

# GETTING STARTED WITH GENTOO LINUX FOR CM-IGLX MODULES

## 1.Revision Notes

28-Mar-07	Initial revision
27-May-07	<ul style="list-style-type: none"><li>•Added drivers for UCB1400 touchscreen controller</li><li>•Changed default audio mixer settings</li><li>•Fixed library paths</li><li>•Removed Ethernet interfaces renaming from udev rules</li></ul>
31-Dec-07	<ul style="list-style-type: none"><li>•Added wireless support (Ralink RT73 chipset)</li><li>•Added support for custom resolution displays</li><li>•All packages updated to the most recent ones</li></ul>

## 2.Introduction

### 2.1.ABOUT THIS DOCUMENT

This document explains how to install a run-time Linux file system image on CompuLab's CM-iGLX. The software management and configuration description can be found at [http://compulab-systems.com/web/linux/iglx/iglx\\_gentoo.html](http://compulab-systems.com/web/linux/iglx/iglx_gentoo.html)

### 2.2.PACKAGE HIGHLIGHTS

The run-time Linux file system for CompuLab's CM-iGLX module is based on the Gentoo 2006.1 distribution. It includes ready to run USB NAND flash image, Linux kernel configuration and source code patches, portage tree used to create the image, packages database archive, and graphics and touchscreen driver sources.

The default Linux run-time image provided by CompuLab fits into 450Mbyte, and includes above 200 software packages. Among them

- Core Gentoo system
- X11 Windowing system (X11R7)
- K-Desktop Environment (KDE)
- Mozilla Firefox browser
- Samba
- thttpd web server
- mplayer multimedia player

There is about 50 MB of free space available for user applications. The user can free additional space by removing unnecessary components from the above list.

## 3. Installation

### 3.1. INSTALLATION BY ETHERLINK

1. Obtain a standard PC with Windows XP/2000. It will be referred to as 'host PC' in this document.
2. Connect a host PC serial port to the COM1 port on the ATX baseboard via a null modem cable, such as the one provided with the Eval Kit.
3. Connect the module's Ethernet port (P10 on ATX baseboards) to the LAN (switch/hub) via a standard network cable, such as the one provided with the Eval Kit.
4. Copy the contents of this Linux package's ZIP file to the `C:\LIN_INST\` folder on your PC. Unzip the "`gentoo.img.gz`" file, to extract "`gentoo.img`".
5. Download and carefully read the "Etherlink.doc" document available following [Developer] >> [CM-iGLX] >> [BIOS & Etherlink image]. Instal and setup a TFTP32 server (provided with this package) on the host and an Etherlink TFTP client on the target as instructed. Set "`c:\lin_inst\`" as the TFTP server base directory. For Windows tftpd32, choose "Settings" and browse for "Base directory". Choose standard TFTP security.
6. On the Host PC, open a Terminal Emulation program, such as HyperTerminal. Ensure that 'flow control' is set to NONE.
7. Enter the BIOS setup on the CM-iGLX by pressing Ctrl-C on HyperTerminal and momentarily pressing the Reset button on the baseboard.
8. Select "Basic CMOS Configuration".
9. In "DRIVE ASSIGNMENT ORDER", select [Drive C:] as [Nand Flash]. Ensure that there are no external USB mass storage devices connected to the USB ports, as those may interfere with the on-board Flash Disk.
10. Select "Write to CMOS and exit".
11. Again, enter the BIOS setup on the CM-iGLX by pressing Ctrl-C on HyperTerminal and momentarily pressing the Reset button on the baseboard.
12. In the terminal window on the host, use [TAB] to select [Start EtherLink] from the main BIOS menu.
13. Using the Etherlink menu, set the NAND image name to "`gentoo.img`".
14. Run "Download NAND image". Do not interrupt the host PC and CM-iGLX until the process is complete!
15. Wait for process completion, which takes several minutes. You can see the progress status by the state of the LED's on the module:
  - Operation in progress – two LED's are flashing
  - Operation completed successfully – one LED is on and other is off
16. Return to the main menu by pressing any key. Press 0 to save the EtherLink configuration for future operations.
17. Reboot and enjoy Linux on the CM-iGLX.

## 4. After Installation

### 4.1. CONNECTION AND LOGGING IN

Use the following username and password to login:  
Account with administrative privileges:

```
User: root
Password: 111111
```

To login into the Linux system, you may use a serial console at 38400 bps (ttyS0, ttyS1), connect through the network (ssh protocol) or use a keyboard and VGA display.

### 4.2. IP ADDRESS

The IP addresses for both network interfaces are obtained automatically using DHCP.

To configure networking, edit `/etc/conf.d/net`, `/etc/resolv.conf` and `/etc/conf.d/hostname`. For more information about Gentoo Linux network configuration, read: <http://www.gentoo.org/doc/en/handbook/handbook-x86.xml?part=4>

Default settings assume that Ethernet controller of CM-iGLX is “eth1” and Ethernet controller of ATX is “eth0”.

### 4.3. BIOS

Don't forget to update BIOS time to avoid warning messages on booting.

### 4.4. SAMBA

Samba – server and client for a Microsoft Windows compatible network.

Use commands: `smbmount`, `smbumount`. In order to configure a Samba server, edit the configuration file `/etc/samba/smb.conf` or use SWAT tool. More information about the Samba configuration can be obtained from Samba documentation.

### 4.5. CUSTOM RESOLUTION DISPLAYS

You can adjust X server to support displays with non-standard resolution.  
To do so you need to edit `/etc/X11/xorg.conf` configure file.

There are some fundamental things you need to know before hacking a `xorg.conf`. These are:

- Your monitor's horizontal and vertical sync frequency options
- Your video adapter's driving clock frequencies, or “dot clocks”

The horizontal sync frequency is just the number of times per second the monitor can write a horizontal scan line; it is the single most important statistic about your monitor. The vertical sync frequency is the number of times per second the monitor can traverse its beam vertically.

Sync frequencies are usually listed on the specifications page of your monitor manual. The vertical sync frequency number is typically calibrated in Hz (cycles per second), the horizontal one in KHz (kilocycles per second). The usual ranges are between 50 and 150Hz vertical, and between 31 and 135 KHz horizontal.

If you have a multisync monitor, these frequencies will be given as ranges.  
For AMD Geode LX800 video adapter's driving clock frequency range is 25.18 to 229.50 MHz.

Now read carefully the “Timing Chart” section in your display documentation.  
Find the typical values for “*active time*”, “*blanking time*”, “*front porch*”, “*sync time*”, “*back porch*” both for the horizontal and vertical timings.  
Your target is to create appropriate “modeline”, for example:

```
#Modename  clock      horizontal timing      vertical timing
"752x564"   40         752 784  944 1088      564 567 569 611
```

The horizontal section consists of four fields, which specify how each horizontal line on the display is to be generated.

The first field of the section (752) contains the number of dots per line which will be illuminated to form the picture - “*active time*”. The second field of the section (784) indicates at which dot the horizontal sync pulse will begin. Difference between second and first fields called “*front porch*”. The third field (944) indicates at which dot the horizontal sync pulse will end. Difference between third and second fields called “*sync time*”. The fourth field (1088) specifies the total horizontal frame length. Difference between fourth and third fields called “*back porch*”.

The vertical section also contains four fields. The first field (564) contains the number of visible lines, which will appear on the display. The second field (567) indicates the line number at which the vertical sync pulse will begin. The third field (569) specifies the line number at which the vertical sync pulse will end. The fourth field contains the total vertical frame length (611).

Note again that all of the horizontal numbers (752, 784, 944, and 1088) are divisible by eight!

Choose the desired refresh rate (for example 60 Hz) to obtain appropriate dot-clock frequency:  
Dot-clock frequency =  $1088 * 611 * 60 \text{ Hz} = 40 \text{ MHz}$  (“clock” field in “modeline”).  
Ensure that it is in range of supported by CM-iGLX video adapter's frequencies. Ensure that horizontal and vertical sync frequencies are supported by your display.

Now it's time to edit your `/etc/X11/xorg.conf`.

- Find section named “Monitor” and add lines:

```
UseModes    "Compulab"
HorizSync   30 - 50
VertRefresh 65 - 72
```

(Don't forget to specify values of your display!)

- Find section named “Screen” and add lines:

```
SubSection "Display"
    Depth    16
    Viewport 0 0
    Modes    "752x564"
EndSubSection
```

- Add section named “Modes” with the following content:

```
Section "Modes"
    Identifier "Compulab"
    ModeLine "752x564" 40 752 784 944 1088 564 567 569 611
        +hsync +vsync
EndSection
```

Save the file and restart X server.

For more information please visit these links:

<http://tldp.org/HOWTO/XFree86-Video-Timings-HOWTO/>

<http://www.x.org/archive/X11R6.8.0/doc/xorg.conf.5.html>

## 4.6.FREQUENTLY USED KERNEL COMMAND LINE PARAMETERS

The following describes several Linux kernel command line parameters.

### 4.6.1.Root Device and Root File System

To specify the device containing the root file system:

```
root=<block device>
```

Example block devices:

- NAND flash: /dev/sda2

- IDE Compact flash: /dev/hda1

- Ramdisk: /dev/ram0

To specify a root file system type, for example ext3:

```
rootfstype=ext3
```

To allow Linux kernel to detect USB device containing root file system specify rootdelay:

```
rootdelay=10
```

### 4.6.2.Serial Consoles

To enable a console on the serial port:

```
console=<tty>,<baud rate>
```

The following is COM-tty mapping for different Linux versions:

- COM 1 (UART): ttyS0

- COM 2 (UART): ttyS1

## 5.Useful Links

The Linux Documentation Project: <http://www.tldp.org/>

The Linux Kernel Archives: <http://www.kernel.org/>

The Gentoo Linux <http://www.gentoo.org>