



OMAP35x Linux BSP User Guide

BSP Documentation

Logic PD // Products
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Revision History

REV	EDITOR	DESCRIPTION	APPROVAL	DATE
A	JCA	-Initial release; -Moved content from the Zoom OMAP35x Development Kit User Manual (PN 1010047); -Added OMAP35x Torpedo Development Kit support	GLJ	07/29/10
B	SO	-Throughout: Updated template; updated links for new support site; reorganized content; replaced "contact Logic PD" links with instructions to post questions on TDG forum; -Section 12.6: Added Step 8	BSB	02/11/14

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1 Introduction

This document provides information pertaining to Logic PD's OMAP35x Linux Board Support Package (BSP). This BSP is compatible with both the OMAP35x SOM-LV and OMAP35x Torpedo SOM platforms.

1.1 Nomenclature

- This document covers the OMAP35x SOM-LV and OMAP35x Torpedo SOM. Use of "OMAP35x SOM" suggests text that applies to both platforms; information specific to one platform will call out the precise name.
- Use of "Zoom™ Development Kit" suggests text that applies to both the Zoom OMAP35x Development Kit (SOM-LV based) and the Zoom OMAP35x Torpedo Development Kit; information specific to one development kit will call out the precise name.

2 Prerequisites

The following items are necessary to complete the procedures in this document.

- Zoom Development Kit registered on [Logic PD's support site](#).¹
 - Registration is required to grant you access to your product's download page where the BSP can be downloaded
- Host PC
- Internet connection

After carefully reviewing the information in this prerequisites section, feel free to jump to the section that best fits your development environment.

- Section 3 describes how to load the demo image via an SD card.
- Section 4 describes how to load the demo image via Ethernet with a DHCP-obtained IP address.
- Section 5 describes how to load the demo image via Ethernet with a static IP address.

2.1 Linux Demo Image

The Linux demo image consists of a .elf file loadable by LogicLoader. The .elf file contains the following programs: U-Boot, Linux kernel, and a RAM-based Linux root filesystem. This image is provided for your convenience; Logic PD makes no claims toward the suitability of this pre-built software for production environments.

IMPORTANT NOTE: Please review the release notes provided with the sample image, paying special attention to dependencies regarding hardware and LogicLoader version. Pre-built software may require a LogicLoader upgrade. For example, version 1.4 of the pre-built Linux image requires at least LogicLoader version 2.4.6.

If you have been using a previous version of this sample image and would like to start with a clean system, you can erase the U-Boot configuration block by typing the following LogicLoader command below at the `losh>` prompt.

```
losh> erase /dev/nand0 B2047 B1
```

¹ <http://support.logicpd.com/TechnicalSupport/RegisterProduct.aspx>

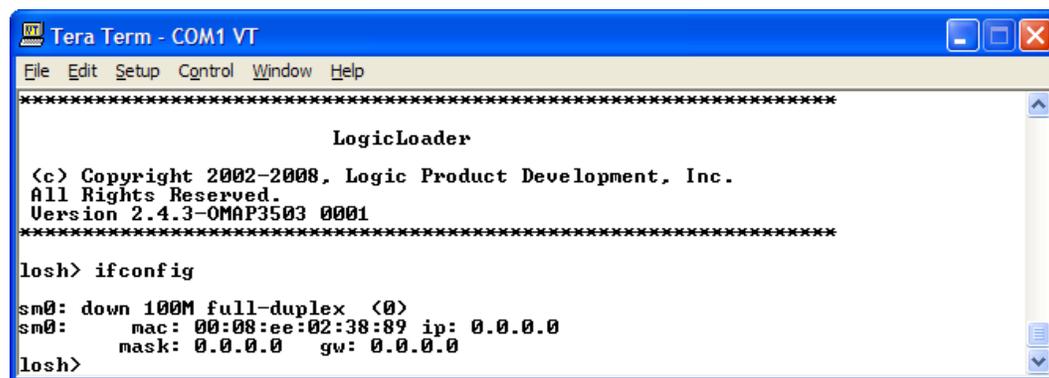
2.2 Determine MAC Address

A future step in this process will ask you for the MAC address of your OMAP35x SOM. This should appear on a sticker affixed to the top of your SOM. However, if you do not know which MAC address sticker represents the 10/100 wired Ethernet controller compared to the 802.11b/g wireless Ethernet controller, you can use a single LogicLoader command to determine which MAC address is active.

Enter the command below at the `losh>` prompt.

```
losh> ifconfig
```

You should see the output below. Take note of which sticker on your SOM represents the MAC address displayed.



```
Tera Term - COM1 VT
File Edit Setup Control Window Help
*****
                        LogicLoader
(c) Copyright 2002-2008, Logic Product Development, Inc.
All Rights Reserved.
Version 2.4.3-OMAP3503 0001
*****

losh> ifconfig

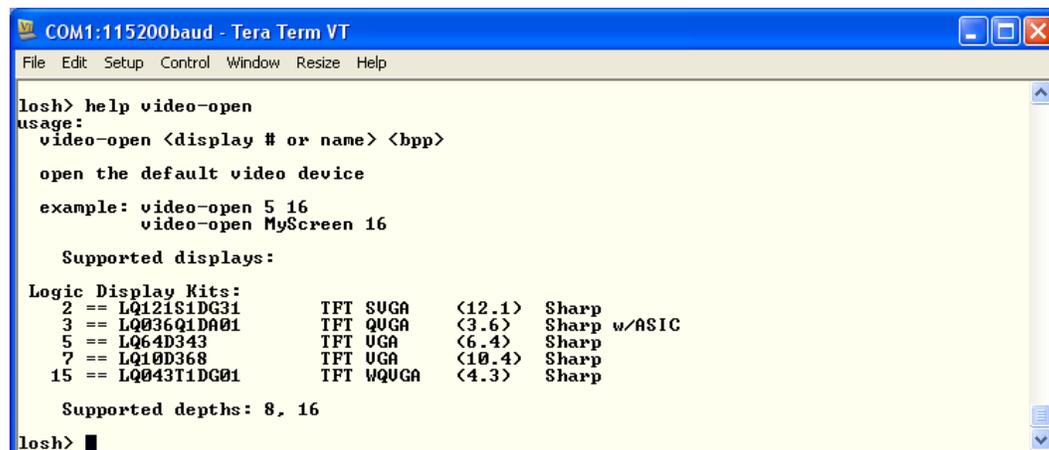
sm0: down 100M full-duplex <0>
sm0:   mac: 00:08:ee:02:38:89 ip: 0.0.0.0
      mask: 0.0.0.0 gw: 0.0.0.0
losh>
```

2.3 Determine Display Number

Logic PD provides several LCD display kits, each of which is numbered by Logic PD. The display number is used by Logic PD software as shorthand for the actual display. To see a complete listing of display numbers, enter the command below at the `losh>` prompt.

```
losh> help video-open
```

You should see the output below. Take note of the numbers assigned to the various Logic PD display kits.



```
COM1:115200baud - Tera Term VT
File Edit Setup Control Window Resize Help

losh> help video-open
usage:
  video-open <display # or name> <bpp>

  open the default video device

  example: video-open 5 16
           video-open MyScreen 16

  Supported displays:

  Logic Display Kits:
  2 == LQ121S1DG31      TFT SUGA   <12.1> Sharp
  3 == LQ036Q1DA01     TFT QUGA   <3.6>  Sharp w/ASIC
  5 == LQ64D343        TFT UGA    <6.4>  Sharp
  7 == LQ10D368        TFT UGA    <10.4> Sharp
  15 == LQ043T1DG01    TFT WQUGA  <4.3>  Sharp

  Supported depths: 8, 16

losh> █
```

3 Load Linux Demo Image via SD Card

This section describes how to download the Linux demo image from an SD card in LogicLoader to the Zoom Development Kit.

3.1 Required Components

- [Tera Term](#)² terminal emulator (or equivalent)
- Linux demo image for the OMAP35x SOM
 - [OMAP35x SOM-LV Linux Demo Image](#)³
 - [OMAP35x Torpedo Linux Demo Image](#)⁴
- SD card with a capacity of at least 32 MB—this card must be large enough to store the sample Linux OS image binary file

3.2 Procedure

1. Download the Linux demo image ZIP file to your host PC.
2. Extract the file and locate the *linux-demo-omap-xxxxxxx.elf* file.
3. Store the *linux-demo-omap-xxxxxxx.elf* file on an SD card.
4. Insert the SD card into the Zoom Development Kit's SD card slot.
5. Start a terminal emulator program on your host PC.
6. Connect the serial cable provided with the Zoom Development Kit from the host PC to the Zoom Development Kit.
7. Power on the Zoom Development Kit and verify the LogicLoader prompt appears in the terminal emulator window.
8. Mount the SD card in LogicLoader.

```
losh> mount fatfs /dev/sdmmc0a /sd
```

9. Change directories to the SD card.

```
losh> cd /sd
```

10. Confirm that your card has been mounted and the *linux-demo-omap-xxxxxxx.elf* file is on the card.

```
losh> ls
```

² <http://support.logicpd.com/DesktopModules/Bring2mind/DMX/Download.aspx?portalid=0&EntryId=1420>

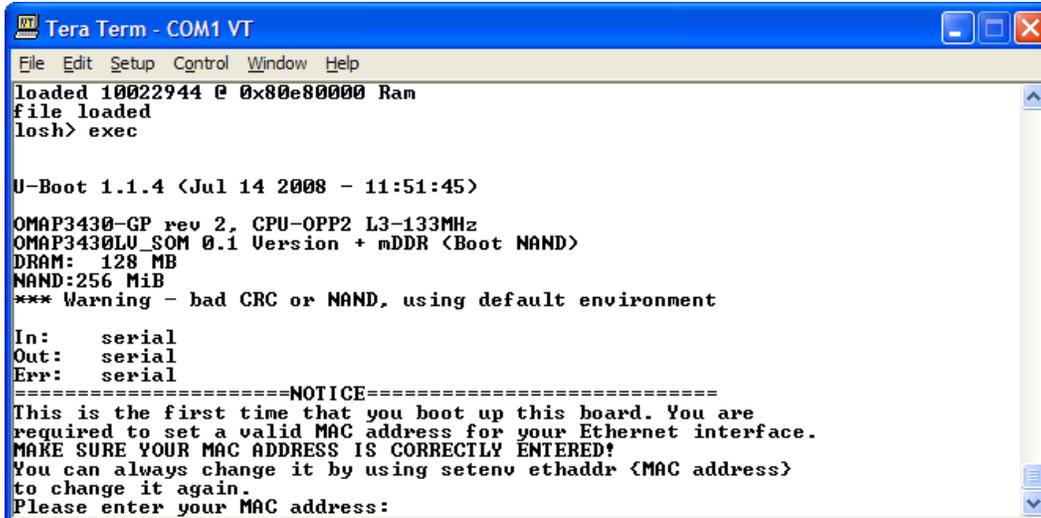
³ <http://support.logicpd.com/DesktopModules/Bring2mind/DMX/Download.aspx?portalid=0&EntryId=1533>

⁴ <http://support.logicpd.com/DesktopModules/Bring2mind/DMX/Download.aspx?portalid=0&EntryId=1504>

12. Load the *linux-demo-omap-xxxxxxx.elf* file.

```
losh> exec
```

You should see the output below.



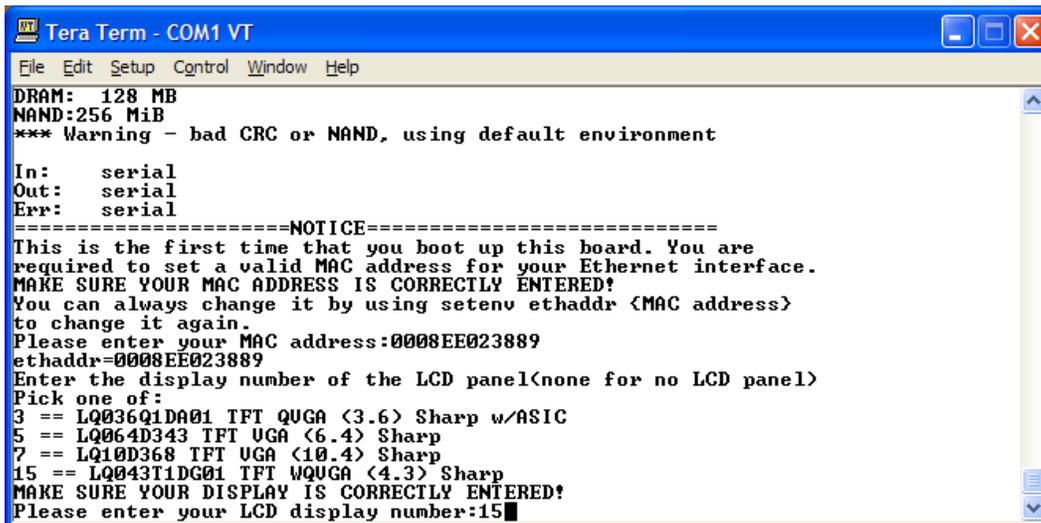
```
Tera Term - COM1 VT
File Edit Setup Control Window Help
loaded 10022944 @ 0x80e80000 Ram
file loaded
losh> exec

U-Boot 1.1.4 (Jul 14 2008 - 11:51:45)

OMAP3430-GP rev 2, CPU-OPP2 L3-133MHz
OMAP3430LU_SOM 0.1 Version + mDDR (Boot NAND)
DRAM: 128 MB
NAND: 256 MiB
*** Warning - bad CRC or NAND, using default environment

In:    serial
Out:   serial
Err:   serial
=====NOTICE=====
This is the first time that you boot up this board. You are
required to set a valid MAC address for your Ethernet interface.
MAKE SURE YOUR MAC ADDRESS IS CORRECTLY ENTERED!
You can always change it by using setenv ethaddr <MAC address>
to change it again.
Please enter your MAC address:
```

13. If this is the first time you have booted into Linux, the default environment variables must be set. You *may* be asked to enter the MAC address of your OMAP35x SOM and the display number for the LCD panel you have connected to the Zoom Development Kit; the MAC address was determined in Section 2.2 above and the supported LCD panel numbers are listed in the Tera Term output. (If you do not have an LCD panel connected to your Zoom Development Kit, please leave the field blank and press the **Enter** key.)



```
Tera Term - COM1 VT
File Edit Setup Control Window Help
DRAM: 128 MB
NAND: 256 MiB
*** Warning - bad CRC or NAND, using default environment

In:    serial
Out:   serial
Err:   serial
=====NOTICE=====
This is the first time that you boot up this board. You are
required to set a valid MAC address for your Ethernet interface.
MAKE SURE YOUR MAC ADDRESS IS CORRECTLY ENTERED!
You can always change it by using setenv ethaddr <MAC address>
to change it again.
Please enter your MAC address:0008EE023889
ethaddr=0008EE023889
Enter the display number of the LCD panel(none for no LCD panel)
Pick one of:
3 == LQ036Q1DA01 TFT QUGA (3.6) Sharp w/ASIC
5 == LQ064D343 TFT UGA (6.4) Sharp
7 == LQ10D368 TFT UGA (10.4) Sharp
15 == LQ043T1DG01 TFT WQUGA (4.3) Sharp
MAKE SURE YOUR DISPLAY IS CORRECTLY ENTERED!
Please enter your LCD display number:15
```

14. After allowing time for the image to load (approximately 15 seconds), the LCD panel connected to your Zoom Development Kit will display the Linux Penguin.



15. When you see the Linux Penguin displayed, you can proceed to Section 6 for instructions on how to boot into the Linux kernel.

4 Load Linux Demo Image via Ethernet (DHCP)

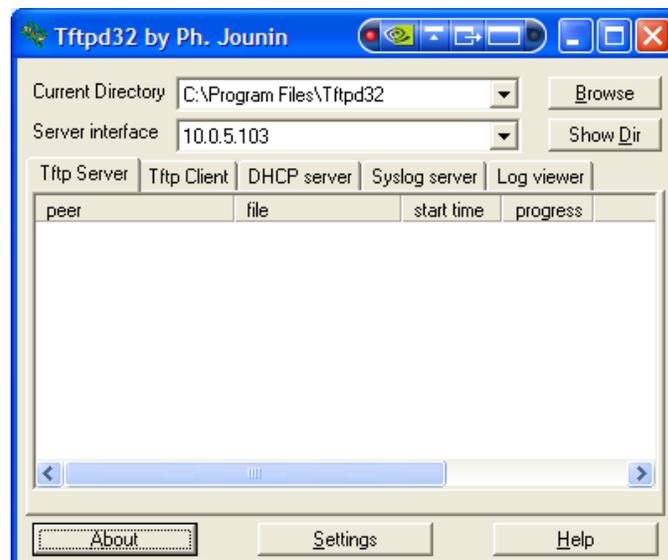
This section describes how to load the Linux demo image in LogicLoader via Ethernet with a DHCP-obtained IP address.

4.1 Required Components

- [Tera Term](#)⁵ terminal emulator (or equivalent)
- Linux demo image for the OMAP35x SOM
 - [OMAP35x SOM-LV Linux Demo Image](#)⁶
 - [OMAP35x Torpedo Linux Demo Image](#)⁷
- A TFTP program installed on your host PC

4.2 Procedure

1. Download the Linux demo image ZIP file to your host PC.
2. Extract the file and locate the *linux-demo-omap-xxxxxxx.elf* file.
3. Place the *linux-demo-omap-xxxxxxx.elf* file in your TFTP folder.
4. Launch your TFTP program.



5. Start Tera Term, initialize the Ethernet port, and obtain an IP address using the commands below.

```

losh> ifconfig
losh> ifconfig sm0 dhcp
losh> ifconfig

```

⁵ <http://support.logicpd.com/DesktopModules/Bring2mind/DMX/Download.aspx?portalid=0&EntryId=1420>

⁶ <http://support.logicpd.com/DesktopModules/Bring2mind/DMX/Download.aspx?portalid=0&EntryId=1533>

⁷ <http://support.logicpd.com/DesktopModules/Bring2mind/DMX/Download.aspx?portalid=0&EntryId=1504>

You should see the output below.

```

Tera Term - COM1 VT
File Edit Setup Control Window Help
*****
                        LogicLoader
(c) Copyright 2002-2008, Logic Product Development, Inc.
All Rights Reserved.
Version 2.4.3-OMAP3503 0001
*****

losh> ifconfig

sm0: up 100M half-duplex <15>
sm0:   mac: 00:08:ee:02:38:89 ip: 0.0.0.0
      mask: 0.0.0.0 gw: 0.0.0.0
losh> ifconfig sm0 dhcp
Starting DHCP on sm0 ...
losh> ifconfig

sm0: up 100M half-duplex <15>
sm0:   mac: 00:08:ee:02:38:89 ip: 10.0.5.70
      mask: 255.255.252.0 gw: 10.0.4.1
losh>

```

6. Load the *linux-demo-omap-xxxxxxx.elf* file. Be sure to insert your own IP address and file name, as they will most likely differ from those in the example below.

```
losh> load elf /tftp/10.0.5.140:OMAP-linux-xxxxxxx.elf
```

You should see the output below.

```

Tera Term - COM1 VT
File Edit Setup Control Window Help
Version 2.4.3-OMAP3503 0001
*****

losh> ifconfig

sm0: up 100M half-duplex <15>
sm0:   mac: 00:08:ee:02:38:89 ip: 0.0.0.0
      mask: 0.0.0.0 gw: 0.0.0.0
losh> ifconfig sm0 dhcp
Starting DHCP on sm0 ...
losh> ifconfig

sm0: up 100M half-duplex <15>
sm0:   mac: 00:08:ee:02:38:89 ip: 10.0.5.70
      mask: 255.255.252.0 gw: 10.0.4.1
losh> load elf /tftp/10.0.5.140:OMAP-linux-xxxxxxx.elf
loading from /tftp/10.0.5.140:OMAP-linux-xxxxxxx.elf:
.....
.....

```

```

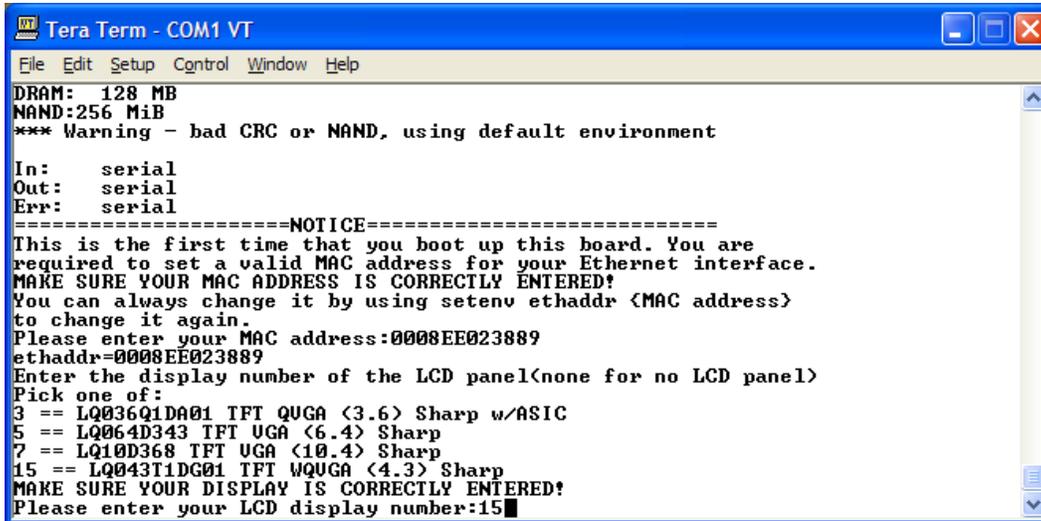
Tera Term - COM1 VT
File Edit Setup Control Window Help
.....
ELF section 0: download address: 0x80208000 load address: 0x80e80000
ELF section 1: download address: 0x80230000 load address: 0x81000000
ELF section 2: download address: 0x803c8000 load address: 0x81200000
warning: guessing combined program header size as 8247008
warning: guessing combined program header size as 9886692
loaded 10022944 @ 0x80e80000 Ram
...done
file loaded
losh>

```

7. Enter the command below.

```
losh> exec
```

If this is the first time you have booted into Linux, the default environment variables must be set. You *may* be asked to enter the MAC address of your OMAP35x SOM and the display number for the LCD panel you have connected to the Zoom Development Kit; the MAC address was determined in Section 2.2 above and the supported LCD panel numbers are listed in the Tera Term output. (If you do not have an LCD panel connected to your Zoom Development Kit, please leave the field blank and press the **Enter** key.)



```
Tera Term - COM1 VT
File Edit Setup Control Window Help
DRAM: 128 MB
NAND:256 MiB
*** Warning - bad CRC or NAND, using default environment

In:  serial
Out: serial
Err: serial
=====NOTICE=====
This is the first time that you boot up this board. You are
required to set a valid MAC address for your Ethernet interface.
MAKE SURE YOUR MAC ADDRESS IS CORRECTLY ENTERED!
You can always change it by using setenv ethaddr <MAC address>
to change it again.
Please enter your MAC address:0008EE023889
ethaddr=0008EE023889
Enter the display number of the LCD panel(none for no LCD panel)
Pick one of:
3 == LQ036Q1DA01 TFT QUGA <3.6> Sharp w/ASIC
5 == LQ064D343 TFT UGA <6.4> Sharp
7 == LQ10D368 TFT UGA <10.4> Sharp
15 == LQ043T1DG01 TFT WQUGA <4.3> Sharp
MAKE SURE YOUR DISPLAY IS CORRECTLY ENTERED!
Please enter your LCD display number:15
```

8. After allowing time for the image to load (approximately 15 seconds), the LCD panel connected to your Zoom Display Kit will display the Linux Penguin.



9. When you see the Linux Penguin displayed, you can proceed to Section 6 for instructions about how to boot into the Linux kernel.

5 Load Linux Demo Image via Ethernet (Static IP)

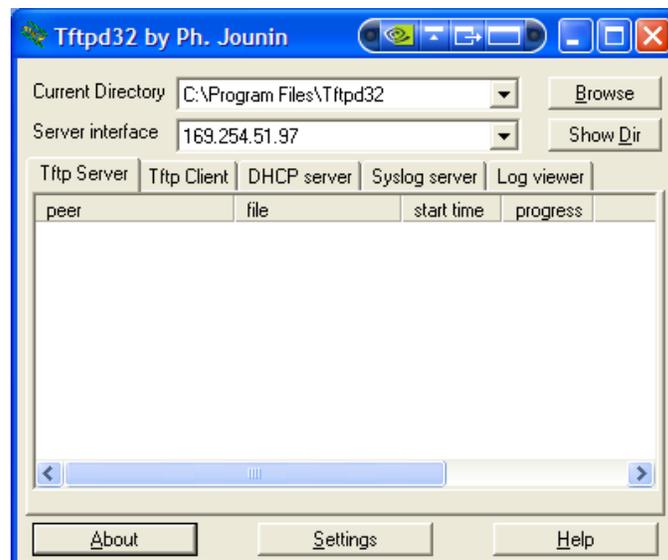
This section describes how to load the Linux demo image in LogicLoader via Ethernet with a static IP address.

5.1 Required Components

- [Tera Term](#)⁸ terminal emulator (or equivalent)
- Linux demo image for the OMAP35x SOM
 - [OMAP35x SOM-LV Linux Demo Image](#)⁹
 - [OMAP35x Torpedo Linux Demo Image](#)¹⁰
- A TFTP program installed on your host PC

5.2 Procedure

1. Download the Linux demo image ZIP file to your host PC.
2. Extract the file and locate the *linux-demo-omap-xxxxxxx.elf* file.
3. Place the *linux-demo-omap-xxxxxxx.elf* file in your TFTP folder.
4. Launch your TFTP program.



5. If you don't know the IP address of your host PC, go to Start > Run and enter the commands below.

```
cmd
ipconfig /all
```

In the output, locate the IP address for the Wired LAN connection that you are using. The IP address of the Zoom Development Kit must match the IP address of your host PC for as many 255 number sets as there are in the subnet mask. For example, if your subnet mask is 255.255.0.0 then the first two number sets of the IP address must be the same on both devices.

⁸ <http://support.logicpd.com/DesktopModules/Bring2mind/DMX/Download.aspx?portalid=0&EntryId=1420>

⁹ <http://support.logicpd.com/DesktopModules/Bring2mind/DMX/Download.aspx?portalid=0&EntryId=1533>

¹⁰ <http://support.logicpd.com/DesktopModules/Bring2mind/DMX/Download.aspx?portalid=0&EntryId=1504>


```

Tera Term - COM1 VT
File Edit Setup Control Window Help
.....
ELF section 0: download address: 0x80208000 load address: 0x80e80000
ELF section 1: download address: 0x80230000 load address: 0x81000000
ELF section 2: download address: 0x803c8000 load address: 0x81200000
warning: guessing combined program header size as 8247008
warning: guessing combined program header size as 9886692
loaded 10022944 @ 0x80e80000 Ram
...done
file loaded
losh>

```

9. Enter the command below.

```
losh> exec
```

If this is the first time you have booted into Linux, the default environment variables must be set. You *may* be asked to enter the MAC address of your OMAP35x SOM and the display number for the LCD panel you have connected to the Zoom Development Kit; the MAC address was determined in Section 2.2 above and the supported LCD panel numbers are listed in the Tera Term output. (If you do not have an LCD panel connected to your Zoom Development Kit, please leave the field blank and press the **Enter** key.)

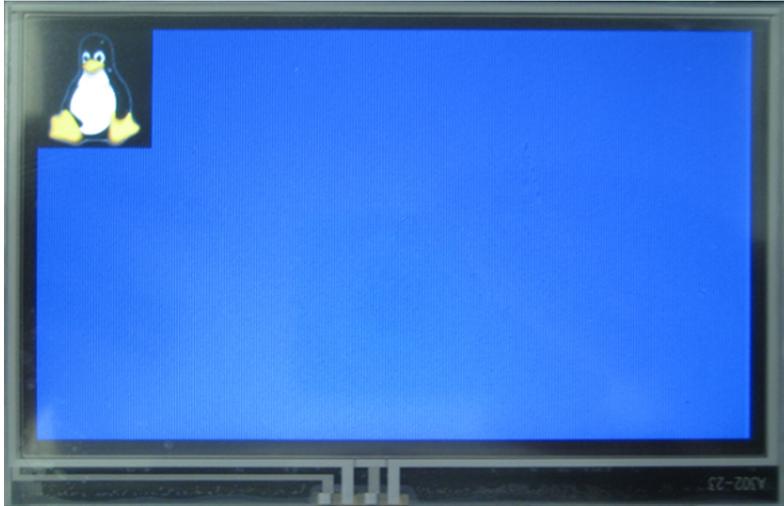
```

Tera Term - COM1 VT
File Edit Setup Control Window Help
DRAM: 128 MB
NAND:256 MiB
*** Warning - bad CRC or NAND, using default environment

In:  serial
Out: serial
Err:  serial
=====NOTICE=====
This is the first time that you boot up this board. You are
required to set a valid MAC address for your Ethernet interface.
MAKE SURE YOUR MAC ADDRESS IS CORRECTLY ENTERED!
You can always change it by using setenv ethaddr <MAC address>
to change it again.
Please enter your MAC address:0008EE023889
ethaddr=0008EE023889
Enter the display number of the LCD panel(none for no LCD panel)
Pick one of:
3 == LQ036Q1DA01 TFT QUGA (3.6) Sharp w/ASIC
5 == LQ064D343 TFT UGA (6.4) Sharp
7 == LQ10D368 TFT UGA (10.4) Sharp
15 == LQ043T1DG01 TFT WQUGA (4.3) Sharp
MAKE SURE YOUR DISPLAY IS CORRECTLY ENTERED!
Please enter your LCD display number:15

```

10. After allowing time for the image to load (approximately 15 seconds), the LCD panel connected to your Zoom Display Kit will display the Linux Penguin.



11. When you see the Linux Penguin displayed, you can proceed to Section 6 for instructions about how to boot into the Linux kernel.

6 Boot into Linux Kernel

In the Tera Term window, enter *root* as both the login and password. You will be brought to the `omap3530#` prompt.

```
Tera Term - COM1 VT
File Edit Setup Control Window Help
Welcome to LogicPD OMAP3530 Embedded Linux Environment
<based on LTIB> running on OMAP3530 LU SOM SDK
!!!! WARNING !!!!!
The default password for the root account is: root
please change this password using the 'passwd' command
and then edit this message (/etc/issue) to remove this message
LogicOMAP3530 login: root
Password:
omap3530#
```

7 Wired Networking

7.1 Assign Zoom Development Kit IP Address

The pre-built Linux demo images do not automatically configure a network interface. However, configuring a network interface by hand is rather straight-forward and you have several options from which to choose, each of which is detailed below.

7.1.1 DHCP from Kernel Command Line

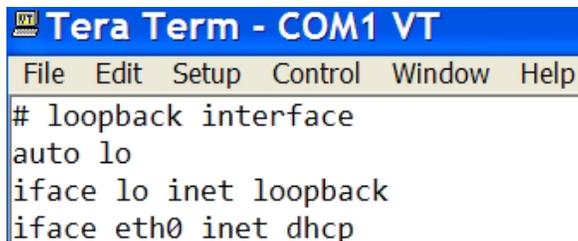
In U-Boot, add "ip=:::::dhcp" to the kernel command line. To do this, you can reboot the system, pause U-Boot, set otherbootargs to the above value, and then execute the *boot* command.

7.1.2 Static IP Address from Kernel Command Line

In U-Boot, add "ip=ip-address::gateway-address:netmask:::" to the kernel command line. See the instructions in Section 7.1.1 for a hint on how to do this.

7.1.3 Ifup/ifdown Command using DHCP

1. Edit the */etc/network/interfaces* file to configure eth0 for dhcp operation (*iface eth0 inet dhcp*).



```

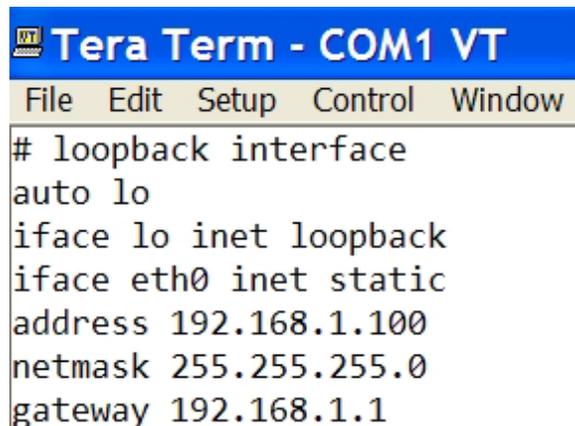
Tera Term - COM1 VT
File Edit Setup Control Window Help
# loopback interface
auto lo
iface lo inet loopback
iface eth0 inet dhcp
  
```

2. Then run the command below.

```
OMAP-35x# ifup eth0
```

7.1.4 Ifup/ifdown Command using Static IP

1. Edit the */etc/network/interfaces* file to configure eth0 with a static IP address (*iface eth0 inet static \n address <>\n netmask <>\n gateway<>*).



```

Tera Term - COM1 VT
File Edit Setup Control Window
# loopback interface
auto lo
iface lo inet loopback
iface eth0 inet static
address 192.168.1.100
netmask 255.255.255.0
gateway 192.168.1.1
  
```

2. Then run the command below.

```
OMAP-35x# ifup eth0
```

7.1.5 Ifconfig Command using DHCP

1. Bring up the network.

```
OMAP-35x# ifconfig eth0 up
```

2. Obtain the IP address from the DHCP server.

```
OMAP-35x# udhcpc -i eth0
```

You should see the output below.

```

Tera Term - COM1 VT
File Edit Setup Control Window Help
OMAP-35x# ifconfig eth0 up
net eth0: SMSC911x/921x identified at 0xc885c000, IRQ: 312
OMAP-35x# eth0: link up, 100Mbps, full-duplex

OMAP-35x# udhcpc -i eth0
udhcpc (v1.11.2) started
Sending discover...
Sending select for 192.168.120.102...
Lease of 192.168.120.102 obtained, lease time 7200
deleting routers
route: SIOCDELRT: No such process
adding dns 192.168.120.1

```

7.1.6 Ifconfig Command using Static IP Address

Bring up the network. Be sure to insert the values appropriate for your system in the command below.

```
OMAP-35x# ifconfig eth0 address <> netmask <> up
```

You could see the output below.

```

File Edit Setup Control Window Help
omap3530# ifconfig eth0 address 10.0.5.163 netmask 255.255.255.0 up
net eth0: SMSC911x/921x identified at 0xc885c000, IRQ: 312
omap3530# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:08:EE:02:83:09
          inet addr:10.0.5.163  Bcast:10.0.5.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1

```

7.2 Set Speed, Duplex, and Auto-negotiation

By default, the wired Ethernet supports auto-negotiation. Should you need to manually force the speed or duplex settings of the interface, the pre-built image includes the *ethtool* command. It has been noted that you should specify “autoneg off” when moving from 100 Mbs to 10 Mbs or from full-duplex to half-duplex. Similarly you should specify “autoneg on” when moving from 10 Mbs to 100 Mbs or from half-duplex to full-duplex. However, your network equipment may respond differently, so this may vary in your situation. Examples include:

- `Ethtool -s eth0 autoneg off speed 10 duplex half` (force 10 Mbs, half-duplex)
- `Ethtool -s eth0 autoneg on speed 100 duplex full` (force 100 Mbs, full-duplex)

7.3 Test Network

The sample image includes the ‘inetd’ program. To enable services, uncomment the appropriate line in inetd’s configuration file found in */etc/inetd.conf*. To start the inetd server, type `/etc/rc.d/init.d/inetd start`. If you modify the configuration file while inetd is running and would like inetd to reconfigure itself, send it the HUP signal.

You may also start the dropbear SSH server on your development kit using the command: `/etc/rc.d/init.d/dropbear start`. Once the dropbear server has been started, you may SSH to the device using `ssh root@ww.xx.yy.zz`—where `ww.xx.yy.zz` is the device’s IP address.

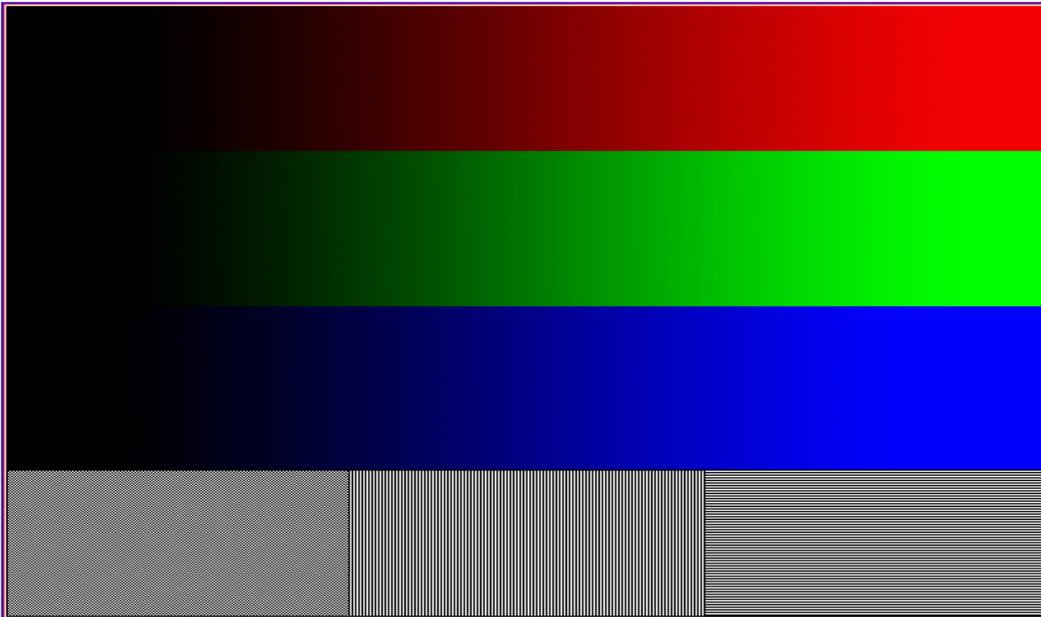
8 Video Display

8.1 Draw Test

To perform a video test on an LCD panel connected to your Zoom Development Kit, enter the command below.

```
OMAP-35x# draw-test
```

Your LCD panel will display a pattern similar to what is shown below.



8.2 DirectFB

The pre-built demo image comes with several DirectFB sample programs. You should launch these test programs in the background using "&" to avoid losing your command prompt, as they do not take input over ttyS0 once they have started.

For example, try the following programs (one at a time and killing each one using *kill -9 pid* after it completes):

- `df_dok &`
- `df_andi &`
- `df_knuckles &`

8.3 Qtopia

The pre-built demo image comes with a sample version of the Qtopia desktop which can be launched using the command below.

```
OMAP-35x# /etc/rc.d/init.d/qtopia &
```

8.4 Backlight

The backlight can be turned on and off using the commands below.

```
OMAP-35x# echo 0 > /sys/devices/platform/omapfb/panel/backlight_level
OMAP-35x# echo 1 > /sys/devices/platform/omapfb/panel/backlight_level
```

9 Audio

Support for audio out is available in the demo image via the following programs:

- aplay <sound file>
- madplay <mp3 file>
- Qtopia “music” application

Volume can be controlled by using the command below, where x is a number 0-100.

```
OMAP-35x# amixer set Master x%
```

For example, the command below will set the volume to 70% of maximum output.

```
OMAP-35x# amixer set Master 70%
```

10 External Memory Interfaces

The demo image includes support for CompactFlash and SD/MMC memory cards. If the cards are present at boot time, they should be automatically detected, mounted, and made available at */mnt/cfcard* and */mnt/sdcard* respectively.

To mount a card inserted at run-time, use the appropriate command below.

```
OMAP-35x# mount /mnt/cfcard
OMAP-35x# mount /mnt/sdcard
```

This is because appropriate entries already exist in the file */etc/fstab*. Review that file and the *mount* command’s documentation for more information if necessary.

The CompactFlash interface is found at */dev/cfa* and the first partition is located at */dev/cfa1*. Similarly, the SD/MMC interface is found at */dev/mmcblk0* and the first partition is located at */dev/mmcblk0p1*. If cards are not mounted automatically, enter the appropriate command below to mount the CompactFlash or SD/MMC card.

```
OMAP-35x# mount -t vfat /dev/cfa1 /mnt/cfcard
OMAP-35x# mount -t vfat /dev/mmcblk0p1 /mnt/sdcard
```

NOTE: OMAP35x SOMs built with processor silicon version ES3.1 do not support CompactFlash. The Linux BSP will automatically detect the SOM hardware configuration and disable the interface if necessary. To see if the CompactFlash interface was disabled during boot, you can review the kernel boot messages for the following line:

```
MUX: setup AA21_BT_IRQ_GPIO157 (0xd800218e): 0x011c -> 0x011c
```

Immediately following that line, OMAP35x SOMs built with ES3.1 silicon will display the following message:

```
Disabling CF as OMAP ES3.1 doesn't drive VSIM0_VEN with enough current!
```

11 Touch Screen

The sample image includes support for the Zoom Development Kit's touchscreen via the special file `/dev/input/event0`. To view raw touch data, enter the `octal_dump` command below and then touch the screen.

```
OMAP-35x# od -x /dev/input/event0
```

You should see the output below.

File	Edit	Setup	Control	Window	Help
omap3530# od -x /dev/input/event0					
0000000	fc28	386d	d852	0009	0003 0000 0160 0000
0000020	fc28	386d	d871	0009	0003 0018 00ea 0000
0000040	fc28	386d	d871	0009	0000 0000 0000 0000
0000060	fc28	386d	fc71	0009	0003 0000 00a9 0000
0000100	fc28	386d	fc71	0009	0003 0001 01de 0000
0000120	fc28	386d	fc71	0009	0000 0000 0000 0000
0000140	fc28	386d	1f03	000a	0003 0000 00aa 0000

To calibrate the touch screen, use the commands below.

```
OMAP-35x# export TSLIB_TSDEVICE=/dev/input/event0
OMAP-35x# export TSLIB_CALIBFILE=/etc/pointercal
OMAP-35x# export TSLIB_CONSOLEDEVICE=none
OMAP-35x# export TSLIB_FBDEVICE=/dev/fb0
OMAP-35x# ts_test (verify touches respond appropriately)
OMAP-35x# ts_calibrate (do this before you run qtopia)
```

12 Built-in Flash Storage via MTD

12.1 Find Flash Partitions

To determine where NOR and NAND flash partitions are, run the command below.

```
OMAP-35x# cat /proc/mtd
```

Look for something similar to *NOR fs#1* or *NAND fs#1* in the output, as shown below.

```
File Edit Setup Control Window Help
omap3530#
omap3530# cat /proc/mtd
dev:      size  erasesize  name
mtd0: 00800000 00020000 "NOR fs #1"
mtd1: 00020000 00020000 "NoLo-NAND"
mtd2: 00220000 00020000 "Lboot-NAND"
mtd3: 0fda0000 00020000 "NAND fs #1"
mtd4: 00020000 00020000 "u-boot Env-NAND"
omap3530#
```

12.2 Erase Flash Partitions

IMPORTANT NOTE: Do not erase any partitions unless you are certain you know what they are and that your system will be able to recover. Please understand how your system boots before erasing any NoLo, Lboot, or other partitions.

Before you begin to use a flash partition, you should completely erase it using the command below, where *x* is the number of the partition you wish to erase (taken from */proc/mtd*).

```
OMAP-35x# flash_eraseall /dev/mtd/
```

For example, to completely erase the NOR flash partition NOR fs #1, use the command below.

```
OMAP-35x# flash_eraseall /dev/mtd/0
```

12.3 Mount Flash Using JFFS2

You can use the *mount* command to access on-board flash. In the example below, we will mount both the NOR and NAND flash filesystem partitions listed in the example above using the JFFS2 flash file system.

```
OMAP-35x# mkdir /mnt/jffs2-nor (make a mount point)
OMAP-35x# mount -t jffs2 /dev/mtdblock0 /mnt/jffs2-nor (mount the
file system)
OMAP-35x# mkdir /mnt/jffs2-nand
OMAP-35x# mount -t jffs2 /dev/mtdblock3 /mnt/jffs2-nand
```

12.4 Create a Root Filesystem on Flash

Continuing the example from above, use the commands below to copy over the various portions of your root filesystem (currently in RAM) to a flash partition and then instruct your Linux kernel to boot it.

```
OMAP-35x# cp -a /bin /dev /dir /etc /home /lib /mnt/jffs2-nand
OMAP-35x# cp -a /linuxrc /opt /root /sbin /tmp /usr /var
/mnt/jffs2-nand
OMAP-35x# mkdir /mnt/jffs2-nand/{mnt,proc,sys}
OMAP-35x# umount /mnt/jffs2-nand
OMAP-35x# reboot
```

Break into U-Boot and set the kernel parameters *root=/dev/mtdblock3* and *rootfstype=jffs2* and continue booting.

12.5 Mount Flash Using YAFFS

Currently, Logic PD supports YAFFS2 on NAND flash only. Follow the same steps as listed above in Section 12.3 and 12.4, but substitute "yaffs" for "jffs2".

```
OMAP-35x# mkdir /mnt/yaffs-nand
OMAP-35x# mount -t yaffs /dev/mtdblock3 /mnt/yaffs-nand
OMAP-35x# cp -a /bin /dev /dir /etc /home /lib /mnt/yaffs-nand
OMAP-35x# cp -a /linuxrc /opt /root /sbin /tmp /usr /var
/mnt/yaffs-nand
OMAP-35x# mkdir /mnt/yaffs-nand/{mnt,proc,sys}
OMAP-35x# umount /mnt/yaffs-nand
OMAP-35x# reboot
```

Break into U-Boot and set the kernel parameters *root=/dev/mtdblock3* and *rootfstype=yaffs* and continue booting.

12.6 Use Pre-Built Flash Root Filesystem

1. Create a partition to hold the demo image on the SOM's NAND flash.

```
losh> erase /dev/nand0 B18 B100
losh> part-add /dev/nand0 b 18 100
losh> mount yaffs /dev/nand0b /demo
```

2. Copy the demo image from a TFTP server (or other location) into the new partition.

```
losh> ifconfig sm0 dhcp
losh> cp /tftp/xx.xx.xx.xx:1013784-std-musbh-yaffs.elf /demo/1013784-std-musbh-yaffs.elf
```

3. Erase U-Boot's environment.

```
losh> erase /dev/nand0 B2046 B2
```

4. Boot the kernel image.

```
losh> load elf /demo/1013784-std-musbh-yaffs.elf
losh> exec
```

5. Interrupt the device when U-Boot shows the *Hit any key to stop autoboot* message.
6. Erase the area covered by the YAFFS root filesystem.

```
=> nand erase 0xEC0000 0xF120000
```

7. Load the root filesystem image.

```
=> setenv serverip xx.xx.xx.xx
=> setenv ipaddr yy.yy.yy.yy
=> tftpboot $loadaddr 1013784-rootfs.yaffs2
```

8. Load and burn the Linux kernel into NAND starting at 0x100000 (assuming the kernel is 0x280000 bytes or smaller).

IMPORTANT: If your memory chip uses 1-bit ECC, replace `<ECC2>` in the command below with `hw`; if your memory chip uses 4-bit ECC, replace `<ECC2>` with `chip`.

```
=> nandecc <ECC2>
```

9. Copy the root filesystem into NAND flash.

```
=> nand write.yaffs $loadaddr 0xEC0000 $filesize
```

10. Set up U-Boot to automatically tell the kernel to mount the YAFFS-based root filesystem.

```
=> setenv bootcmd run mtdboot
=> saveenv
```

11. Reset the OMAP35x SOM to return to LogicLoader.

```
=> reset
```

12. From now on, you can script LogicLoader to automatically boot this Linux image using the procedure below.

```
losh> part-add /dev/nand0 b 18 100
losh> mount yaffs /dev/nand0b /demo
losh> load elf /demo/1013784-std-musbh-yaffs.elf
losh> exec
```

NOTES:

- On the first boot into Linux, it may take longer than usual as the initial setup occurs; this longer boot time should disappear on subsequent power cycles.
- It is **VERY** important to restart the SOM using only the *halt* or *reboot* commands as these will properly unmount the YAFFS filesystem. Failure to properly shut down the Linux environment may cause a long delay during the next startup as the YAFFS driver scans the root filesystem for errors.

13 Wireless Networking

IMPORTANT NOTE: Wireless networking is not available on all OMAP35x SOMs and is not available on the OMAP35x Torpedo Development Kit.

Wireless networking is provided by a wireless module, which is accessed as networking device *eth1*. The wireless module manufacturer supplies Logic PD with the source code to their kernel module under a non-transferable license agreement. Logic PD has integrated the wireless kernel module and binary firmware into the SDIO and wireless networking stacks. As such, Logic PD can only provide the binary modules for this software. If you have further questions regarding this software and its license, please post your question on the Logic PD [Technical Discussion Group \(TDG\) Forum](#).¹¹

13.1 Install Wireless Kernel Module

The wireless interface is not automatically started by the Linux BSP. Use the command below to install the wireless kernel module.

```
=> /etc/rc.d/init.d/uf1050a start
```

13.2 Scan for Available Wireless Networks

Use the command below to obtain a list of available wireless networks.

```
=> iwlist eth1 scanning
```

13.3 Add WEP Key

Use the command below to assign the wireless network key.

```
=> iwconfig eth1 key XXXXX
```

13.4 Associate with Wireless Network

Use the command below to specify the wireless network with which to associate.

```
=> iwconfig eth1 essid XXX
```

13.5 Start Wireless Interface

As in the case of the wired network, starting the interface can be done using the following methods:

- `ifup/ifdown dhcp` (edit `/etc/network/interfaces`)
- `ifup/ifdown static IP` (edit `/etc/network/interfaces`)
- `ifconfig static IP`
- `ifconfig dhcp` using `udhcp`

¹¹ <http://www.logicpd.com/contact/inquiry/>

14 Bluetooth Networking

14.1 Start or Stop Bluetooth Interface

Use the command below to start the Bluetooth interface.

```
=> hciconfig hci0 up
```

Use the command below to stop the Bluetooth interface.

```
=> hciconfig hci0 down
```

14.2 Assign Hardware Name

Use the command below to assign a name to the hardware. Be sure to substitute *<your_name>* with whatever identifying name you would like to use.

```
=> hciconfig hci0 name <your_name>
```

14.3 View Bluetooth Device Configuration

Use the command command to view the Bluetooth device configuration.

```
=> hciconfig -a hci0
```

14.4 Modify Bluetooth Device Configuration

Use the command below to modify the Bluetooth device configuration, using the hexadecimal identifier of your device class.

```
=> hciconfig hci0 class 0XXXXXXXXX
```

14.5 Scan for Bluetooth Devices

Use the command below to scan for remote Bluetooth devices.

```
=> hcitool scan
```

14.6 Query Bluetooth Device

Use the command below to query a specific Bluetooth device, using the six-byte MAC address of the device.

```
=> hcitool info XX:XX:XX:XX:XX:XX
```

15 Use ISP1760 USB Host Controller

The Zoom Development Kit's standard Type A connector (flat, rectangular) is attached to the ISP1760 host controller. The device driver for this peripheral is included as a module in the pre-built demo images. To use this interface, you must first load the proper module using the command below.

```
OMAP-35x# modprobe pehci
```

The interface has been tested with various USB hubs, flash drives, keyboards, and mice.

16 Use OMAP Processor OTG Controller

The OMAP processor includes an Inventra high-speed dual-role controller, commonly referred to as MUSB. This peripheral is attached to the Type mini-A connector on the Zoom Development Kit baseboard. This interface has proven difficult to work with when run in On-the-Go (OTG) mode; therefore, Logic PD has chosen to build the demo images with the MUSB peripheral configured as either a dedicated host or device.

16.1 Use MUSB in Host Mode

1. It is important that you are using a proper OTG cable with a real mini-A connector plugged into the Zoom Development Kit. A mini-B connector looks very similar to a mini-A connector and in fact will mate with a mini-A. However, the mini-B connectors will not properly configure the ID pin, which forces the OTG controller into host mode. Logic PD uses the 2m USB OTG cable from [Lindy](#)¹² (part number 31634).
2. You **MUST** have the OTG cable plugged into the Zoom Development Kit at boot (the other end of the cable does not have to be plugged in).
3. Load and boot one of the sample images with "musbh" in its title.
4. Install the driver using the command below.

```
OMAP-35x# modprobe musb_hdrc
```

5. Use the interface as you normally would.

16.2 Use MUSB in Device Mode

The sample images include modules that support Ethernet and File-backed Storage Gadgets (FSGs).

1. To get started, load and boot one of the sample images with "musbd" in its title.
2. After boot, install the MUSB driver using the command below.

```
OMAP-35X# modprobe musb_hdrc
```

¹² <http://www.lindy-usa.com/>

3. To use the device as an Ethernet-over-USB gadget, follow the steps below.
 - a. Load the kernel module.

```
OMAP-35x# modprobe g_ether
```

- b. Connect the Zoom Development Kit to a Linux host PC using a USB cable.
- c. Configure the new network connection on the Linux host PC.

```
bash$ ifconfig usb0 ...
```

- d. Configure the network connection on the Zoom Development Kit.

```
OMAP-35X# ifconfig usb0 ...
```

4. The following example demonstrates how to use the device as a file-backed storage gadget. This example assumes that you have an ext2fs or FAT filesystem on an SD/MMC card attached to `/dev/mmcblk0p1`. **NOTE:** The card must not already be mounted.
 - a. Load the kernel module.

```
OMAP-35x# modprobe g_file_storage file=/dev/mmcblk0p1
```

- b. Connect the device to a Linux host PC.
- c. Do whatever is necessary on your host PC to mount the newly inserted device. Most modern distributions such as Fedora and Ubuntu will automatically detect the device and treat it like a USB flash drive.
- d. Transfer some files over to the device.
- e. Disconnect the device from the host PC.
- f. Mount the SD/MMC card and verify that the files were transferred.

```
OMAP-35x# mount /dev/mmcblk0p1 /mnt/sdcard
OMAP-35x# ls /mnt/sdcard
```

17 Shut Down Linux System

To properly shut down the Zoom Development Kit, use either the `poweroff` or `reboot` commands.

18 Reset Environment Variables

The first time the Linux kernel was booted on your kit, you were prompted to set certain default environment variables (MAC address and LCD panel type). If you would like to reset the environment variables, you will need to interrupt the autoboot process after executing the loaded image.

1. Perform the initial steps to load the `.elf` file, as described in the procedures above.

- Execute the image.

```
losh> exec
```

- When you see the *Hit any key to stop autoboot* message, press the **Enter** key within six seconds to abort the boot process.

```
Tera Term - COM1 VT
File Edit Setup Control Window Help
ELF section 0: download address: 0x80208000 load address: 0x80e80000
ELF section 1: download address: 0x80230000 load address: 0x81000000
ELF section 2: download address: 0x803c8000 load address: 0x81200000
warning: guessing combined program header size as 8247008
warning: guessing combined program header size as 9886692
loaded 10022944 @ 0x80e80000 Ram
...done
file loaded
losh> exec

U-Boot 1.1.4 (Jul 14 2008 - 11:51:45)

OMAP3430-GP rev 2, CPU-OPP2 L3-133MHz
OMAP3430LU_SOM 0.1 Version + mDDR (Boot NAND)
DRAM: 128 MB
NAND:256 MiB
In: serial
Out: serial
Err: serial
Hit any key to stop autoboot: 4 █
```

- At the => prompt, use the *help* command to output a list of all the commands available.

```
Tera Term - COM1 VT
File Edit Setup Control Window Help
Hit any key to stop autoboot: 0
=> help
? - alias for 'help'
askenv - get environment variables from stdin
autoscr - run script from memory
base - print or set address offset
bdfinfo - print Board Info structure
boot - boot default, i.e., run 'bootcmd'
bootd - boot default, i.e., run 'bootcmd'
bootm - boot application image from memory
bootp - boot image via network using BootP/TFTP protocol
cmp - memory compare
coninfo - print console devices and information
cp - memory copy
crc32 - checksum calculation
dhcp - invoke DHCP client to obtain IP/boot params
echo - echo args to console
go - start application at address 'addr'
help - print online help
ibus - Select i2c Bus
icrc32 - checksum calculation
iloop - infinite loop on address range
imd - i2c memory display
iminfo - print header information for application image
imm - i2c memory modify (auto-incrementing)
imw - memory write (fill)
innm - memory modify (constant address)
iprobe - probe to discover valid I2C chip addresses
itest - return true/false on integer compare
loadb - load binary file over serial line (kermit mode)
loads - load S-Record file over serial line
loady - load binary file over serial line (ymodem mode)
loop - infinite loop on address range
md - memory display
mm - memory modify (auto-incrementing)
mtest - simple RAM test
mw - memory write (fill)
nand - NAND sub-system
nboot - boot from NAND device
nfs - boot image via network using NFS protocol
nm - memory modify (constant address)
ping - send ICMP ECHO_REQUEST to network host
printenv - print environment variables
rarpboot - boot image via network using RARP/TFTP protocol
reset - Perform RESET of the CPU
run - run commands in an environment variable
saveenv - save environment variables to persistent storage
setenv - set environment variables
sleep - delay execution for some time
tftpboot - boot image via network using TFTP protocol
version - print monitor version
=>
```

The following is an example of an environment change. We will set the LCD panel to the 4.3" WQVGA display that is included with the Zoom Development Kit.

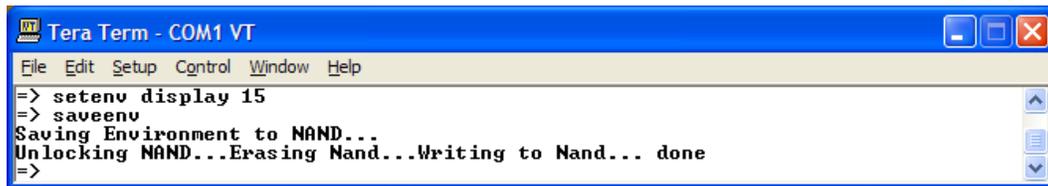
1. Set the LCD panel to the 4.3" WQVGA display.

```
=> setenv display 15
```

2. Save the environment change.

```
=> saveenv
```

You should see the output below.

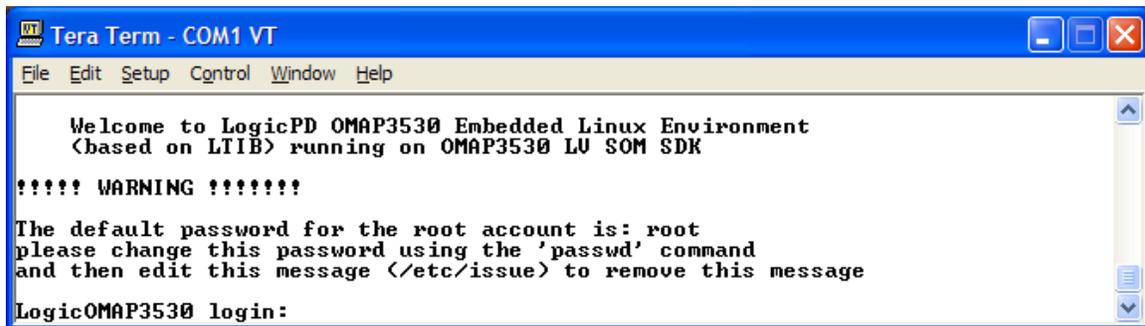


```
Tera Term - COM1 VT
File Edit Setup Control Window Help
=> setenv display 15
=> saveenv
Saving Environment to NAND...
Unlocking NAND...Erasing Nand...Writing to Nand... done
=>
```

3. After the environment variable has been saved, finish booting into the kernel.

```
=> boot
```

You should then see the LogicOMAP3530 login: prompt to log into the Linux kernel.



```
Tera Term - COM1 VT
File Edit Setup Control Window Help

Welcome to LogicPD OMAP3530 Embedded Linux Environment
(based on LTIB) running on OMAP3530 LU SOM SDK

!!!!!! WARNING !!!!!!!

The default password for the root account is: root
please change this password using the 'passwd' command
and then edit this message (/etc/issue) to remove this message

LogicOMAP3530 login:
```

19 Prepare for Linux Development

This section will describe how to prepare your host PC for Linux development on the Zoom Development Kit.

Logic PD provides customers with three paths to Linux platform development.

- Internal LTIB-based tool chain
- Patches to open-source software which can be used in any environment
- A partnership with Timesys providing access to their LinuxLink tools

19.1 Internal LTIB-based Tool Chain

Internally, Logic PD develops its Linux BSP and systems using an LTIB-based environment. [LTIB](#)¹³ is an open-source tool used to develop and deploy BSPs for various target platforms. In general, Logic PD does not make this tool available to customers. That decision stems from a desire of Logic PD's to stay focused on providing our customers with a complete hardware and software platform, which leaves little time to support development tools. On occasion, Logic PD will make this environment available to customers under specific circumstances. Please [contact Logic PD](#)¹⁴ to discuss this topic further.

The internal LTIB-based tool chain has been tested to run on Fedora Core 6 and Ubuntu 8.10.

19.1.1 Prepare Fedora Core 6

If installing Fedora Core 6 from scratch, pick the "development" environment and install "everything." This should allow you to install the LTIB-based environment without any trouble.

19.1.2 Prepare Ubuntu 8.10 (Intrepid Ibex)

If installing Ubuntu from scratch, there are a few items that you will need to install **before** installing the LTIB environment.

1. Modify the `/etc/sudoers` file.

```
$ sudo visudo
```

2. Add the following line to the `/etc/sudoers` file.

```
your_name ALL = NOPASSWD: /usr/bin/rpm, /opt/ltib/usr/bin/rpm
```

3. Remove the dash shell, as it can get in the way of LTIB.

```
$ sudo apt-get remove dash
```

4. Install the bash shell.

```
$ sudo apt-get install bash
```

¹³ <http://savannah.nongnu.org/projects/ltib>

¹⁴ <http://www.logicpd.com/contact/inquiry/>

5. Install the basic build tools.

```
$ sudo apt-get install build-essential
```

6. If you plan to develop using NFS, install and configure it now.

```
$ sudo apt-get install nfs-kernel-server nfs-common portmap
$ cat > my-exports << EOF
$ /opt/nfs-exports ww.xx.yy.zz/24(r2,async,insecure,no_root_squash)
EOF
$ sudo cp my-exports /etc/exports
```

7. A TFTP server will come in handy; install and configure one now.

```
$ sudo apt-get install tftpd-hpa
$ sudo mkdir /tftpboot
$ sudo chmod 777 /tftpboot
# Modify /etc/inetd.conf to change last field of tftp service line to
'/tftpboot'
```

8. Send SIGHUP to inetd or restart it if you are running tftpd-hpa as a daemon. The default is to run it as a thread inside inetd. As such, you need to send the inetd process the HUP signal to get it to re-read the configuration file you just changed so it will use */tftpboot* as the TFTP server directory.

- So, if you are running tftpd-hpa as a daemon, enter the command below.

```
$ sudo /etc/init.d/tftpd-hpa restart
```

- If you are using tftpd-hpa in its default configuration, enter the command below.

```
$ cat /var/run/inetd.pid # this will output inetd's process ID
number
$ sudo kill -1 xxx # where 'xxx' is the process ID from above
```

9. LTIB requires a few items; install them now.

```
$ sudo apt-get install rpm wget bison
$ sudo apt-get install 'zlib*'
$ sudo apt-get install libncurses5 libncurses5-dev
$ sudo apt-get install flex
$ sudo apt-get install tcl
$ sudo perl -MCPAN -eshell # drops you into a cpan shell
$ install LWP::UserAgent # allow internet access; wait for
installation
$ exit
```

If the *perl* command and *cpan* shell above do not work, use the Synaptic Package Manager to find perl's LWP package.

10. We need a few more items to properly build the Qtopia example.

```
$ sudo apt-get install libx11-dev
$ sudo apt-get install libxext-dev
$ sudo apt-get install makedepend
$ sudo apt-get install libjpeg-dev
$ sudo apt-get install uuid-dev
```

19.1.3 Install LTIB

19.1.3.1 ISO Image

It is easiest at this point to move the LTIB ISO image into the directory you wish to use for development. To install the LTIB environment, create a directory and then mount the ISO image via a loopback block device and run the installer.

```
$ sudo mkdir /ltib
$ sudo chmod 777 /ltib
$ sudo mkdir /mnt/foo
$ sudo mount -o loop ./ltib-xxx.iso /mnt/foo
$ /mnt/foo/install # do not run this as root.
```

Follow the instructions on the screen and choose an installation directory of */ltib*; LTIB should install properly.

19.1.3.2 Tar File

If LTIB comes as a tar archive, use the following steps to install it.

1. Extract the archive into a directory.

```
$ tar -zxvf ltib.tar.gz
```

2. Enter the newly created directory and run the installer.
3. Follow the instructions on the screen and LTIB should install properly.

19.1.4 First Build

Once you have installed LTIB, you need to build the package for the first time. **NOTE:** This can take several hours, depending on your host PC. Not all LTIB builds take this long, just the initial one.

Change to the directory where you installed LTIB and execute it.

```
$ ./ltib
```

Logic PD ships LTIB with a sample configuration. When the build is complete, you will have a working Linux system similar to the pre-built images available from Logic PD's website. For more information, please look to the *doc/* sub-directory of LTIB.

19.1.5 Reporting Problems

For more information, please look to the *doc/* sub-directory of LTIB. If you have an issue installing LTIB or building the initial image, please create a post on the Logic PD [TDG Forum](#) and include the following information:

- Full name of LTIB ISO image and MD5SUM
- Build log (obtain by going to the LTIB install directory and entering the command below)

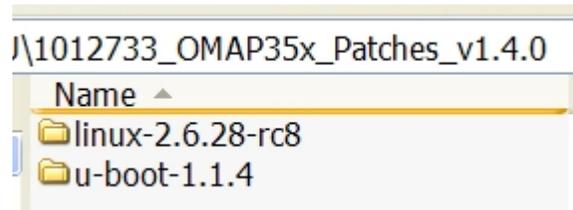
```
$ ./ltib 2>&1 | tee my-ltib-error-log
```

19.2 Patches to Open Source Software

If you are experienced with Embedded Linux development and have a build environment you are comfortable with using, Logic PD provides patches for the Linux kernel and U-Boot bootloader. These patches will apply cleanly to a pristine kernel source package.

Download the patch files from the [OMAP35x Torpedo SOM downloads page](#)¹⁵ or the [OMAP35x SOM-LV downloads page](#).¹⁶ Follow the instructions in the included *README* file. The *README* file will document which patches to install, in what order, the version of tools used, and other information that should get you going.

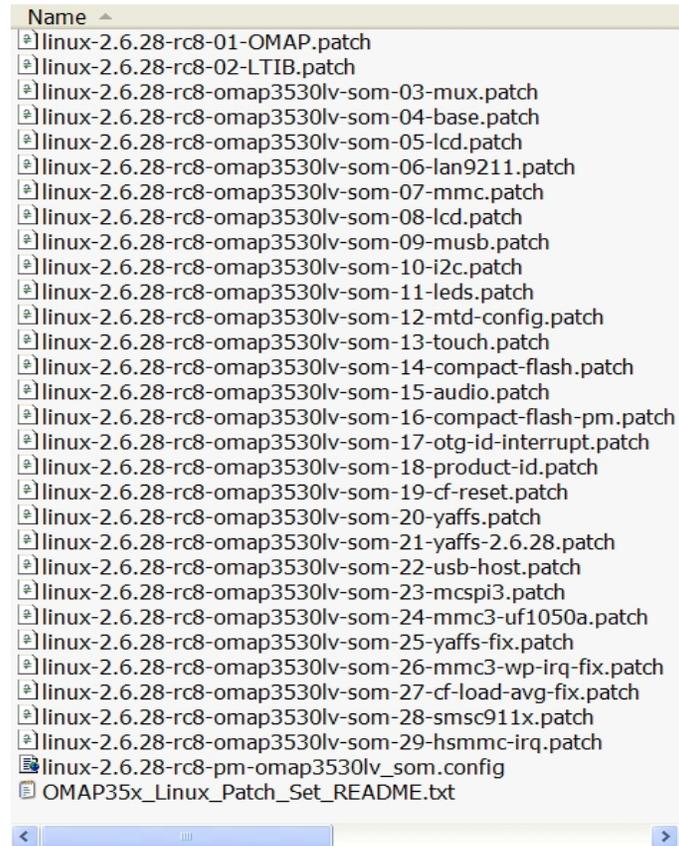
For example, the 1.4.0 release of the OMAP35x Linux BSP included a ZIP file with patches for linux-2.6.28-rc8 and u-boot-1.1.4 as shown in the picture below.



¹⁵ <http://support.logicpd.com/ProductDownloads/OMAP35xTorpedoSOM.aspx>

¹⁶ <http://support.logicpd.com/ProductDownloads/OMAP35xSOM-LV.aspx>

The Linux directory contains a series of numbered patches that can be applied to a pristine 2.6.28-rc8 Linux kernel downloaded from [The Linux Kernel Archives website](http://www.kernel.org/)¹⁷, as well as a sample kernel configuration file.



Finally, the *README* includes information concerning which tools Logic PD is using and how they were configured, as shown below.

```

patch -p1 < "patch file name"

The patched kernel was built by Logic using the following tools:

- GCC      v4.1.1 configured for --target=arm-none-linux-gnueabi
- binutils v2.1.7 configured for --target=arm-none-linux-gnueabi

GCC command line options used to build the demonstration image are:

-nostdinc
-mlittle-endian
-fno-strict-aliasing
-fno-common
-Os
-marm
-fno-omit-frame-pointer
-mapcs
-mno-sched-prolog
-mabi=aapcs-linux
-mno-thumb-interwork
-march=armv5t
-Wa,-march=armv7a
-msoft-float
-Uarm
-fno-stack-protector
-fno-omit-frame-pointer
-fno-optimize-sibling-calls

```

¹⁷ <http://www.kernel.org/>

If you are an experienced embedded Linux developer with additional questions regarding the patches, please post your question on the Logic PD [TDG Forum](#) and include the complete name of the patch ZIP file you downloaded.

19.3 Timesys Partnership

Logic PD is very pleased to be partnered with Timesys. Logic PD supplies Timesys with our board support package and works with them to integrate it into their excellent tools (LinuxLink and Factory). Logic PD and Timesys work together to ensure that the BSP and related Linux environment stays current and that mutual customers get the best support possible.

In many cases, Logic PD customers can access a free trial of the Timesys tools. For additional information, please contact Timesys or post a question regarding this topic on the Logic PD [TDG Forum](#). Please also see the dedicated [Timesys/Logic PD web page](#).¹⁸

¹⁸ <http://www.timesys.com/supported/boards/logic>