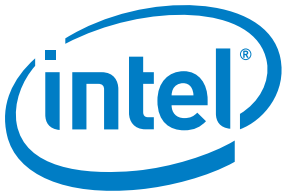


Moon Island Black's Beach Gateway Early Access Kit

Getting Started Guide

March 2014

Intel Confidential

Document Number: 544500-1.0

Contents

Figures

Tables

Revision History

Date	Revision	Description
March 2014	1.0	Added many details to the step by step instructions.
05 Feb 2014	0.94	Added instructions for turning off Integrity Management with the ima_appraise=off switch.
20 January 2014	0.93	Draft for Engineering Sample release

§

1 Introduction

This guide describes how to set up and begin running the Moon Island Black's Beach Gateway Development Toolkit.

In this document, for convenience:

- ***Development Kit*** is used as a generic term for the Moon Island Black's Beach Gateway Development Kit, including the target system hardware, board firmware, and Wind River* software.
- ***Target System*** is used as a generic term for the Advantech* UTX-3110 compact box PC which is included in this kit.
- ***Host System*** is used as a generic term for a stand-alone computer system onto which the Wind River Development Tools are installed. Not included in this kit.

This document contains installation information for the Wind River Intelligent Device Platform (IDP) software. Details about the IDP software are in the *Wind River Intelligent Device Platform Programmer's Guide* listed in Table 1.

Intel provides support for the development kit. Contact your Intel representative for assistance.

1.1 Development Kit Contents

The Development Kit contains the following:

- Advantech UTX-3110 compact box PC
- Power cord
- 2x Wi-Fi* antennae
- Documentation packet
- USB Flash memory key
- USB and video cables:
  - Micro HDMI to standard HDMI cable
  - HDMI to DVI-D video adapter
  - Micro USB to USB adapter

USB Key Contents

The contents of the USB key are:

- Target System operating system (OS) (bootable from the USB key)
- An installer for the Wind River Systems host tools, Linux* software, and Intel® Atom™ Board Support Package (BSP).
  - In the `install` folder
- Development Kit Hardware and Software documentation
  - In the `wrs-idp-documents` folder
- A restore image for the target system and deployment scripts
  - In the `restore` folder

1.2 Related documents

Table 1. Related Documents

Title	Revision and Location
Intel® Atom™ Processor E3800 product family technical information web page	https://www-ssl.intel.com/content/www/us/en/intelligent-systems/bay-trail/atom-processor-e3800-family-overview.html
Wind River Intelligent Device Platform Security Guide 2.0*	Beta Included on USB Key
Wind River Intelligent Device Platform Release Notes 2.0	Edition 3 Included on USB Key
Wind River Intelligent Device Platform Programmer's Guide 2.0	Edition 5 Included on USB Key
Wind River Linux 5.0/5.0.1 Recommended Development Host Distributions*	Updated 4/5/13 Included on USB Key

1.3 Documentation Conventions

The following conventions are used in this manual:

- `Courier font` - code examples, command line entries, API names, parameters, filenames, directory paths, and executables
- **Bold text** - graphical user interface entries and buttons

1.4 Platform Photos

Figure 1. Front View

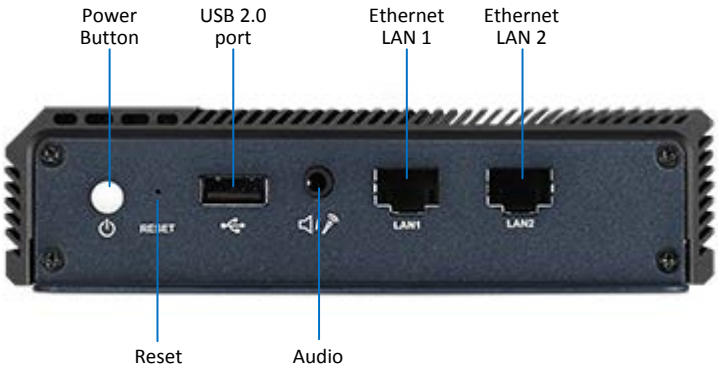
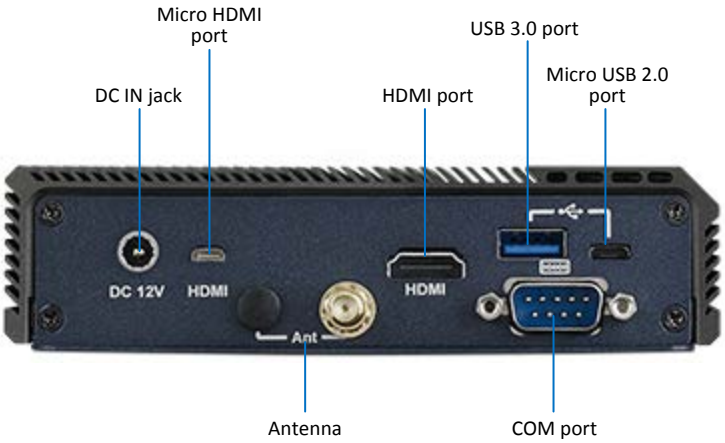


Figure 2. Rear View



§

2 Target System Setup

Follow the steps below to setup the Target System.

2.1 Target System Software

The Target System comes pre-loaded with Wind River Linux and Wind River Intelligent Device Platform 2.0 XT software.

The included USB key is also bootable and is pre-loaded with the Wind River Linux and Wind River Intelligent Device Platform 2.0 XT software.

Use the following login and password by default:

```
login: root

password: root
```

2.2 Keyboard, Video, and Power

Keyboard

Connect a USB keyboard to the Target System using any of the available USB ports.

Video Monitor

Connect the Target System to an HDMI monitor using either a micro HDMI cable in the micro HDMI port, or a standard HDMI cable in the standard HDMI port.

Use an adapter to connect to a DVI or VGA monitor.

Power

Plug in the 12 V DC jack of the included power adapter to the DC In of the Target System. Plug in the power cord of the adapter to 120V or 240V input power.

2.3 Wired Ethernet Connection

The best way to connect the Target System to the internet or other network is through an Ethernet router with integrated DHCP server. Use an Ethernet cable to connect the **LAN2 port** of the Target System to one of the I/O ports of the router.

The IDP runtime software implements a network gateway function that assumes the Ethernet eth0 interface (LAN2 port) has a WAN connection. The Target System will attempt to obtain an IP address from a DHCP server on this interface.

If the Target System cannot obtain an IP address from a DHCP server, it will display a message stating: `eth0: link down` and `eth0: link is not ready.` To stop the attempts to obtain an IP address and the messages, turn off the multi-WAN service with the following command: `service multiwan stop`.

As an alternative to connecting the Target System to an Ethernet router with an integrated DHCP server, the Target System may be configured with a static IP address after the system has booted. (See Section 2.5.1 – Configuring a Static IP Address Using webif.)

2.4 Wireless Ethernet Connection

After the Target System has booted, the IDP gateway advertises a wireless LAN network with Service Set Identifier (SSID) of: `IDPDK-xxxx` (where `xxxx` is the last 4 digits of the wireless network card MAC address).

To find the last 4 digits of the wireless network card MAC address, issue the Linux command: `ifconfig wlan0` from the Target System command line. The MAC address is listed in the `ifconfig wlan0` output as the `HWaddr`. For example:

```
HWaddr 00:0F:20:CF:8B:42
```

In this case, the last four digits of the MAC address are: 8B42, and the Target System would advertise an SSID of: `IDPDK-8B42`.

Connect to this local wireless network using the password: **`windriveridp`**.

2.4.1 Connecting to the Target System's Local Wireless Network

This section contains step-by-step instructions to connect the Host System (or another wireless device) to the Target System's local wireless network.

The following was performed on a Host System running Ubuntu* 12 operating system. The procedure should be similar for other operating systems.

1. Select the Network Icon at the top of the screen, or go to System Settings -> Network Connections.
2. Find the Target System's local wireless network with an SSID of IDPDK-xxxx.
3. Select the Target System's local wireless network to connect to it.
4. When prompted, enter the password: **windriveridp**.

You should now be connected to the Target System's local wireless network.

Note: The onboard wireless LAN is statically defined to use the 192.168.1.0 subnet.

2.5 Wind River Web Interface Tool (webif)

Wind River provides a Web Interface tool (webif) that allows the user to control and change many of the Target System settings.

Perform the following to access the Web Interface tool.

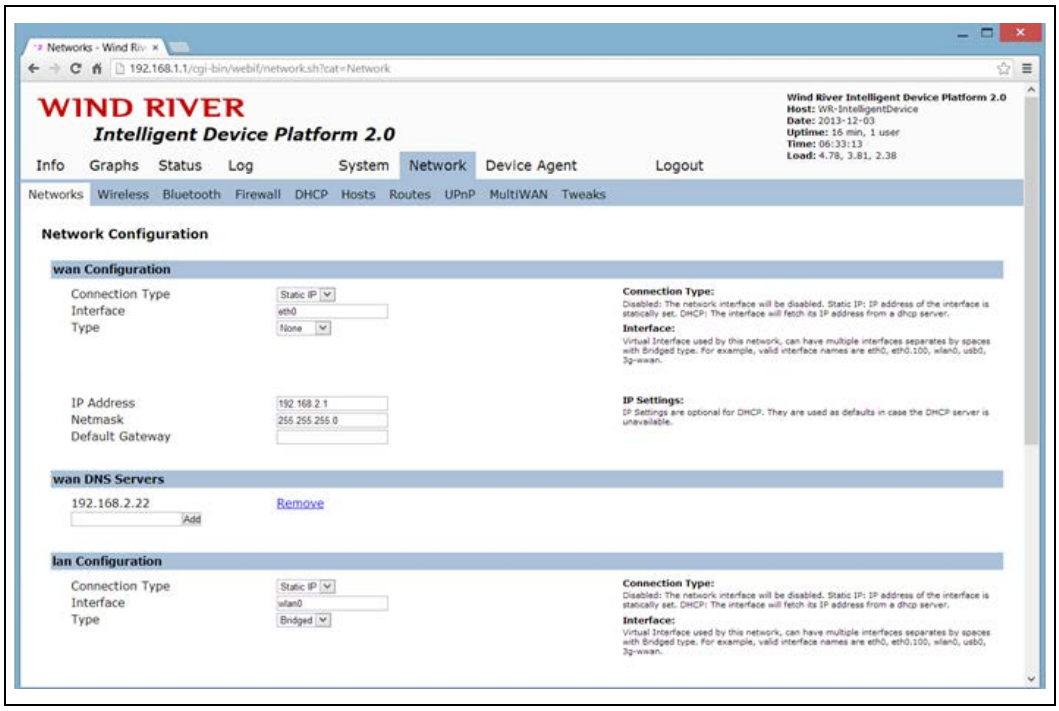
1. Connect from a Host System to the Target System on the wired or wireless Ethernet interface as explained in Section 2.3 or Section 2.4 above.
2. On the Host System, open an internet browser.
3. In the address window of the browser, enter an internet address of `http://192.168.1.1`.
4. If the connection to the Web Interface is successful, a popup box will ask for a user name and password.
5. Login as user name: `admin` and password: `admin`.

See the *Wind River Systems IDP Programmer's Guide* and *Release Notes* provided on the USB key for details regarding the Web Interface tool and its myriad Target System customization options.

2.5.1 Configuring a Static IP Address Using webif

To configure a static IP address for the Wired and Wireless network interfaces, as mentioned above, go to the **Network** tab, and setup the **Network Configuration** as shown in the screen capture in Figure 3.

Figure 3. Configuring Static IP Address



When the changes have been made as shown in Figure 3, scroll to the bottom of the screen and click the **Save Changes** button, then be sure to click **Apply Changes**.

§

3 Installing the IDP Tools on the Host System

The Moon Island Black's Beach Gateway Development Toolkit includes a USB key that contains an installer for the Host System software.

The host software includes the *Wind River Systems - Intelligent Device Platform (IDP) Version 2.0 XT Early Access Release 3*.

3.1 Host System OS Requirements

The Wind River Systems development tools may be installed on many different Linux* based host systems. **Before proceeding**, review *Wind River Linux 5.0/5.0.1 Recommended Development Host Distributions* to ensure that you have installed the appropriate packages and that your system meets the minimum operating system requirements. The document is included on the USB key in the `wrs-idp-documents/` folder and is called Recommended-Hosts-List_5.0.1.pdf.

Note: These instructions have been validated on an Ubuntu 12.04 LTS 64-bit host system.

Note: The Ethernet port used for internet access on the Host System must be named `eth0` in order for the Installer to work properly. See instructions in Section 6 - Errata regarding how to check and change the naming if necessary.

3.2 Host System Hardware Recommendations

The following Host System hardware is recommended.

- 3rd Generation Intel® Core™ i5 or better CPU
- CPU with four or more cores and with Intel® Hyper-Threading Technology (Intel® HT Technology)
- 150 GB or more of free disk space
- 4 GB or more RAM

With the minimum hardware above, a typical initial compile will take about 3 hours. Improving the specifications of the Host System can decrease that time to about 2 hours.

3.3 Wind River Software Installation Prerequisites

Before starting the host tools installation, check the following.

3.3.1 Installation Folders

- The installation process requires two new folders to be created in the home directory of your host system:
  1. `WindRiver` - The folder to install the host tools. The installation requires approximately 12 GB of free space in this folder.
  2. `Installer` - A temporary folder that can be deleted later. The installation requires approximately 15 GB of free space in this folder.

Create the `WindRiver` and `Installer` folders before proceeding. (You may choose a different name for these folders if desired.) For example:

```
cd $HOME
mkdir WindRiver
mkdir Installer
```

- The install process also requires approximately 15 GB of temporary disk space in the `/tmp` directory.

3.3.2 Wind River Host Tools License

You must have a temporary *License Authentication Code* or a permanent *License Authentication File* for installation of the IDP host tools.

- For Early Access kits, a temporary *License Authentication Code* is provided in the Dear Customer Letter that was included in the Development Kit.
- If you purchased a kit, instructions to obtain a permanent License Authentication File is provided in the Dear Customer Letter that was included in the Development Kit.

3.4 Installing the Host Tools Base Packages

Follow the steps below to install Wind River Linux 5.0.1, Wind River IDP 2.0 XT, and Wind River Workbench 3.3.5 on the Host System.

1. Plug in the provided USB key into the Host System.
2. Using the GUI or command line, copy the Installer file from the USB key `install` folder to the `Installer` folder on the Host System. The Installer file is named `DVD-R180785.1-1-00.zip` or similar.

```
cp /media/AtomGatewaySW/install/DVD-R180785.1-1-00.zip \
   $HOME/Installer/
```

3. Using the GUI or command line, unzip the Installer zip file.

```
cd $HOME/Installer
unzip DVD*.zip –d ./
```

4. Go to the unzipped `DVD-R180785.1-1-00` folder and start the `setup_linux` executable. An Installer window will open.

```
cd DVD-R180785.1-1-00
./setup_linux
```

5. On the Installer popup window, select the Wind River Host Tools install location. Use the **Browse** button to find and select the `WindRiver` folder you created earlier, or enter the complete path to that folder.
6. On the Installer page titled **Online Update Settings** keep the defaults check-marked.
7. On the Installer page titled **Online Update Settings,** if your network requires a proxy server for access to the internet, do the following:
   a) Mark the box titled **Connect to the internet using a proxy server**.
   b) Provide the proxy server information for your network.
8. On the Installer page titled **Install Now or Create a Local Download** keep the default **Install** checkbox enabled. (Local download is only for administrators planning multiple installs of the product.)
9. On the Installer page titled **Choose Activation Type** do one of the following:
   a) If you received a permanent *License Activation File* with the purchase of the Development Kit, do the following:
      i) Make a directory called `license` in the `$HOME/WindRiver` directory.
      ii) Copy the license activation file into the `$HOME/WindRiver/license` directory.
      iii) Select **Permanent activation** and enter the full path and filename of the license file, or use the **Browse** button to find it using the GUI.
   b) For temporary activation, select **Temporary activation**. A *License Activation Code* will be asked for later. Use the one provided in the Dear Customer Letter that was included in the Development Kit.

10. On the Installer page titled **Host Information**, select the Ethernet adapter that will be used for downloading the Host tools from the internet.
11. On the Installer page titled **User Information**, do the following:
    a) If you selected **Temporary activation** earlier, enter the temporary *License Authentication Code* provided in the Dear Customer Letter that was included in the Development Kit.
    b) Enter the required user information.
12. On the Installer page titled **Choose Installation Filters**, select **Intel** only.
13. On the Installer page titled **Select Products**, keep the default selections.
14. When the **License Agreement** window pops up, click the **I ACCEPT** circle to accept the standard license agreement and the product evaluation license agreement for WR Linux and IDP.
15. On the Installer page titled **Confirm and Install**, click Install.

Note: The download and install can take a few hours depending on the speed of your Internet connection.

16. Successful installation will end with a message that says: `Media Installation Completed`. Click **Finish** to exit the Installer window.
17. If you encounter any issues during installation, provide the `$HOME/WindRiver/setup.log` and `setup_install_failure.log` files to the Intel support contact.

3.5 Applying Patches for IDP

There is only one patch required at this time and it applies to all IDP supported boards. It should be applied after successful installation of the base packages as performed above.

The patch can be found at:

ftp://ftp.windriver.com/TECH_SUPPORT/ggao/WRL_5_0_1_12-IDP-patches-20140219-spin1.zip

The instructions for installing the patch are as follows:

1. Copy the patch .zip file into the `$HOME/WindRiver/updates` directory.
2. Go to the `$HOME/WindRiver/updates` directory and unzip the patch.

   ```
   cd $HOME/WindRiver/updates
   unzip WRL_5_0_1_12-IDP-patches-20140219-spin1.zip –d ./
   ```

   You should now have one new directory in the `$HOME/WindRiver/updates` directory named: `CDR-R180966.1-1_140219_213520`
3. Go to the `$HOME/WindRiver/maintenance/wrInstaller/x86-linux2` directory and run `wrInstaller`.

   ```
   cd $HOME/WindRiver/maintenance/wrInstaller/x86-linux2
   ./wrInstaller
   ```
4. On the Installer page titled **Choose Maintenance Task** choose **Patch** and press **Next**.
5. On the Installer page titled **Select Patches to Install**, select the patch that was unzipped in step 2 selected, and select **Install**.
6. The patch updates in few seconds. Hit **Finish** to close the Installer window.

§

4 Building the Wind River IDP Runtime Software

This section describes how to use the Host System to build a Wind River IDP runtime file system and operating system that can then be installed onto the Target System.

4.1 Build Requirements

The build process requires two folders to be created on your host system at the same level as the `WindRiver` and `Install` folders created earlier:

1. `Project` - The project folder in which you will develop your IDP-based solution. The build requires approximately 40 GB of free space in this folder.
2. `Project/build-cache` - The folder where the build cache is stored. Using a build cache can significantly reduce the time required to build the project after incremental changes are made. The build requires approximately 5 GB of free space in this folder.

Create the `Project` and `build-cache` folders before proceeding. (Different names for these folders can be used if desired.) For example:

```
cd $HOME
mkdir Project
mkdir Project/build-cache
```

4.2 Wind River Linux Configure Command

Go to the `Project` folder, for example: `cd $HOME/Project`.

Now configure the IDP build using the `configure` command. A typical `configure` command for IDP would look like this:

```
../WindRiver/wrlinux-5/wrlinux/configure \
  --enable-board=intel-atom-baytrail \
  --enable-kernel=standard \
  --enable-rootfs=glibc-idp \
  --enable-addons=wr-idp \
  --enable-parallel-pkgbuilds=8 \
  --enable-jobs=50 \
  --enable-reconfig \
  --with-template=feature/idp_devkit_full,feature/intel-
wilkinpeak2,feature/recovery \
  --with-layer=wr-intel-support,wr-mcafee \
  --with-sstate-dir=./build-cache
```

The configure command may take a few minutes to complete.

Note: The '\' symbols in the configure command above tell the Linux command line interpreter to ignore the following return or newline. The configure command above does not need the '\' symbols if it is entered entirely on one line.

Note: In the `--with-template` switch above, there is no space or return between `intel-` and `wilkinpeak2`.

4.3 Build the Runtime System Software

When the Configure command is finished, build the Target System runtime operating system by issuing the following command from the `Project` folder:

```
make fs
```

This builds the Linux* runtime system and generates the runtime components that can be installed on your target system.

The first time a target runtime system is built, it can take several hours depending on your host system's specifications.

There are potentially many different ways in which the target root file system and boot procedure could be organized. In this release, the only supported method is based on the above configuration line and default IDP platform settings.

4.4 Generate Bootable USB with the Target System's Operating System

The next step is to get the Target System runtime operating system that was generated with `make fs` onto a USB key.

A couple of things to note before performing this step:

- WARNING: All of the contents of the USB key will be overwritten.
- The USB key needs to have a capacity of at least 4 GB.

When the `--with-template=feature/recovery` configure switch is used, as described above, the IDP build system automatically puts the root file system files (tarred and zipped) in the `Project/export` directory.

The target root file system files are zipped and tarred into this file:

```
Project/export/intel-atom-baytrail-glibc-idp-standard-dist-
srm.tar.bz2
```

This procedure uses a shell script called `deploy.sh` to create a bootable USB from that file from those root file system files.

From the `Project` directory, run the following command. (Substitute the correct drive designation for the USB disk in place of `/dev/sd?` below.)

```
   sudo ./deploy.sh \
-d /dev/sd? -y -g ./grub-ima –b intel-atom-baytrail \
-f export/intel-atom-baytrail-glibc-idp-standard-dist-srm.tar.bz2
```

Note: Linux may ask you for your user password when using `sudo` to run in super user mode.

When the deploy.sh command finishes, the target system should be able to boot from the USB key.

§

5 Installing the IDP Runtime on the Target System

IDP Runtime software comes pre-loaded on the Target System.

This section describes how to install a new build of the IDP runtime software, such as the runtime created using the procedure in the preceding chapter.

The IDP runtime can be booted directly from the provided USB key. However, Intel recommends installing the runtime components to the Target System hard drive according to the instructions below.

Note: The build of the IDP runtime software that is pre-loaded on the Target System has IMA whitelisting disabled. This will allow changes to the system during development. The feature should be enabled on final deployed systems to improve security.

Note: Before proceeding, ensure the Target System setup in Section 2 is complete.

5.1 Setting the Default Boot Device in the BIOS

In order to boot from a USB Key, you must set it as the highest priority boot option in the BIOS.

1. Insert the USB disk created above into the target system.
2. Press the **Power** button to turn on the target system.
3. Press the Escape (**Esc**) key repeatedly during boot up until the BIOS menu appears.
4. Use the left and right arrow keys to navigate to the **Boot** Tab of the BIOS menu.
5. Use the up and down arrow keys to navigate the **Hard Drive BBS Priorities**. Press **Enter**.
6. Use the arrow keys to navigate to **Boot Option #1**. Press **Enter**.
7. In the **Boot Option #1 pop-up window**, use the arrow keys to select the USB Key. Press **Enter**.
8. Make sure the **Boot Option #1** is now listed as the USB disk.
9. Press **F4** to Save Changes and Exit. Select **Yes**. Press **Enter**.
10. When the system has booted, login as user `root` using password `root`

5.2 Turning off Integrity Management on the USB Key File System

Warning: Integrity Management must be turned off before the operating system allows the installation of a disk image to the Target System hard disk as outlined in the next chapter.

To turn off Integrity Management when booting from the USB disk, inspect the `/boot/grub/menu.lst` grub menu file on the USB disk to make sure the `ima_appraise=off` switch is included in the `kernel` line at the end of the file. Add the switch if it is not already included. For example:

1. Open the `menu.lst` file with the vim editor.
   ```
   vim /boot/grub/menu.lst
   ```
2. Use the arrow keys to go to the end of the `kernel` line at the end of the file.
3. Begin insert editing mode by typing `i`.
4. Add `ima_appraise=off` to the end of the line.
5. Exit insert edit mode by pressing the Esc key.
6. The kernel line should now look similar to this: (all on one line)
   ```
   kernel /boot/bzImage root=UUID=<uuid-number> rw,noatime\
     rootwait reboot=bios ima_appraise=off
   ```
7. To save (write) the file and quit vim, type the following and press Enter.
   ```
   :wq
   ```

Note: The `vim` editor is included in the USB key file system.

5.3 Installing the IDP Runtime to the Target System Hard Disk

Now reboot the Target System from the USB disk, and install the new IDP Runtime onto the Target System hard disk.

1. Reboot the Target System from the USB disk with the reboot command.
   ```
   reboot
   ```
2. When the system has booted, login as user `root` using password `root`.
3. Run the following commands on the Target System to install IDP from the USB disk to the Target System hard disk:
   ```
   tgt=/dev/sda /sbin/reset_media
   ```
   Say **yes** when asked to “Restore the boot media to its factory defaults.”

   This process will take several minutes.
4. When the copy has finished, shutdown by entering the command:
   ```
   shutdown –h now
   ```
5. Wait until the **Power** button light turns off.
6. Remove the USB key.

7. Press the **Power** button to power-on the board again.
8. When the system has booted, login as user `root` using password `root`.

The Target System is now ready to use.

§

6 Errata

Note: The following errata on this version of the platform are shown in Table 2.

Table 2. Target System Errata

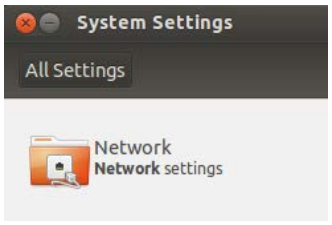
Errata Description	Workaround
Serial (COM) Port is connected internally to the RS-232 connector. The RS-485 Serial Port is not available by default.	To connect the internal RS-485 port to the external Serial (COM) pot, open the chassis and change the internal cable to the RS-485 connector.
Even when connected to the internal RS-232 connector, the Serial (COM) Port is not working properly in RS-232 mode.	
The multi-WAN service checks the Ethernet link status every few minutes and prints out “link down” and “link is not ready” status messages.	Stop the multi-WAN service with the command: `service multiwan stop`
The Ethernet port used for internet access on the Host System must be named eth0 in order for the Installer to work properly.	See instructions below regarding how to check and change the port naming.
Standard HDMI Port cannot be used when Serial (COM) Port is used due to physical conflict with the cable connectors.	Use the micro-HDMI connector to attach an HDMI monitor.
When the Target system HDMI output is connected directly to an HDMI monitor, the HDMI video output may stop partway through Target System boot-up.	Connect the Target System to a DVI-D monitor using an HDMI to DVI-D adapter.

6.1 Checking and Changing the Ethernet Port Name to eth0 for the Wind River Host Tools Installer

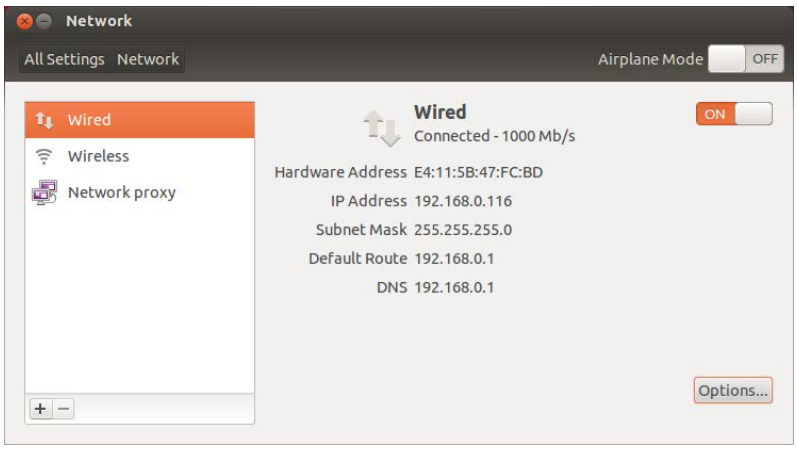
To check the name being used for the Ethernet port, do the following.

These instructions are for Ubuntu Linux. The procedure for other versions of Linux will differ somewhat.

1. Open the **System Settings** -> Network tool.



2. In the **Network** settings window, select the network interface that will be used for internet access during installation.
3. Click the **Options** button.



4. The **Editing** network connection box will popup.

5. In the **Wired** tab, the **Device MAC address** of the network connection is listed. At the end of the address, the name of the connection is listed in parentheses – usually as (eth*x*).
6. If the name of the connection is **eth0**, then no further actions are necessary. Otherwise continue with step 7.
7. If the name of the connection is not eth0, make a note of what the port name is. You must now edit the **...net.rules** file in the operating system files.
8. Navigate to the /etc/udev/rules.d/ folder in the operating system files.
9. Find the file with a name that ends in net.rules and that includes the rules for the Ethernet port you will use for internet access. Look for the name of the port that was found in step 6.
10. Change the **name** of the port from the old name to **eth0**. (That is a numeric zero, not a letter O). Like this:

    NAME="eth0"

11. Save the file **...net.rules** file.
12. Reboot the system.
13. Check the internet port naming as in steps 1 – 4 above to check that the port is now named **eth0**.

§