then we can log in and look for some different by:

```
$dmesg | head

Activities Terminal Mon 20:03 1.705 KiB/s 1:12.4 KiB/s en
vy@vy-X550LN: /

File Edit View Search Terminal Help
debian@beaglebone:~$ dmesg | head
[ 0.000000] Booting Linux on physical CPU 0x0
[ 0.000000] Linux version 4.14.108-ti-r119 (root@x1-am57xx-beagle-x15-2gb) (gcc version 6.3.0 20170516 (Debi9
[ 0.000000] CPU: ARMv7 Processor [413fc082] revision 2 (ARMv7), cr=10c5387d
[ 0.000000] CPU: PIPT / VIPT nonaliasing data cache, VIPT aliasing instruction cache
[ 0.000000] OF: fdt: Machine model: TI AM335x BeagleBone Black
[ 0.000000] Memory policy: Data cache writeback
[ 0.000000] efi: Getting EFI parameters from FDT:
[ 0.000000] efi: UEFI not found.
[ 0.000000] cma: Reserved 48 MiB at 0x9c800000
[ 0.000000] On node 0 totalpages: 130560
debian@beaglebone:~$
```

Summary:

Those are some of the command and note we should take into account when booting a Beaglebone Black machine. To debug and for further process, recommend following the “Exploring BeagleBone” by Derek Molloy.