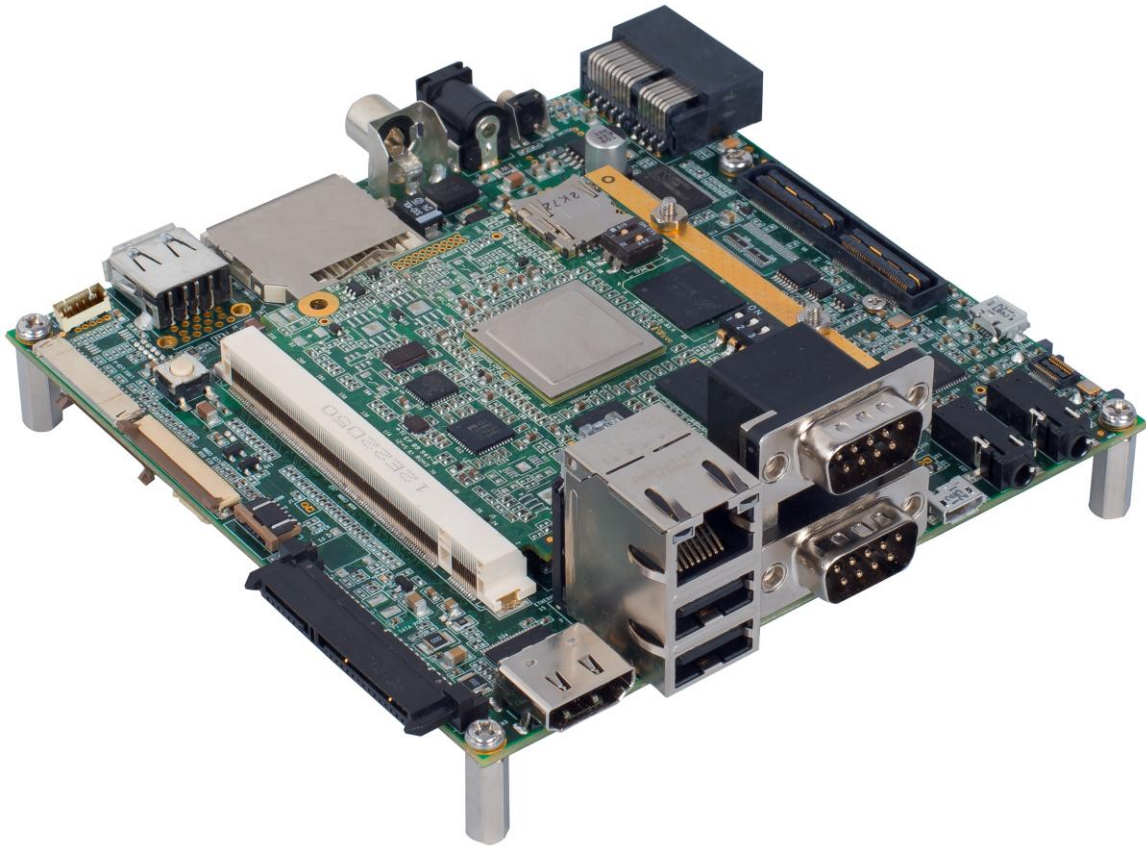


iW-RainboW-G15D i.MX6 Qseven SOM Development Platform Linux User Manual



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Address	: iWave Systems Technologies Pvt. Ltd. # 7/B, 29 th Main, BTM Layout 2 nd Stage, Bangalore, India – 560076
Email	: support.ip@iwavesystems.com
Website	: www.iwavesystems.com

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1 INTRODUCTION

1.1 Purpose

The Purpose of this document is to help the software engineers to program and test the iW-RainboW-G15M-Q7 Linux development platform and this will also guide to configure the Linux development environment in the Host PC and build the board support package.

1.2 Scope

The document describes the MFG-Tool, U-Boot, Linux Operating System and related software installed on the iW-RainboW-G15M-Q7 platform. The Linux BSP is a collection of binary, source code, and support files that can be used to create a Linux kernel image and a root file system for iW-RainboW-G15M-Q7 platform.

2 BSP COMPILATION

2.1 Host Requirements

- A Linux host PC with latest version (ex. Ubuntu version 9.04)
- Root permission on the Development Host.
- Cross compiler package for iW-RainboW-G15M-Q7.

2.2 Standalone compilation

LTIB can be used to extract and build the u-boot source/ linux kernel source. The following steps will help to build the u-boot source code / linux kernel directly for iW-RainboW-G15M-Q7 platform.

- Before compiling the source code cross compiler should be extracted to “/opt” directory of host machine if it is not present.
- Change the directory to /opt

```
host@host~$cd /opt
```

Note: The cross compiler located in below path

[Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/Linux/Cross-Compiler/freescale.tar.gz](#)

- Extract the cross compiler to “/opt” directory of host machine

```
host@host/opt~$tar -xvzf /<path to Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x>/
Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/Linux/Cross-
Compiler/freescale.tar.gz
```

Note: To disable the LDO Bypass for pre-production SOMS, refer section [APPENDIX G – LDO Bypass Mode](#)

2.2.1 U-Boot

- Create a directory and open the directory in host to build the uboot

```
host@host~$mkdir <directory_name>
host@host~$cd <directory_name>
```

Note: The u-boot source code tar file from deliverables is located in the below path.

[Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/U-Boot/u-boot-2009.08.tar.gz](#)

- Un-tar the downloaded u-boot-2009.08.tar.gz file in to newly created directory.

```
host@host/<directory>~$tar -xvzf /<path to Deliverables_iW-G15D-Q7LXC_Rx.x-
RELx.x>/Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/U-Boot/u-boot-
2009.08.tar.gz
```

- Copy the u-boot patch file to current directory.

```
host@host/<directory>~$cp /<path to Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x>/
Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/U-Boot/PATCH000-iW-
PRDVZ-SC-01-Rx.x-RELx.x-UBoot_basic_customization.patch .
```

- Change the directory to u-boot source code directory.

```
host@host/<directory>~$cd /<path to u-boot source>/u-boot-2009.08
```

- To apply the patch file, execute the below command.

```
host@host/<directory>/u-boot.2009.08~$patch -Np1 < ../PATCH000-iW-PRDVZ-SC-01-
Rx.x-RELx.x-UBoot_basic_customization.patch
```

- To export the Cross Compiler and tool chain path, execute the below command.

```
host@host/<directory>/u-boot.2009.08~$export
PATH=$PATH:/opt/freescale/usr/local/gcc-4.6.2-glibc-2.13-linaro-multilib-
2011.12/fsl-linaro-toolchain/bin
```

```
host@host/<directory>/u-boot.2009.08~$export CROSS_COMPILE=arm-none-linux-
gnueabi-
```

- To configure for iWave-G15M-Q7 platform, execute the below command.

```
host@host/<directory>/u-boot.2009.08~$make mx6_iwg15m_q7_config
```

- To compile the u-boot source code, execute the below command.

```
host@host/<directory>/u-boot.2009.08~$make
```

- After successful compilation, boot loader image (u-boot.bin) will be created in below path.

```
~/u-boot.2009.08/u-boot.bin
```

- Refer the [BINARY PROGRAMMING](#) section to update the u-boot binary.

2.2.2 Linux kernel

- Create a directory and open the directory in host to build the Linux.

```
host@host~$mkdir <directory_name>
```

```
host@host~$cd <directory_name>
```

Note: The Linux kernel source code tar file from deliverables is located in the below path.

[Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/Linux/Kernel/linux-3.0.35.tar.gz](#)

- Un-tar the downloaded linux-3.0.35.tar.gz file in to newly created directory.

```
host@host/<Directory>~$tar -xvzf /<path_to_Deliverables_iW-G15D-Q7LXC_Rx.x-
RELx.x>/Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-
Code/Linux/Kernel/linux-3.0.35.tar.gz
```

- Copy the kernel patch file to current directory.

```
host@host/<Directory>~$cp /<path_to_Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x>/Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/Linux/Kernel/PATCH000-iW-PRDVZ-SC-01-Rx.x-RELx.x-Linux_basic_customization.patch .
```

- Change the directory to Linux source code directory.

```
host@host/<Directory>~$cd <path_to_linux-3.0.35>/linux-3.0.35
```

- To apply the patch file, execute the below command.

```
host@host/<Directory>/linux-3.0.35~$patch -Np1 < ./ PATCH000-iW-PRDVZ-SC-01-Rx.x-RELx.x-Linux_basic_customization.patch
```

- Export the architecture, cross compiler and tool chain path.

```
host@host/<Directory>/linux-3.0.35~$export ARCH=arm
```

```
host@host/<Directory>/linux-3.0.35~$export PATH=$PATH:/opt/freescale/usr/local/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain/bin
```

```
host@host/<Directory>/linux-3.0.35~$export CROSS_COMPILE=arm-none-linux-gnueabi-
```

- To configure the kernel for iW-RainboW-G15M-Q7, execute the below command.

```
host@host/<Directory>/linux-3.0.35~$make imx6_iwg15m_q7_defconfig
```

- To compile the kernel module drivers and kernel image, execute the below commands.

```
host@host/<Directory>/linux-3.0.35~$make;make ulmage
```

- After successful compilation, kernel image (ulmage) will be created in the below path.

```
~/linux-3.0.35/arch/arm/boot/ulmage
```

- Refer the [BINARY PROGRAMMING](#) section to update the Linux kernel binary.

Note: To Enable Default Linux Boot logo, deselect "Standard 224-color iWave logo" in make menuconfig and compile again.

```
Device Drivers --->
```

```
Graphics support --->
```

```
[*] Bootup logo --->
```

```
[ ] Standard 224-color iWave logo
```

2.3 LTIB Compilation

2.3.1 Host setup

This document assumes that Ubuntu PC is used. Not a requirement, but the packages may be named differently and the method of installing them may be different.

- Ubuntu 9.04 (Jaunty) Desktop is the only supported Linux distribution for LTIB build hosts.
 - ❖ 32 Bit install from the Desktop CD are supported.
 - ❖ Other versions of Ubuntu are not supported and may have build issues.
- Then install ISO image and installation procedure is available from:
 - ❖ <http://old-releases.ubuntu.com/releases/9.04/>
 - ❖ <https://help.ubuntu.com/8.04/installation-guide/i386/index.html>
- This part of steps required only once per host. The Ubuntu package manager requires network access to download the packages.

Note: Please make sure your internet connection is not blocked to download the host supported packages. If the host PC requires internet proxy settings, then refer the [APPENDIX A](#) section.

2.3.1.1 Update sources.list to point to old-releases repository

Ubuntu 9.04 is considered an old release, so the package manager can't get packages from Canonical's normal repository. A 'sources.list' is included in the below path.

Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/Linux/LTIB/

This sources.list adjusts the package manager's source paths to point to 'old-releases.ubuntu.com'.

- Open a terminal and copy the included 'sources.list' file to /etc/apt/sources.list

```
$sudo cp /<Path_to_Deliverables>/Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/Linux/LTIB/sources.list /etc/apt/sources.list
```
- Change the permission of the sources.list file

```
$ sudo chmod 644 /etc/apt/sources.list
```

2.3.1.2 Update to the Latest Packages

- Open up System -> Administration -> Update Manager



Figure 1: Update Manager

- Click on Settings



Figure 2: Update Manager Settings

- Open the Updates tab and Set 'Release upgrade' to 'Never'.



Figure 3: Update Manger-Updates

- Close the settings dialog box and Click on 'Check' to check for updated packages. Then choose to install the update packages.



Figure 4: Update Manager-Check for New Updates

2.3.1.3 Host package installation

- Open a terminal window and install the below packages in host PC.

```
sudo apt-get install gettext libgtk2.0-dev
sudo apt-get install rpm bison libfreetype6-dev
sudo apt-get install libdbus-glib-1-dev
sudo apt-get install liborbit2-dev intltool
sudo apt-get install ccache ncurses-dev zlib1g
sudo apt-get install zlib1g-dev gcc git g++
sudo apt-get install libtool uuid-dev liblz2-dev
sudo apt-get install tcl dpkg perl binutils
sudo apt-get install libstdc++6 libstdc++6-4.3-dev
sudo apt-get install zlibc texinfo m4
sudo apt-get install build-essential g++
sudo apt-get install liblz2-2 liblz2-dev uuid-dev
sudo apt-get install zlib1g-dev alien
sudo apt-get install libncurses5-dev
sudo apt-get install rpm autoconf
sudo apt-get install uboot-mkimage
sudo apt-get install texlive texinfo
```

2.3.1.4 Sudoers

- To edit the sudoer's file, execute the below command.

```
sudo visudo
```

Note: This is needed for the user to use LTIB. This assumes that all the developers have administrator privileges on this host. If that is not the case, a similar line can be added for each user.

- If the below mentioned line is not present in the file, then add it to the end of the file to have administrator privileges on this host for the user as shown below.

```
<user name> ALL = NOPASSWD: /usr/bin/rpm, /opt/freescale/ltib/usr/bin/rpm
```



```
GNU nano 2.2.6 File: /etc/sudoers.tmp Modified
#
# This file MUST be edited with the 'visudo' command as root.
#
# Please consider adding local content in /etc/sudoers.d/ instead of
# directly modifying this file.
#
# See the man page for details on how to write a sudoers file.
#
Defaults env_reset

# Host alias specification

# User alias specification

# Cmnd alias specification

# User privilege specification
root    ALL=(ALL:ALL) ALL

# Members of the admin group may gain root privileges
%admin   ALL=(ALL) ALL

# Allow members of group sudo to execute any command
%sudo   ALL=(ALL:ALL) ALL
iwave   ALL = NOPASSWD: /usr/bin/rpm, /opt/freescale/ltib/usr/bin/rpm
#includedir /etc/sudoers.d

^G Get Help      ^O WriteOut      ^R Read File     ^V Prev Page     ^K Cut Text      ^C Cur Pos
^X Exit          ^J Justify       ^W Where Is      ^N Next Page     ^U UnCut Text    ^T To Spell
```

Figure 5: Sudoers File

- After adding the above admin privileges in the sudoers file, then press CTRL+X to exit and Press 'Y' to save (If you don't want to save press 'N').

2.3.2 Installing and Building LTIB

The below procedure must not be done with root permissions. But some linux systems may need root permission. However, here the below steps are for performing the procedure "not as root".

- Create a directory and open the created directory in host to build the LTIB.

```
host@host~$mkdir <directory_name>
```

```
host@host~$cd <directory_name>
```

Note: IW-G15D-Q7LXC_RX.X-RELX.X_L****_****.tar.gz package will be in the below path.

[Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/Linux/LITB/IW-G15D-Q7LXC_Rx.x-](#)

*RELX.X_L****_****.tar.gz*

- Un-tar the downloaded IW-G15D-Q7LXC_RX.X-RELX.X_L****_****.tar.gz file in a specific directory

```
host@host/<directory_name>~$tar -xvzf /<path_to_Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x>/Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Source-Code/Linux/LITB/IW-G15D-Q7LXC_RX.X-RELX.X_L****_****.tar.gz
```

- Enter into the LTIB source code,

```
host@host/<directory_name>~$cd IW-G15D-Q7LXC_RX.X-RELX.X_L****_****
```

- Now execute the below command to install the ltib in your desired directory.

```
host@host/<directory_name>/IW-G15D-Q7LXC_RX.X-RELX.X_L****_**** ~$./install
```

- To install, user have to accept the terms and conditions that will be displayed in the terminal during the installation.
- During the installation, enter the path to install ltib at below condition.

```
Where do you want to install LTIB? (/home/iwave/IW-G15D-Q7LXC_RX.X-RELX.X_L****_****)
```

- The ltib source code is copied into the entered path. Open the ltib directory.

```
host@host/<directory_name>~$cd /<path_to_ltib>/ltib
```

- Run the below command and select platform to Freescale iMX reference boards as shown below then exit and save.

```
host@host/LTIB_Imx6/ltib $ ./ltib -c
```

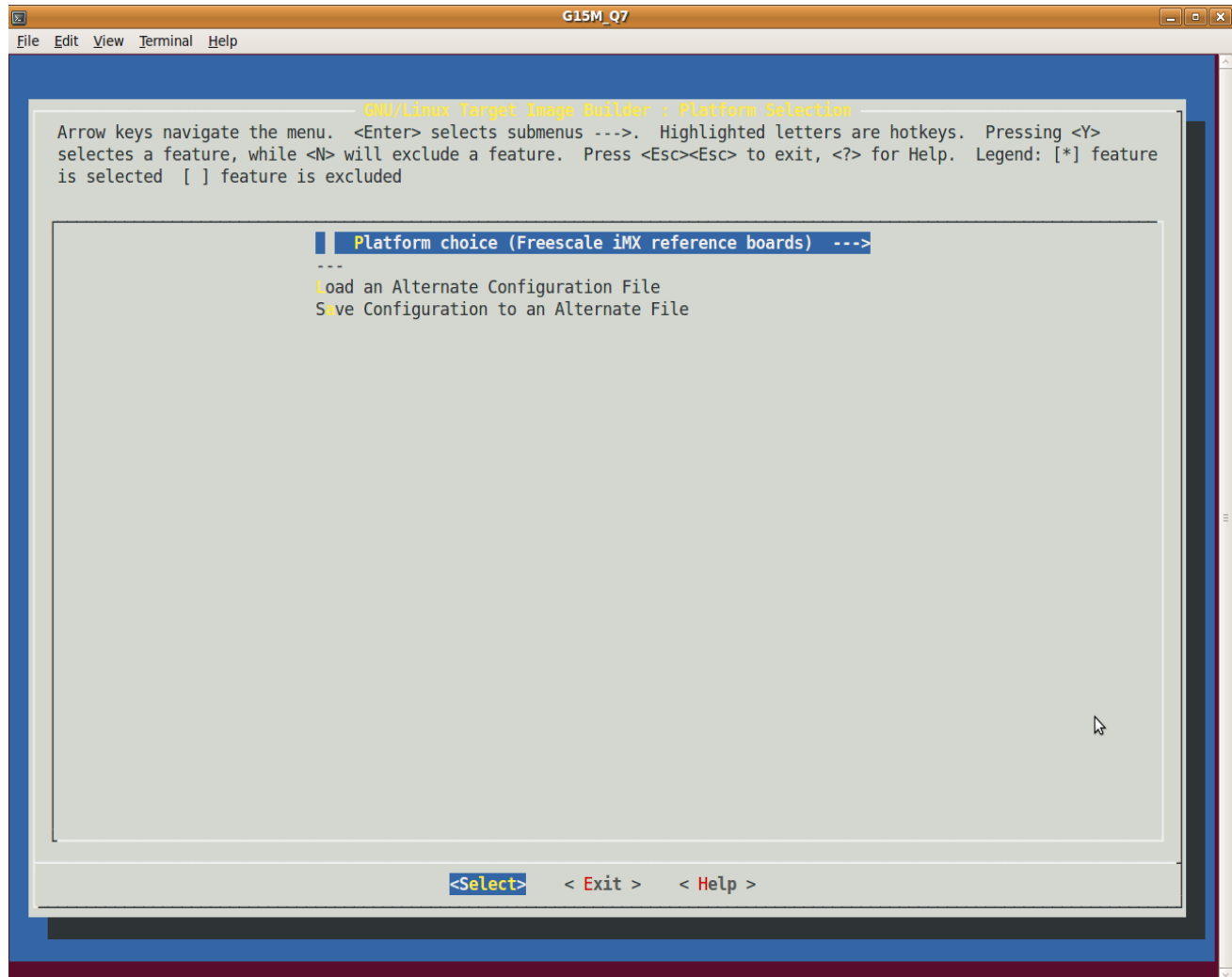


Figure 6: LTIB Menu Configuration Window 1

- In the next menu, select the platform type as imx6q as shown in below figure, exit and save.

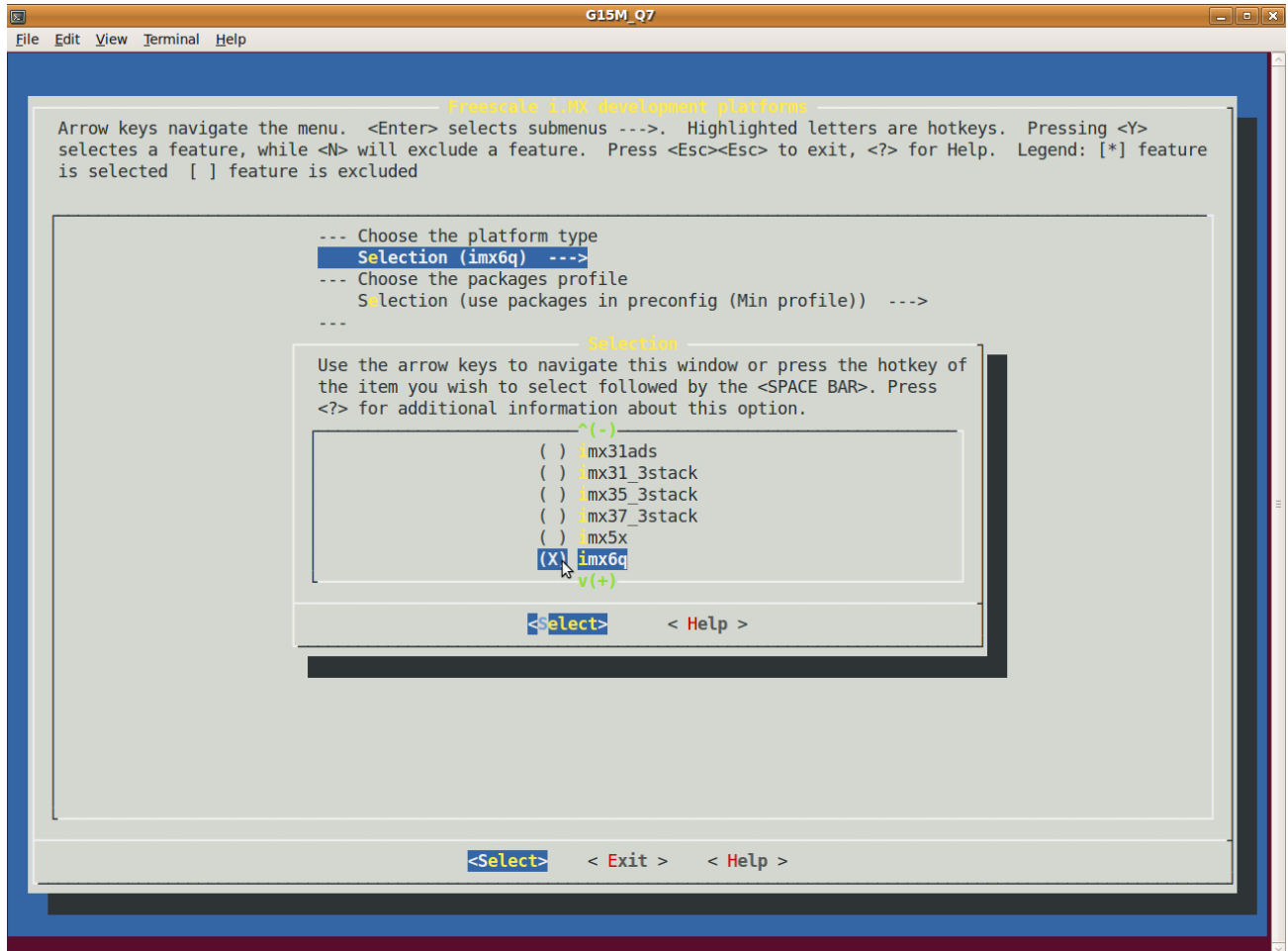


Figure 7: LTIB Menu Configuration Window 2

- On the next menu, make sure the mx6q_iwg15m_q7 is selected as shown in below figure.

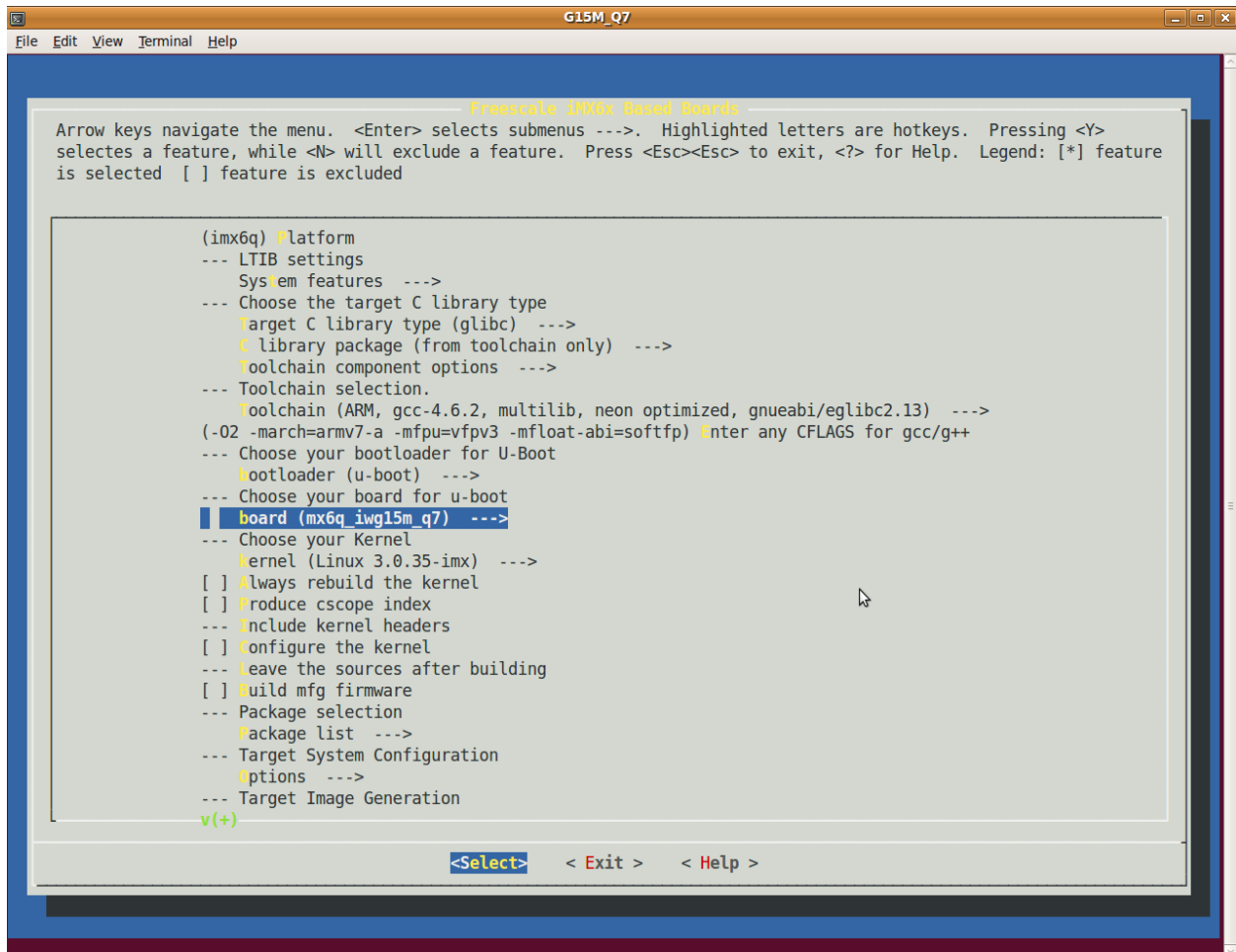


Figure 8: Platform selection

- Exit the configuration screen and save the changes as shown in the below figure.

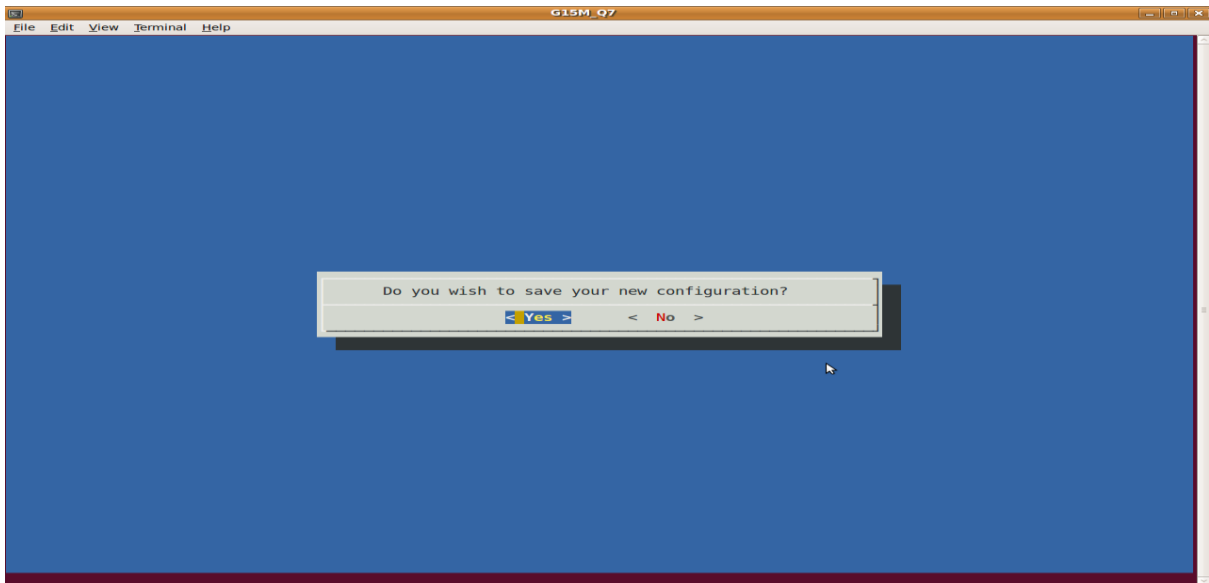


Figure 9: Saving the configuration

- Compilation may take more than 1 hour so, please wait till the build succeed message displays as shown below.

```
removing the boot directory and files
removing man files and directories
removing info files
removing /usr/share/locale directory
removing /usr/man directory
removing static libraries
removing target rpm database
stripping binaries and libraries

Filesystem stats, including padding:
    Total size           = 297472k
    Total number of files = 4946

Started: Wed Nov 21 11:01:26 2012
Ended:   Wed Nov 21 13:03:37 2012
Elapsed: 7331 seconds

Build Succeeded
```

Figure 10: LTIB Build Succeed

- The file systems binary will be created in the below path.

/<Path_to_Itib_directory>/ltib/rootfs/

- Copy the “iwtest” folder into rootfs directory.

```
host@host~$sudo cp -rf /<path to Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x>/Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Binaries/Application/iwtest /<path_to_Itib>/ltib/rootfs/
```

- Copy the “mrvl” folder to below rootfs path.

```
host@host~$sudo cp -rf /<path_to_Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x>/Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Binaries/Application/Wi-Fi/mrvl /<path_to_Itib>/ltib/rootfs/lib/firmware/
```

Note: The “iwtest” and “mrvl” folder will be in the below paths respectively.

Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Binaries/Application/iwtest

Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/Binaries/Application/Wi-Fi/mrvl

- Execute the below commands to compress the rootfs binaries.

```
host@host~$cd rootfs
host@host~$sudo tar -cvzf ../rootfs.tar.gz *
host@host~$cd ../
```

- Refer the [BINARY PROGRAMMING](#) section to update the rootfs binary.

2.3.3 U-Boot

- Execute the below command, to prepare the u-boot source code in ltib.

\$/ltib -m prep -p u-boot

- The uboot source code will be in the below location.

/<Path_to_Itib_directory>/ltib/rpm/BUILD/u-boot-2008-09

- Execute the below command to compile the uboot source code,

\$/ltib -m scbuild -p u-boot

- The uboot binary file will be in the below location.

/<Path_to_Itib_directory>/ltib/rpm/BUILD/u-boot-2008-09/u-boot.bin

- Refer the [BINARY PROGRAMMING](#) section to update the u-boot binary.

2.3.4 Linux kernel

- Execute the below command, to prepare the linux kernel source code in ltib.

`$/ltib -m prep -p kernel`

- The linux kernel source code will be in the below location.

`/<Path_to_ltib_directory>/ltib/rpm/BUILD/linux-3.0.35`

- Execute the below command to compile the Linux kernel source code,

`$/ltib -m scbuild -p kernel`

- The linux kernel binary file will be in the following location.

`/<Path_to_ltib_directory>/ltib/rpm/BUILD/linux-3.0.35/arch/arm/boot/ulmage`

- Refer the [BINARY PROGRAMMING](#) section to update the linux kernel binary.

3 BINARY PROGRAMMING

The MFG-Tool is a manufacturing tool from Freescale that runs under Windows. It is designed to program firmware to iW-RainboW-G15M-Q7 platforms for mass production.

3.1 Requirements

To program the binaries for iW-RainboW-G15M-Q7 platform, following Items are required:

- USB type A to mini micro A cable.
- Host PC (Windows).
- Micro SD/ Standard SD / eMMC / SATA
- Binary files (u-boot.bin, ulmage, rootfs.tar.gz)
- The below figure shows the minimum memory requirement of partition for the boot device.

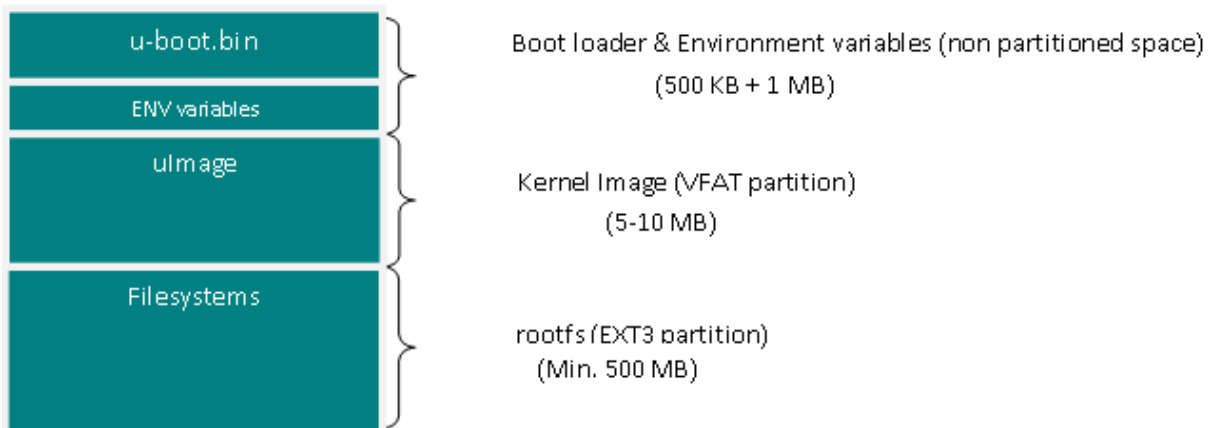


Figure 11: Boot device memory layout

Note: The MFG-Tool with this deliverables will divide the boot device's space equally for VFAT and EXT3 partition after allocation of boot loader environment variables space.

The rootfs tar file should be in rootfs.tar.gz format and the binaries name should not be modified. To build the binaries refer the [BSP COMPILATION](#) section in this document.

3.2 Limitations

- MFG tool supports to program the binaries for only one device at a time.
- If MFG tool v2.0 application is executed on Windows7, when it runs in the “updater” phase, a popup message will be shown to ask whether disk should be formatted. Please ignore it, or click the "Cancel" button. It will not affect any function.
- When the xml file (ucl2.xml) or the configuration file (cfg.ini or UICfg.ini) is modified while the application is running; the change will not work until the application is restarted.
- This application does not support USB 3.0 host port.

3.3 Programming the binaries

- Select Serial downloader boot mode in iW-RainboW-G15M-Q7 platform and make sure to boot media is connected/ inserted properly. Refer section Boot Mode Setting in iW-RainboW-G15D-QuickStartGuide document for boot mode setting procedure.
- Connect debug UART with host PC and Power ON the iW-RainboW-G15M-Q7 platform. Refer sections Debug UART Setting and Powering ON iW-RainboW-G15D in iW-RainboW-G15D-QuickStartGuide document to connect debug UART and power ON procedure.
- Use USB type A to mini micro A cable to connect the iW-RainboW-G15M-Q7 platform with host PC via USB OTG port.
- *The MFG-Tool package will be in the below path*

[Deliverables_iW-G15D-Q7LXC_Rx.x-RELx.x/MFG-Tool/IW-G15M-Q7LXC_RX.X-RELX.X_MFG_*****](#)

*Note: The pre-built binaries for iW-RainboW-G15M-Q7 Quad/Dual/DualLit/Solo platform will be in-built with this IW-G15M-Q7LXC_RX.X-RELX.X_MFG_***** package.*

- Copy the binary files into the below path, in case to program the user compiled binaries.

[~/IW-G15M-Q7LXC_RX.X-RELX.X_MFG_*****/Profiles/MX6** Linux Update/OS Firmware/files/](#)

- Open the “cfg.ini” file with Notepad; change the “name” to select the boot device for programming the binaries as shown below.

SPI - [iwave-SPI](#) (default)
micro SD - [iwave-mSD](#)
eMMC - [iwave-mmc](#)
SATA - [iwave-SATA](#) (only for Quad/Dual Processor)
Standard SD – [iwave-sSD](#)

Note: If SPI NOR flash is the boot device, then the rootfs.tar.gz and ulmage will be programmed into the eMMC only

- The *cfg.ini* file will be located below path

*~/IW-G15M-Q7LXC_RX.X-RELX.X_MFG_*****/cfg.ini*

Example : To program the binaries to micro SD, *cfg.ini* file to be modified as shown below,

```
[profiles]
chip = MX6** Linux Update
[platform]
board = iWave-G15M-Q7
[LIST]
name = iwave-mSD
```

- Open the “IW-G15M-Q7LXC_RX.X-RELX.X_MFG_****” folder and double click on “MfgTool2.exe” file.
- The MFG Application will open and will display the current operation in status text box.
- If the platform is detected, the "HID-compliant device" message will be displayed in the status box.

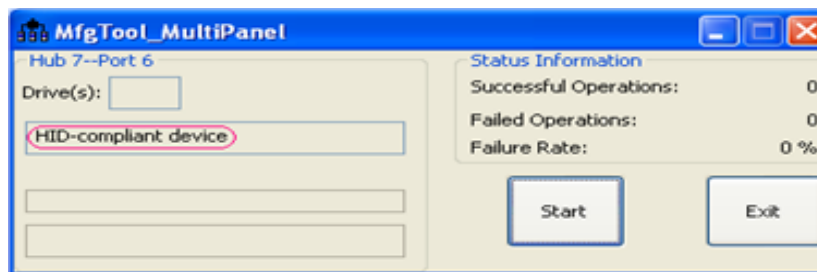


Figure 12: Platform Detection

- Click on the Start button, MFG Tool will start programming binaries into boot device and the debug console will show the debug messages.
- After successfully programming the Binaries to boot device, the progress bar will become Green colour and status box will be shown “Done”.

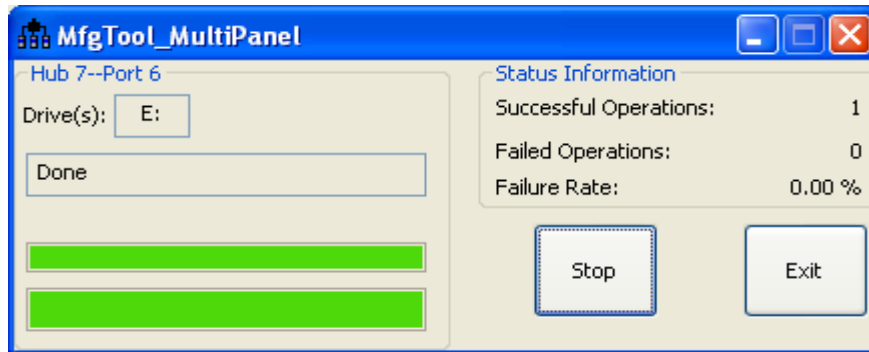


Figure 13: Binary Programming Succeed

- Click "Stop" to finish, and Click "Exit" to terminate the application.
- After powering OFF the platform, change to *internal boot mode*.

Note: If you stop the application in between of programming binaries and if you re-start, the application will try to continue from the point where you stopped before. But it is not guaranteed that it can continue successfully. It is NOT recommended to do this.

4 U-BOOT TESTING AND BOOT CONFIGURATION

This part of the document explains about testing the peripherals in u-boot level and loading the Linux OS from different devices for iW-RainboW-G15M-Q7 platform.

- iW-RainboW-G15M-Q7 platform can boot from one of the below boot media devices.

SPI Flash (default)

Micro SD

eMMC

SATA (Only in Quad/Dual Processor)

Standard SD (Optional)

Note: Refer the section Boot Media Setting in i.MX6-QsevenSOM-HardwareUserGuide document for boot media device selection.

- Connect debug UART with host PC and Power ON the iW-RainboW-G15M-Q7 platform. Refer the sections Debug UART Setting and Powering ON iW-RainboW-G15D in iW-RainboW-G15D-QuickStartGuide document to connect debug UART and power ON procedure.
- To Enter in boot loader console, Refer the section Linux Test Environment section in iW-RainboW-G15D QuickStartGuide document to get the boot loader console.

4.1 Basic commands

- To find available commands and descriptions in U-Boot level type the below command.

iWave-G15 >help

- The Available commands will be displayed in command prompt as shown below.

bdfinfo - print Board Info structure

boot - boot default, i.e., run 'bootcmd'

bootm - boot application image from memory

saveenv - save environment variables to persistent storage

setenv - set environment variables

- To display the platform information, execute the below command.

iWave-G15 >bdfinfo

- The platform information will be displayed in command prompt as shown below.

arch_number = 0x0000112E

env_t = 0x00000000

boot_params = 0x10000100

```
DRAM bank = 0x00000000
-> start   = 0x10000000
-> size     = 0x40000000
ethaddr    = aa:bb:cc:dd:ee:f1
baudrate   = 115200 bps
```

4.2 Basic Device Tests

In U-Boot level, the supported devices are

- RAM
- Standard SD, Micro SD, eMMC
- SPI NOR flash
- I2C
- SATA
- Ethernet

Note: To know about the procedure for connecting the peripherals to iW-RainboW-G15M-Q7 platform refer iW-RainboW-G15D-QuickStartGuide document.

4.2.1 RAM test

- In iW-RainboW-G15M-Q7 platform RAM physical address is from 0x10000000 to 0x3FFFFFFF.

Note: Accessing the restricted RAM area or other physical address may cause unpredictable behaviour. Make sure, you are not entering the restricted area RAM address. 0x10008000 is the u-boot RAM location and this RAM area should not be accessed.

- To write the data into RAM location, execute the below command.

```
iWave-G15 >mw <RAM_addr> <DATA> <No_of_location_to_be_write>
```

- To display the data in the RAM location, execute the below command.

```
iWave-G15 >md <RAM_addr> <No_of_location_to_be_display>
```

- To test the RAM read/write, execute the below.

```
iWave-G15 >mtest <RAM_addr_start> <RAM_addr_end> <DATA> <No_of_times>
```

Example

```
iWave-G15 >mtest 0x10800000 0x10900000 0xAABBCCDD 0x1
```

Pattern AABBCCDD Writing... Reading...Tested 1 iteration(s) without errors.

4.2.2 SD/eMMC

- Initialize the particular SD/eMMC device by the below command.

```
iWave-G15 >mmc dev <SD slot No>
```

- The SD/eMMC static slot numbers are below.

Standard SD - 0

Mircro SD - 1

eMMC - 2

- To display the SD/eMMC device information, execute the below.

```
iWave-G15 >mmcinfo
```

Device: FSL_USDHC

Manufacturer ID: 3

OEM: 5344

Name: SU04G

Tran Speed: 25000000

Rd Block Len: 512

SD version 3.0

Clock: 50000000

High Capacity: Yes

Capacity: 3965190144 Bytes

Bus Width: 4-bit

Boot Partition for boot: No boot partition available

4.2.3 SPI NOR flash test

Caution: Accessing the SPI Flash will corrupt the boot code if the SPI Flash is the boot device.

- To enable the SPI flash execute the below command.

```
iWave-G15 >sf probe 1:1
```

JEDEC ID: 0xbf:0x25:0x41

2048 KiB SST25VF016B - 2MB at 1:1 is now current device

- To erase the contents in SPI flash, execute the below command.

```
iWave-G15 >$sf erase <offset_address> <size>
```

Example

```
iWave-G15 >$ sf erase 0x000000 0x10000
```

```
Erasing SPI NOR flash 0x0 [0x10000 bytes]
```

```
.....SUCCESS
```

- To write any data to the SPI flash, First need to write that data into the RAM location then can be copied to SPI flash
- To write the data into RAM, refer the [RAM test](#) section.
- To write the data from RAM into SPI flash, execute the below.

```
iWave-G15 >$sf write <RAM_addr> <flash_offset><size>
```

Example

```
iWave-G15 >$sf write 0x10800000 0x000000 0x100
```

```
Writing SPI NOR flash 0x0 [0x100 bytes] <- ram 0x10800000
```

```
SUCCESS
```

4.2.4 I2C test

- To list connected I2C devices on the I2C bus

```
iWave-G15> i2c probe
```

```
Valid chip addresses: 00 0E 1C 44 50 60
```

4.2.5 SATA test

- To initialize the SATA device, execute the below command.

```
iWave-G15 >$sata init
```

```
AHCI 0001.0300 32 slots 1 ports 3 Gbps 0x1 impl SATA mode
```

```
flags: ncq stag pm led clo only pmp pio slum part
```

```
SATA Device Info:
```

```
S/N: C011201111100000000B
```

```
Product model number: 16GB SATA Flash Drive
```

```
Firmware version: SFDDA01A
```

```
Capacity: 31277232 sectors
```

- To display the SATA information, execute the below command.

```
iWave-G15 >$sata info
```


SATA device 0: Model: 16GB SATA Flash Drive Firm: SFDDA01A

Ser#:011201111100000000B

Type: Hard Disk

Supports 48-bit addressing

Capacity: 15272.0 MB = 14.9 GB (31277232 x 512)

4.2.6 Ethernet test

- To set the MAC address and IP address for the platform and to save the environment variables, execute the below command.

iWave-G15 >setenv ethaddr '<MAC addr>'

iWave-G15 >setenv ipaddr '<board_ip_addr>'

iWave-G15 >saveenv

- To ping any IP address from the platform, execute the below command.

iWave-G15 >ping <any_ip_addr>

Example

*iWave-G15 >ping ******

PHY identify @ 0x3 = 0x00221611

FEC: Link is Up 796d

Setting MAC Addr

Using FEC0 device

*host ***** is alive*

Note: To permanently program the MAC address in to i.MX6 OTP fuse, Refer the section [APPENDIX H – Permanent MAC address](#)

4.3 Environment variables settings

By default the environment variables will be saved in the SPI NOR Flash. But in case of SATA or SD/MMC boot device options, save the environment variables in SATA / SD/MMC by changing the environment variable store device configuration in boot loader (u-boot) source code.

4.3.1 Micro SD boot

- Micro SD booting is the default boot mode for the iW-RainboW-G15M-Q7 platform.
- To load the kernel and file systems from the Micro SD, the environment variables should be set as shown below.

iWave-G15 >setenv bootcmd_msd 'run bootargs_mmc;mmc dev 1;fatload mmc 1 \${loadaddr} \${kernel};bootm'

```
iWave-G15 >setenv bootargs_msd 'setenv bootargs ${bootargs_base}
    root=/dev/mmcb1k1p2 rootwait rw ${hdmi} ${lcd}'
iWave-G15 >setenv bootcmd 'run bootcmd_msd'
iWave-G15 >saveenv
```

- To boot the platform, execute the below command.

```
iWave-G15 >boot
```

4.3.2 EMMC boot

- To load the kernel and file systems from the EMMC, the environment variables should be set as shown below.

```
iWave-G15 >setenv bootcmd_mmc 'run bootargs_mmc;mmc dev 2;fatload mmc
    2 ${loadaddr} ${kernel};bootm'
iWave-G15 >setenv bootargs_mmc 'setenv bootargs ${bootargs_base}
    root=/dev/mmcb1k2p2 rootwait rw ${hdmi} ${lcd}'
iWave-G15 >setenv bootcmd 'run bootcmd_mmc'
iWave-G15 >saveenv
```

- To boot the platform, execute the below command.

```
iWave-G15 >boot
```

4.3.3 Standard SD boot

- To load the kernel and file systems from the Standard SD, the environment variables should be set as shown below.

```
iWave-G15 >setenv bootcmd_ssd 'run bootargs_mmc;mmc dev 0;fatload mmc
    0 ${loadaddr} ${kernel};bootm'
iWave-G15 >setenv bootargs_ssd 'setenv bootargs ${bootargs_base}
    root=/dev/mmcb1k0p2 rootwait rw ${hdmi} ${lcd} wifi_active=off'
iWave-G15 >setenv bootcmd 'run bootcmd_ssd'
iWave-G15 >saveenv
```

- To boot the platform, execute the below command.

```
iWave-G15 >boot
```

4.3.4 SATA boot

- To load the kernel and file systems from the SATA, the environment variables should be set as shown below.

```
iWave-G15 >setenv bootcmd_sata 'run bootargs_sata;sata init;fatload sata
    0 ${loadaddr} ${kernel};bootm'
```

```
iWave-G15 >setenv bootargs_sata 'setenv bootargs ${bootargs_base} root=/dev/sda2  
rootwait rw ${hdmi} ${lcd}'
```

```
iWave-G15 >setenv bootcmd 'run bootcmd_sata'
```

```
iWave-G15 >saveenv
```

- To boot the platform, execute the below command.

```
iWave-G15 >boot
```

4.3.5 TFTP & NFS boot

Kernel image (ulmage) and rootfs (file systems) can be loaded through TFTP and NFS respectively. But the iW-RainboW-G15M-Q7's boot loader (u-boot) should be loaded from boot media.

Note: To configure the host PC (under Linux OS) for TFTP and NFS server refer the [APPENDIX B](#) section.

- To load the kernel and file systems using the TFTP and NFS, the environment variables should be set as shown below.

```
iWave-G15 >setenv serverip '<serverip>'
```

```
iWave-G15 >setenv nfsroot '<rootfs-(filesystem)path in host >'
```

```
iWave-G15 >setenv bootfile 'ulmage'
```

```
iWave-G15 >setenv bootcmd 'run bootcmd_net'
```

```
iWave-G15 >saveenv
```

- Make sure to copy the bootfile (ulmage) into tftp server folder (/tftpboot/) and nfsroot has valid path.
- To boot the platform, execute the below command.

```
iWave-G15 >boot
```

4.3.6 HDMI and LCD settings

- By default HDMI is mapped with frame buffer 2 and LVDS 1 is mapped with frame buffer 0. The environment variables should be set as shown below

Frame buffer 0 - LVDS (WVGA - 800x480)

Frame buffer 2 – HDMI (1080p - 1920x1080M@60)

```
iWave-G15 >setenv hdmi 'video=mxcfb1:dev=hdmi,1920x1080M@60,if=RGB24,bpp=24'
```

```
iWave-G15 >setenv lcd 'video=mxcfb0:dev=ldb,LDB-WVGA,if=RGB666,bpp=16'
```

- To interchange the display devices frame buffer mapping, the environment variables should be set as shown below.

Frame buffer 0 - HDMI (1080p - 1920x1080M@60)

Frame buffer 2 – LVDS (WVGA - 800x480)

```
iWave-G15 >setenv hdmi video=mxcfb0:dev=hdmi,1920x1080M@60,if=RGB24,bpp=24'
```

```
iWave-G15 >setenv lcd 'video=mxcfb1:dev=ldb,LDB-WVGA,if=RGB666,bpp=16'
```

- To change the HDMI resolution to 720P, execute the below command.

```
iWave-G15 >setenv hdmi  
'video=mxcfb<X>:dev=hdmi,1280x720M@60,if=RGB24,bpp=24'
```

Example

```
iWave-G15 >setenv hdmi 'video=mxcfb1:dev=hdmi,1280x720M@60,if=RGB24,bpp=24'
```

- To save the changes and boot the platform, execute the below command.

```
iWave-G15 >saveenv;boot
```

4.3.7 Optional features settings

- By default, display frame Buffer is set as Debug Console. To set UART as Debug Console add the below string in the boot arguments.

Example

```
iWave-G15 > setenv bootargs_base 'console=ttymx1,115200n8'
```

To revert back to frame buffer debug console, add the below string in the boot arguments.

Example

```
iWave-G15 > setenv bootargs_base 'console=tty0'
```

- By default Quad core will be in active state. To limit the no of processors add the below string in the boot arguments.

```
maxcpus=<maximum no of cpu to be active>
```

Example

```
iWave-G15 >setenv bootargs_mmc 'setenv bootargs ${bootargs_base}  
root=/dev/mmcblk2p2 rootwait rw ${hdmi} ${lcd} maxcpus=2'
```

- By default TVIN analog decoder is supported. To support the CMOS camera, add the below string in the boot arguments.

```
csi=<tvin/cmos>
```

tvin - to add TVIN driver with OS

cmos – to add CMOS driver with OS

Example

```
iWave-G15 >setenv bootargs_mmc 'setenv bootargs ${bootargs_base}  
root=/dev/mmcblk2p2 rootwait rw ${hdmi} ${lcd} csi=cmos'
```

- By default Wi-Fi is supported by SDHC1 port. To support the Standard SD slot with SDHC1, add the below string in the boot arguments.

```
wifi_active=<on/off>
```

on – configure SDHC1 for Wi-Fi

off – configure SDHC1 for Standard SD

Example

```
iWave-G15 >setenv bootargs_mmc 'setenv bootargs ${bootargs_base}  
root=/dev/mmcbk2p2 rootwait rw ${hdmi} ${lcd} wifi_active=off'
```

- By default CPU LDO regulator will be bypassed. To activate the LDO regulator, add the below string in the boot arguments.

```
ldo_active=<on/off>
```

on – activate the LDO regulator in SOC

off – disable the LDO regulator in SOC


Example

```
iWave-G15 >setenv bootargs_mmc 'setenv bootargs ${bootargs_base}  
root=/dev/mmcbk2p2 rootwait rw ${hdmi} ${lcd} ldo_active=on'
```

5 LINUX PERIPHERAL TEST

This part of the document explains about testing the peripherals in Linux OS level for iW-RainboW-G15M-Q7 platform.

- Connect debug UART with host PC and Power ON the iW-RainboW-G15M-Q7 platform. Refer the sections Debug UART Setting and Powering ON iW-RainboW-G15D in iW-RainboW-G15D-QuickStartGuide document to connect debug UART and power ON procedure.
- By default, Display frame buffer is set as Linux Debug console. So after U-boot Debug message comes in Terminal, Linux boot message will come in default display as shown below (for Quad Core SOM).



```
starting pid 1337, tty '': '/etc/rc.d/rcs'
Mounting /proc and /sys
Starting the hotplug events dispatcher udevd
udevd (1346): /proc/1346/oom_adj is deprecated, please use /proc/1346/oom_score_adj instead.
Synthesizing initial hotplug events
EXT3-fs: barriers not enabled
kjournald starting. Commit interval 5 seconds
EXT3-fs (mmcblk2p2): using internal journal
EXT3-fs (mmcblk2p2): recovery complete
EXT3-fs (mmcblk2p2): mounted filesystem with writeback data mode
Setting the hostname to iWave-G15M
Mounting filesystems
mount: mounting usbfs on /proc/bus/usb failed: No such file or directory
Starting inetd:
Starting the port mapper:
Starting the dropbear ssh server:
starting pid 3042, tty '': '/etc/rc.d/rc_gpu.S'
starting pid 3050, tty '': '/etc/rc.d/rc_mxc.S'

arm-none-linux-gnueabi-gcc (Freescale MAD -- Linaro 2011.07 -- Built at 2011/08/10 09:20) 4.6.2 2011
root filesystem built on Mon, 28 Oct 2013 22:59:51 +0530
Freescale Semiconductor, Inc.

Rootfs Version      : iW-PRDVZ-SC-01-R3.0-REL1.4

iWave-G15M login:
```

- To enter the commands in frame buffer console, connect the USB Keyboard in iW-RainboW-G15M-Q7 platform USB slot and enter.
- To enter in boot loader console, Refer the section Linux Test Environment section in iW-RainboW-G15D Quick Start Guide document to get the boot loader console.
- To connect the peripherals with iW-RainboW-G15M-Q7 platform, refer iW-RainboW-G15D-Hardware User Guide document.

5.1 Block Devices Test

The iW-RainboW-G15M-Q7 platform will support the below block devices.

- Micro SD, eMMC
- USB host
- USB OTG (host and device)
- SATA
- SPI
- Standard SD (Optional)

Testing device Requirements

To test the block devices supported by iW-RainboW-G15M-Q7 platform, following Items are required.

- USB memory stick
- Micro SD / Standard SD
- USB Type A to mini micro A cable.
- USB Type B to mini micro B cable.
- SATA HDD

5.1.1 SD/eMMC/USB/USB OTG (as host) Test

- The Standard SD / Micro SD / eMMC / USB (Host) / USB OTG (as Host) will mount in below mentioned directories. The standard SD is the optional device.

<i>Standard SD</i>	- /mnt/mmcbk0p1, /mnt/mmcbk0p2 ...etc
<i>Micro SD</i>	- /mnt/mmcbk1p1, /mnt/mmcbk1p2 ...etc
<i>eMMC</i>	- /mnt/mmcbk2p1, /mnt/mmcbk2p2 ...etc
<i>USB / USB OTG</i>	- /mnt/sdb1, /mnt/sdb2 /.....etc

Note: Refer the section [Optional features settings](#) to add the standard SD support

- To view the contents, execute below command.

```
root@iWave-G15M~$cd /<mount_directory>
```

```
root@iWave-G15M/<mount_directory>~$ls
```

- To create a directory and remove a directory from the mounted partition, execute below commands respectively.

```
root@iWave-G15M/<mount_directory>$mkdir <directory_name>
```

```
root@iWave-G15M/<mount_directory>$rm -rf <target_directory>
```

- To copy a file to the mounted partition, execute below command.

```
root@iWave-G15M/<mount_folder>$cp <source_file> <Destination>
```

- To exit from the mount folder, execute below command.

```
root@iWave-G15M/<mount_directory>$cd /root
```

5.1.2 USB OTG as device

- Connect OTG Cable to OTG Port
- To change the directory to “iwtest” folder, execute the below command

```
root@iWave-G15M~/ $cd /iwtest/
```

- Execute below command to insert the file storage module.

```
root@iWave-G15M/iwtest~/ $insmod g_file_storage.ko file=/dev/mmcbk2p1  
removable=1
```


- After successful module registration, it shows the below debug message.

g_file_storage gadget: File-backed Storage Gadget, version: 20 November 2008

g_file_storage gadget: Number of LUNs=1

g_file_storage gadget-lun0: ro=0, file: /dev/sdb1

fsl-usb2-udc: bind to driver g_file_storage.ko

root@iWave-G15M/iwtest\$ g_file_storage gadget: high speed config #1

- Then the files and folders from iW-RainboW-G15M-Q7 platform's eMMC will be displayed on Windows Host PC as shown in the figure below.

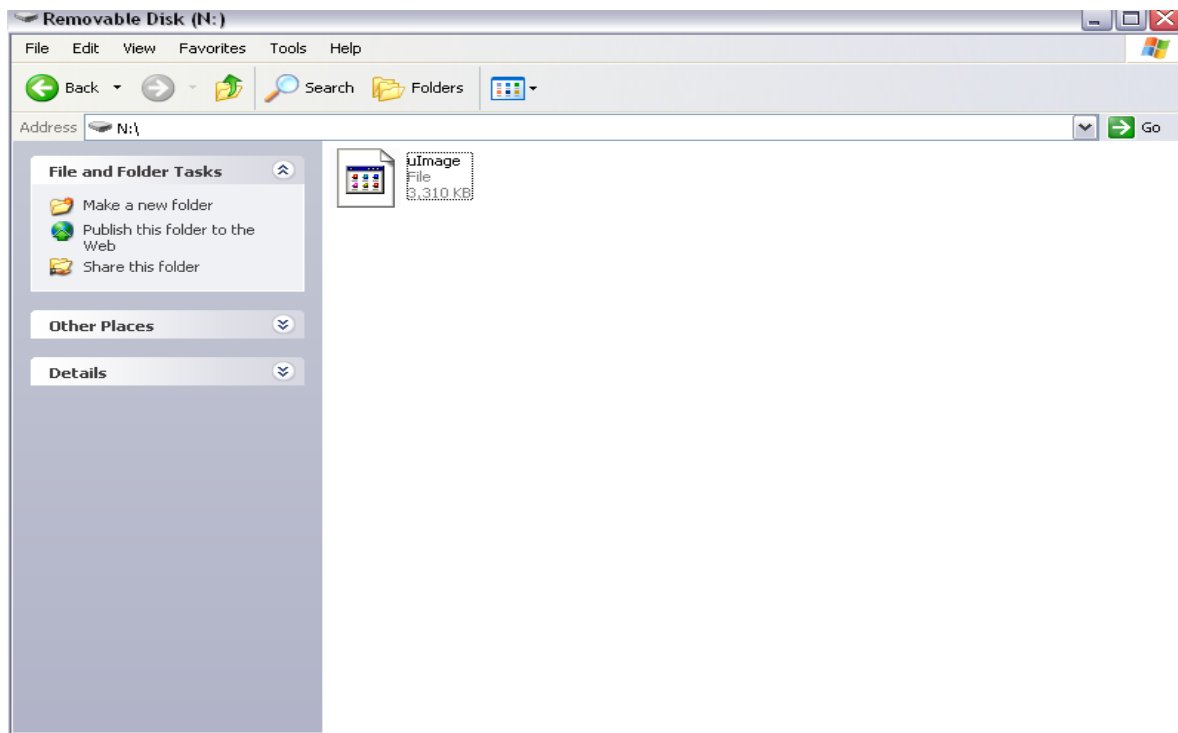


Figure 14: OTG device detection on Host PC

- To unload the `g_file_storage.ko` module, execute the below command

root@iWave-G15M/iwtest~/\$rmmod g_file_storage.ko

- To change the directory to “root” folder, execute the below command

root@iWave-G15M/iwtest~/\$cd /root

5.1.3 SATA Hard disk Test

- Connect the SATA Hard disk to iW-RainboW-G15M-Q7 platform before powering ON.

Note: SATA HDD should be connected or removed at only when the platform is powered off (Hot plug support is not supported).

Note: iMx6 Duallite and Solo Processors doesn't support SATA

- The messages will be displayed in the command prompt when loading the kernel as shown below.

```
ata1.00: ATA-8: 16GB SATA Flash Drive, SFDDA01A, max UDMA/133
ata1.00: 31277232 sectors, multi 16: LBA48 NCQ (depth 31/32)
ata1.00: configured for UDMA/133
scsi 0:0:0:0: Direct-Access  ATA  16GB SATA Flash SFDD PQ: 0 ANSI: 5
sd 0:0:0:0: [sda] 31277232 512-byte logical blocks: (16.0 GB/14.9 GiB)
sd 0:0:0:0: [sda] Write Protect is off
sd 0:0:0:0: [sda] Write cache: enabled, read cache: enabled, doesn't support DPO or FUA
sda: sda1 sda2
sd 0:0:0:0: [sda] Attached SCSI disk
```

- SATA HDD will mount with detected nodes. Here SATA HDD is mounted in below mentioned path,

```
/mnt/sda1, /mnt/sda2 ...etc
```

- To view the files and folders in partitions, execute below command.

```
root@iWave-G15M~$cd /<mount_directory>
root@iWave-G15M/<mount_directory>$ls
```

- To create a directory and remove a directory in mounted partition, execute below commands respectively.

```
root@iWave-G15M/<mount_directory>$mkdir <directory_name>
root@iWave-G15M/<mount_directory>$rm -rf <target_directory>
```

- To copy a file to the Hard disk drive, execute below command.

```
root@iWave-G15M/<mount_folder>$cp <source_file> <Destination>
```

- To exit from the mount partitions, execute below command.

```
root@iWave-G15M/<mount_directory>$cd /root
root@iWave-G15M~$umount /mnt/<mount_directory>/
```

5.1.4 SPI NOR flash test

Caution: Accessing the SPI Flash will corrupt the boot code if the SPI Flash is the boot device.

- To display the SPI NOR flash information, execute the below command.

```
root@iWave-G15M ~/$cat /proc/mtd
```

- To mount the SPI NOR flash partitions, execute the below command.

```
root@iWave-G15M~$mount -t jffs2 /dev/mtdblock0 /<mount_directory>
```

- To view the files and folders in mounted partitions, execute the below command.

```
root@iWave-G15M~$cd /<mount_directory>
```

```
root@iWave-G15M/<mount_directory>$ls
```

- To create a directory and remove a directory in mounted partition, execute the below commands respectively.

```
root@iWave-G15M/<mount_directory>$mkdir <directory_name>
```

```
root@iWave-G15M/<mount_directory>$rm -rf <target_directory>
```

- To copy a file to the mounted partition, execute the below command.

```
root@iWave-G15M/<mount_folder>$cp <source_file> <Destination>
```

- To exit from the mount partitions, execute the below command.

```
root@iWave-G15M/<mount_directory>$cd /root
```

```
root@iWave-G15M~$umount /mnt/<mount_directory>/
```

5.2 Network Devices Test

The iW-RainboW-G15M-Q7 platform will support the below network devices.

- Ethernet
- Wi-Fi
- CAN
- Bluetooth

Testing device Requirements

To test the Network devices supported by iW-RainboW-G15M-Q7 platform, following Items are required

- Ethernet connection
- CAN cable
- Wi-Fi Access point
- Blue tooth

5.2.1 Ethernet Test

- Connect the Ethernet cable and to enable the Ethernet device, execute the below command.

```
root@iWave-G15M ~$ifconfig eth0 up
```

- To set the IP address using DHCP, execute the below command.

```
root@iWave-G15M ~$udhcpc -i eth0
```

```
udhcpc (v1.20.2) started
```

```
Sending discover...
```

```
Sending select for *****...
```

```
Lease of ***** obtained, lease time 43200
```

```
Deleting routers
```

```
adding dns *****
```

```
adding dns *****
```

- To check the IP address set, execute the below command.

```
root@iWave-G15M ~$ifconfig
```

```
eth0  Link encap:Ethernet  HWaddr 00:01:02:03:04:05
```

```
inet addr:***** Bcast:***** Mask:255.255.255.0
```

```
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
```

```
RX packets:28783 errors:0 dropped:87 overruns:0 frame:0
```

```
TX packets:15286 errors:0 dropped:0 overruns:0 carrier:0
```

```
collisions:0 txqueuelen:1000
```

```
RX bytes:6218139 (5.9 MiB) TX bytes:4454482 (4.2 MiB)
```

- To test Ethernet, execute the below command.

```
root@iWave-G15M~$ping <any_ip_addr>
```

```
PING ***** (***** ) 56(84) bytes of data.
```

```
64 bytes from *****: icmp_seq=1 ttl=64 time=0.206 ms
```

```
64 bytes from *****: icmp_seq=2 ttl=64 time=0.160 ms
```

```
64 bytes from *****: icmp_seq=6 ttl=64 time=0.161 ms
```

Note: Please make sure the host has NFS server and TFTP server configuration. If not configured, please refer the section [APPENDIX B - TFTP & NFS server configuration](#).

5.2.1.1 File transfer using TFTP server

- To receive any file from TFTP server to iW-RainboW-G15M-Q7 platform, execute the below command

```
root@iWave-G15M~$tftp -g <server_ip> -r <file_name>
```

- To transmit any file from iW-RainboW-G15M-Q7 platform to TFTP server (host PC), execute the below command

```
root@iWave-G15M~$tftp -p <server_ip> -l <file_name>
```

5.2.1.2 Folder Mount from NFS

- To mount any folder from NFS server (Host PC) to iW-RainboW-G15M-Q7 platform, execute the below command

```
root@iWave-G15M~$mount -o nolock -t nfs <server_ip>:./<filepath> /mnt/floppy
```

- To view the NFS mounted files and folders, execute below command.

```
root@iWave-G15M~$ls /mnt/floppy/
```

5.2.2 Wi-Fi Test

- To insert the Wi-Fi driver module in kernel, execute below commands.

```
root@iWave-G15M~$insmod /iwtest/mlan.ko
```

```
root@iWave-G15M~$insmod /iwtest/sd8787.ko
```

- To check the Wi-Fi parameters and the wireless statistics, execute the below command.

```
root@iWave-G15M~$ iwconfig
```

```
lo      no wireless extensions.
```

```
can0    no wireless extensions.
```

```
can1    no wireless extensions.
```

```
eth0    no wireless extensions.
```

```
mlan0   IEEE 802.11-DS ESSID:"" Nickname:""
```

```
Mode:Managed Access Point: Not-Associated Bit Rate:1 Mb/s
```

```
Tx-Power=15 dBm
```

```
Retry limit:9 RTS thr=2347 B Fragment thr=2346 B
```

```
Encryption key:off
```

```
Power Management:on
```

```
Link Quality=0/5 Signal level=0 dBm Noise level=0 dBm
```

```
Rx invalid nwid:0 Rx invalid crypt:0 Rx invalid frag:3
```

```
Tx excessive retries:0 Invalid misc:0 Missed beacon:0
```

- To enable the Wi-Fi device, execute the below command.

```
root@iWave-G15M~$ifconfig mlan0 up
```

- To scan the available Wi-Fi access points and display in console, execute the below command.

```
root@iWave-G15M~$iwlist mlan0 scan
```

```
mlan0 Scan completed :
```

Cell 01 - Address: 00:24:01:F2:21:4F

ESSID:"*****" [2]

Mode:Master

Frequency=2.437 GHz (Channel 6)

Quality:1/5 Signal level:-88 dBm Noise level:-96 dBm

Encryption key:on

Bit Rates: 1 Mb/s; 2 Mb/s; 5.5 Mb/s; 11 Mb/s; 6 Mb/s

9 Mb/s; 12 Mb/s; 18 Mb/s; 24 Mb/s; 36 Mb/s

48 Mb/s; 54 Mb/s

Extra: Beacon interval=100

IE: IEEE 802.11i/WPA2 Version 1

Group Cipher : TKIP

Pairwise Ciphers (2) : CCMP TKIP

Authentication Suites (1) : PSK

IE: WPA Version 1

Group Cipher : TKIP

Pairwise Ciphers (2) : CCMP TKIP

Authentication Suites (1) : PSK

IE: Unknown:

DD180050F2020101070003A4000027A4000042435E0062322F00

IE: Unknown:

```
DD1E00904C334C101BFFFF000000000000000000000000000000000000000000000
```

IE: Unknown:

DD1A00904C34060019000

IE: Unknown: DD0900037F01010000FF7F

Extra:band=bg

- To select any one access point from the list and to set the password and ESSID for the Wi-Fi access point, execute the below command.

```
root@iWave-G15M~$iwpriv wlan0 passphrase "1;passphrase=<pass_phrase>"
root@iWave-G15M~$iwconfig wlan0 essid "<Access_point_name>"
```

- To set the IP address using DHCP, execute the below command.

```
root@iWave-G15M~$udhcpc -i wlan0
udhcpc (v1.20.2) started
Sending discover...
Sending select for *****...
Lease of ***** obtained, lease time 43200
Deleting routers
adding dns *****
adding dns *****
```

- To check the ip address of Wi-Fi access point, execute the below command.

```
root@iWave-G15M~$ifconfig
```

- To ping with another network device, execute the below command.

```
root@iWave-G15M~$ping <any_ip_addr>
```

Example

```
root@iWave-G15M~$ping *****
PING ***** (***** ) 56(84) bytes of data.
64 bytes from *****: icmp_seq=1 ttl=64 time=0.206 ms
64 bytes from *****: icmp_seq=2 ttl=64 time=0.160 ms
64 bytes from *****: icmp_seq=6 ttl=64 time=0.161 ms
```

5.2.3 CAN Test

To test the CAN interface, two CAN modules are required. Here two G15M platforms are used to test the CAN module.

Note: If customer uses their own CAN device with the G15M platform then user has to take care of the particular CAN device application part.

- Connect the iW-RainboW-G15M platform CAN port to another iW-RainboW-G15M-Q7 platform's CAN port (it may be either can0 or can1 port).

- Set the bitrate and enable the CAN device, execute the below command.

```
root@iWave-G15M~$ip link set <CAN_DEVICE> up type can bitrate <bitrate>
```

Note: The <CAN_DEVICE> is depends upon the CAN port you have connected with another platform. It may be can0 or can1.

- Here assume two G15M platforms name as G15M-A and G15M-B. Consider G15M-A will act as a transmitter and G15M-B will act as a receiver.
- To ensure the CAN network status, execute the below command.

```
root@iWave-G15M~$ifconfig
```

```
can0    Link encap:UNSPEC HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
```

```
UP RUNNING NOARP MTU:16 Metric:1
```

```
RX packets:2 errors:0 dropped:0 overruns:0 frame:0
```

```
TX packets:1 errors:0 dropped:0 overruns:0 carrier:0
```

```
collisions:0 txqueuelen:10
```

```
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
```

```
Interrupt:142
```

- To receive the data and display in console, execute the below command.

```
root@iWave-G15M~$cantest <candev_no>
```

```
read 16 bytes
```

```
3F [6] 11 22 33 44 55 66
```

Note: Before transmit the data, execute CAN receive command in receiver side.

- To transmit the data, execute the below command.

```
root@iWave-G15M~$cantest <candev_no> 123#AABBCCDD
```

- To disable the CAN modules, execute the below command.

```
root@iWave-G15M~$ifconfig <candev_no> down
```

- Repeat the above steps for different bitrates. The nominal bitrates and most used in automotive platforms are below,

33.333 kbps, 83.333 kbps, 100 kbps, 125 kbps, 250 kbps and 500kbps.

5.2.4 Bluetooth

- Connect the USB Bluetooth module and by execute below command to check the Bluetooth interface.

```
root@iWave-G15M~$hciconfig
hci0: Type: USB
BD Address: 00:15:83:15:A1:B9 ACL MTU: 672:4 SCO MTU: 48:1
UP RUNNING PSCAN ISCAN
RX bytes:4430 acl:60 sco:0 events:145 errors:0
TX bytes:3834 acl:62 sco:0 commands:54 errors:0
```

- To enable the interface, execute the below command
- To check the initialized or enabled Bluetooth devices, execute the below command and the debug messages as follows.

```
root@iWave-G15M~$hciconfig hci0 up piscan

root@iWave-G15M~$hcidtool dev
Devices:
hci0 00:15:83:15:A1:B9
```

- Scan the surrounding devices addresses and names, execute the below command and the debug messages as follows.

```
root@iWave-G15M~$hcidtool scan
Scanning ...
XX:XX:XX:XX:XX:XX XXXX
XX:XX:XX:XX:XX:XX XXXX
```

- Get surrounding devices addresses and classes by executing below command and the debug messages as follows.

```
root@iWave-G15M~$hcidtool inq
Inquiring ...
XX:XX:XX:XX:XX:XX clock offset: 0x6354 class: 0x5a0204
```

- To get the info about a scanned device, execute the below command and the debug messages as follows.

```
root@iWave-G15M~$hcidtool info <MACAddress>
Requesting information ...
BD Address: XX:XX:XX:XX:XX:XX
Device Name: XXXXX
```

*LMP Version: (0x4) LMP Subversion: 0x12e9
Manufacturer: XXXXXXXXXXXXXXXXXXXXXXXX
Features: 0xff 0xff 0x8f 0xfe 0x9b 0xff 0x59 0x83
<3-slot packets> <5-slot packets> <encryption> <slot offset>
<3-slot EDR eSCO> <extended inquiry> <extended features>
Extended features: 1 pages*

- Pinging the scanned devices, execute the below command.

*root@iWave-G15M~\$!2ping <device MAC address>
Ping: XX:XX:XX:XX:XX:XX from 00:15:83:15:A1:B9 (data size 44) ...
4 bytes from XX:XX:XX:XX:XX:XX id 0 time 9.69ms
4 bytes from XX:XX:XX:XX:XX:XX id 1 time 19.66ms
4 bytes from XX:XX:XX:XX:XX:XX id 2 time 49.98ms*

5.3 Display Devices Test

The iW-RainboW-G15M-Q7 platform will support the below display devices.

- HDMI (up to 1080p)
- LCD (LVDS - 0)
- Quad display
- PWM

Testing device Requirements

To test the display devices supported by iW-RainboW-G15M-Q7 platform, following Items are required.

- HDMI Monitor with cable.
- Quad display setup in case of Quad display testing.

5.3.1 LCD Back light Testing

- The LCD back light has been controlled using PWM.
- To see the actual brightness set, execute below command.

root@iWave-G15M~/\$cat /sys/class/backlight/pwm-backlight.1/brightness

- To see the max brightness that can be set, execute below command.

root@iWave-G15M~/\$cat /sys/class/backlight/pwm-backlight.1/max_brightness

- To change the brightness, execute below command.

root@iWave-G15M~/\$echo 100 > /sys/class/backlight/pwm-backlight.1/brightness

- Observe the LCD backlight brightness for different values.

5.3.2 LCD Test

- LCD is the default enabled display.
- To change the directory to “iwtest” folder, execute the below command.

```
root@iWave-G15M~/$cd /iwtest/
```

- Dump the image on LCD frame buffer.

```
root@iWave-G15M/iwtest~$cat <image name>.bin > /dev/fb0
```

Example

```
root@iWave-G15M~$cat LCD1.bin > /dev/fb0
```

- Image will be displayed on the LCD as shown in figure below.

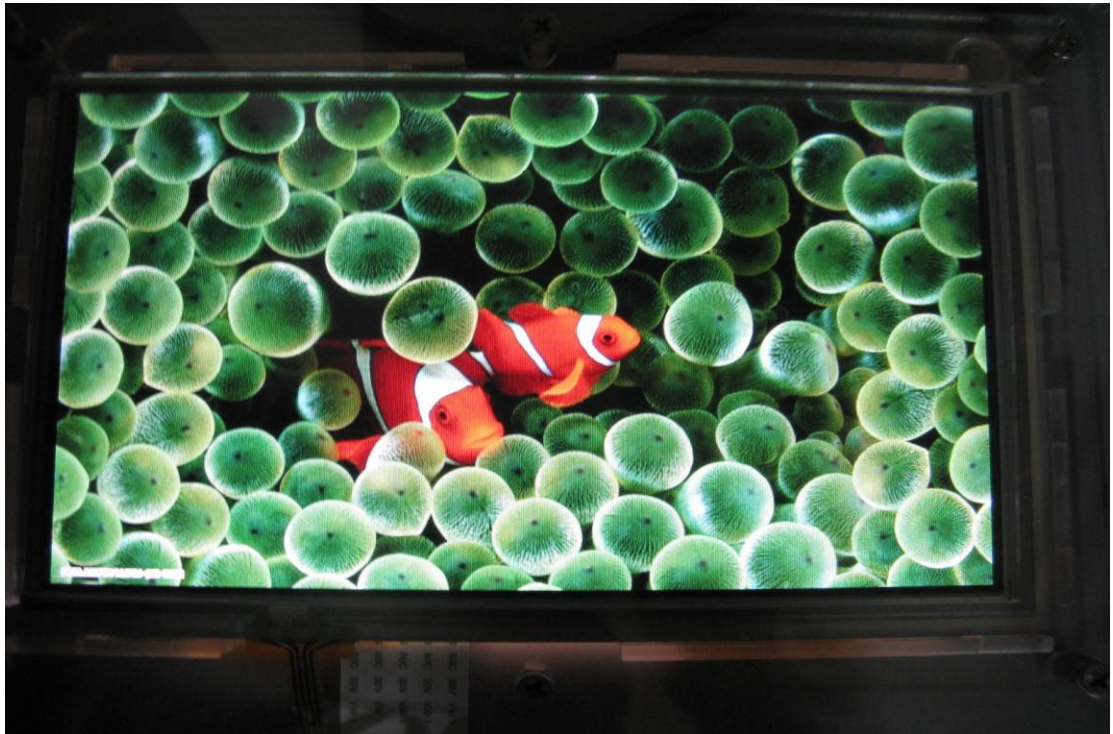


Figure 15: LCD Image Dump

- To change the directory to “root” folder, execute the below command.

```
root@iWave-G15M~/$cd /root/
```

5.3.3 HDMI Test

- The HDMI supported resolutions are,
640x480p, 720x480p, 1280x720p, 1920x1080p
- And the tested resolutions are,
1280x720p, 1920x1080p

Note: HDMI Monitor should support the standard HDMI resolution set. If not the images/logo will not be displayed properly.

5.3.4 1080p Resolution

- 1080p (1920x1080) is the default HDMI resolution. If it is not set to 1080p resolution, refer [HDMI and LCD settings](#) section.
- Change the directory to “iwtest” folder and to enable the HDMI frame buffer, execute the below commands respectively.

```
root@iWave-G15M~/$cd /iwtest/
```

```
root@iWave-G15M/iwtest~$echo 0 > /sys/class/graphics/fb2/blank
```

- To ensure the HDMI resolution is 1080p, execute the below command.

```
root@iWave-G15M/iwtest~$cat /sys/class/graphics/fb2/mode
```

- Dump the image on HDMI frame buffer

```
root@iWave-G15M/iwtest~$cat <image name>.bin > /dev/fb2
```

Example

```
root@iWave-G15M/iwtest~$cat 1080p1.bin > /dev/fb2
```

- Image will be displayed on the HDMI as shown below.



Figure 16: HDMI 1080p Image

- To change the directory to “root” folder, execute the below command.

```
root@iWave-G15M/iwtest~$cd /root/
```

5.3.5 720p Resolution

- 1080p (1920x1080) is the default HDMI resolution. To change the HDMI resolution to 720p, refer the [HDMI and LCD settings](#) section.
- To change the directory to “iwtest” folder and to enable the HDMI frame buffer, execute the below commands respectively.

```
root@iWave-G15M~/iwtest~$cd /iwtest/
```

```
root@iWave-G15M/iwtest~$echo 0 > /sys/class/graphics/fb2/blank
```

- To ensure the HDMI resolution is 720p, execute below command.

```
root@iWave-G15M/iwtest~$cat /sys/class/graphics/fb2/mode
```

- Dump the image on HDMI frame buffer

```
root@iWave-G15M/iwtest~$cat <image name>.bin > /dev/fb2
```

Example

```
root@iWave-G15M/iwtest~$cat 720p1.bin > /dev/fb2
```

- Image will be displayed on the HDMI as shown below.



Figure 17: HDMI 720p Image

- To change the directory to “root” folder, execute the below command.

```
root@iWave-G15M~/$cd /root/
```

5.3.6 Quad display testing

Note: Quad display demo need additional hardware setup. This Quad display hardware setup is not included in this default hardware shipment. But this special feature is tested and BSP support is available for customers on need basis. Please contact iWave sales team (mktg@iwavesystems.com) for more details and to get support on this special Feature.

Note: iMx6 Quad core and Dual processors only support Quad display.

- The default display's resolutions are as below.

Frame Buffer 0 – LVDS1 - WVGA (800x480)

Frame Buffer 2 – HDMI - 1080p (1920x1080)

Frame Buffer 4 – LVDS2 - SVGA (800x600)

Frame Buffer 5 – Parallel Display - WVGA (800x480)

- To change the brightness, execute the below command.

```
root@iWave-G15M~/$echo 255 > /sys/class/backlight/pwm-backlight.1/brightness
```


- To change the directory to “iwtest” folder and to enable the frame buffers, execute the below command.

```
root@iWave-G15M~/$cd /iwtest/  
root@iWave-G15M/iwtest~$echo 0 > /sys/class/graphics/fb5/blank  
root@iWave-G15M/iwtest~$echo 0 > /sys/class/graphics/fb4/blank  
root@iWave-G15M/iwtest~$echo 0 > /sys/class/graphics/fb2/blank
```

- To ensure the display’s resolution, execute below command.

```
root@iWave-G15M/iwtest~$cat /sys/class/graphics/fb5/mode  
root@iWave-G15M/iwtest~$cat /sys/class/graphics/fb4/mode  
root@iWave-G15M/iwtest~$cat /sys/class/graphics/fb2/mode  
root@iWave-G15M/iwtest~$cat /sys/class/graphics/fb0/mode
```

- Dump the image on the frame buffers

```
root@iWave-G15M/iwtest~$cat <image name>.bin > /dev/fbX
```

Example

```
root@iWave-G15M/iwtest~$cat LCD1.bin > /dev/fb0  
root@iWave-G15M/iwtest~$cat 1080p1.bin > /dev/fb2  
root@iWave-G15M/iwtest~$cat svga1.bin > /dev/fb4  
root@iWave-G15M/iwtest~$ cat LCD2.bin > /dev/fb5
```

- To change the directory to “root” folder, execute the below command.

```
root@iWave-G15M/iwtest~$cd /root/
```

5.4 HID Devices Test

The iW-RainboW-G15M-Q7 platform will support the below Human Interface devices.

- USB HID devices
- Touch screen

Testing device Requirements

To test the Human Interface Devices supported by iW-RainboW-G15M-Q7 platform, following Items are required.

- USB mouse and keyboard.

Note: Detection only supported in USB HID devices (mouse / Keyboard) in the Linux level.

5.4.1 USB HID devices

5.4.1.1 Mouse

- Insert the USB Mouse in iW-RainboW-G15M-Q7 platform USB slot. The following message will be displayed in command prompt.

```
usb 2-1.1: new low speed USB device number 4 using fsl-ehci
input: Logitech USB Optical Mouse as /devices/platform/fsl-ehci.1/usb2/2-1/2-1.1/2-1.1:1.0/input/input2
generic-usb 0003:046D:C05A.0002: input,hidraw0: USB HID v1.11 Mouse [Logitech USB Optical Mouse] on usb-fsl-ehci.1-1.1/input0
```

5.4.1.2 Keyboard

- Insert the USB Keyboard in iW-RainboW-G15M-Q7 platform USB slot. The following message will be displayed in command prompt.

```
usb 2-1.1: new low speed USB device number 5 using fsl-ehci
input: Dell Dell USB Keyboard as /devices/platform/fsl-ehci.1/usb2/2-1/2-1.1/2-1.1:1.0/input/input3
generic-usb 0003:413C:2003.0003: input,hidraw0: USB HID v1.10 Keyboard [Dell Dell USB Keyboard] on usb-fsl-ehci.1-1.1/input0
```

5.4.2 Capacitive Touch Screen Test

- To calibrate the touch and know the information about the touch device, execute the below command.

```
root@iWave-G15M~$cat /proc/bus/input/devices
I: Bus=0018 Vendor=0000 Product=0000 Version=0000
N: Name="EP0700M06"
P: Phys=
S: Sysfs=/devices/platform/imx-i2c.0/i2c-0/0-0038/input/input0
U: Uniq=
H: Handlers=event0
B: PROP=0
B: EV=b
B: KEY=400 0 0 0 0 0 0 0 0 0
B: ABS=2618000 3
```


Note: In the above log touch device is detected as input0 indicated in bold. So in the script file “export TSLIB_TSDEVICE” is modified as shown below.

```
root@iWave-G15M~$export TSLIB_TSDEVICE=/dev/input/event0
```

5.4.2.1 Touch Calibration

- To execute the touch calibration, execute the below command.

```
root@iWave-G15M/$ts_calibrate
```

- Calibrate the touch screen by touching the cross hairs precisely.

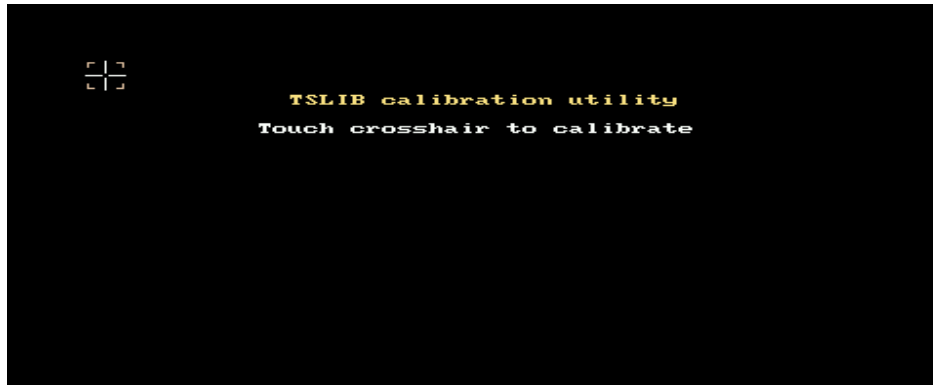


Figure 18: Touch screen calibration window

5.4.2.2 Touch Test

- To execute the touch test, execute the below command.

```
root@iWave-G15M/$ts_test
```

- Touch screen test application will launch automatically.

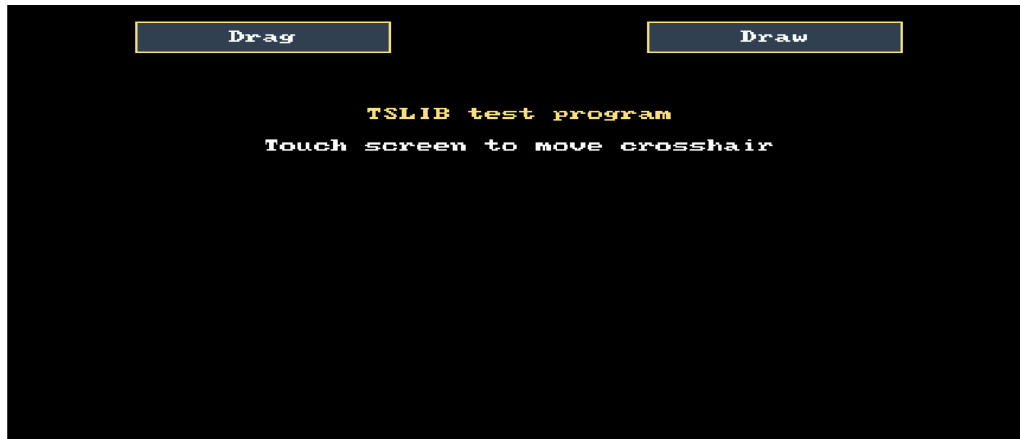


Figure 19: Touch screen test application

- Select “Draw” option and draw a line on LCD using stylus.
- To clear the screen, just touch on the draw box.
- To exit from this test case, press ctrl+‘c’.

Note: If the touch is not calibrated properly, the wrong touch screen values will be displayed in command prompt and touch test will not work properly.

5.4.3 Resistive Touch Screen Test

- To calibrate the touch and know the information about the touch device, execute the below command.

```
root@iWave-G15M~$cat /proc/bus/input/devices
I: Bus=0018 Vendor=0000 Product=0000 Version=0000
N: Name="max11801_ts"
P: Phys=
S: Sysfs=/devices/platform/imx-i2c.0/i2c-0/0-0049/input/input0
U: Uniq=
H: Handlers=mouse0 event0
B: PROP=0
B: EV=b
B: KEY=400 0 0 0 0 0 0 0 0 0
B: ABS=1000003
```

Note: In the above log touch device is detected as input0 indicated in bold. So in the script file “export TSLIB_TSDEVICE” is modified as shown below.

```
root@iWave-G15M~$export TSLIB_TSDEVICE=/dev/input/event0
```

Note: The resistive touch tested rootfs cannot be used to test the capacitive touch.

5.4.3.1 Touch Calibration

- To execute the touch calibration, execute the below command.

```
root@iWave-G15M/$cd /iwtest
```

```
root@iWave-G15M/iwtest~$./mx6q_touch_calibrate.sh
```

- Calibrate the touch screen by touching the cross hairs precisely

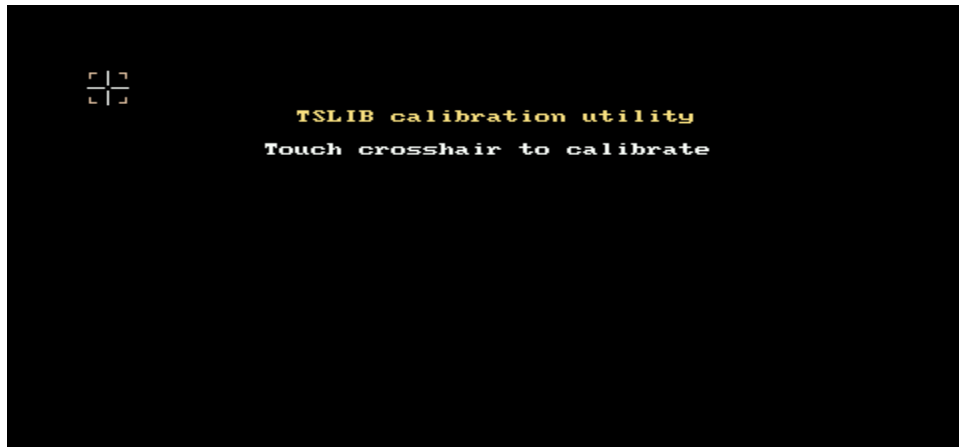


Figure 20: Touch screen calibration window

5.4.3.2 Touch Test

- To execute the touch test, execute the below command.

```
root@iWave-G15M/$cd /iwtest
```

```
root@iWave-G15M/iwtest~$./mx6q_touch_test.sh
```

- Touch screen test application will launch automatically.

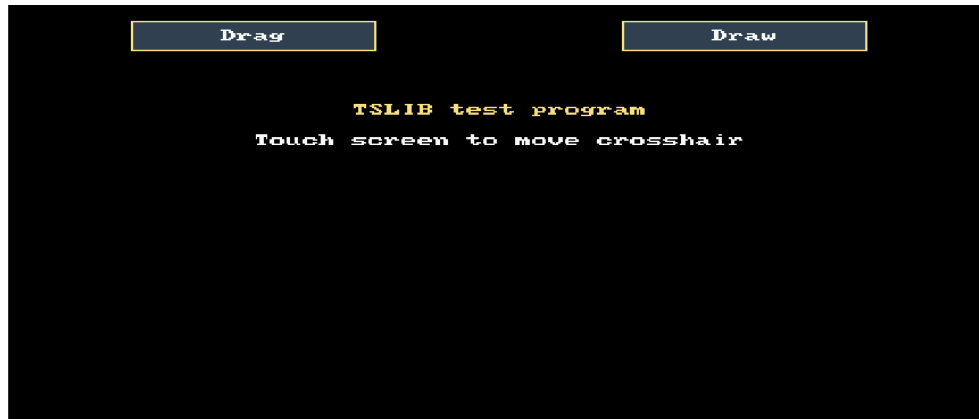


Figure 21: Touch screen test application

- Select “Draw” option and draw a line on LCD using stylus.
- To clear the screen, just touch on the draw box.
- To exit from this test case, press ctrl+‘c’.

5.5 UART Test

- Connect the iW-RainboW-G15M-Q7 platform’s data UART port with another serial port of host PC using serial cable.
- The supported UART devices and its nodes are listed below,

UART 1(debug) - /dev/ttymxc1

UART 2 - /dev/ttymxc2

UART 4 - /dev/ttymxc4

- In case of data UART, Open another UART console in host PC and set the serial port settings as mentioned below.

Bits per second: 9600 bps

Data bits: 8

Parity: none

Stop bits: 1

Flow control: none

- To transmit data through the UART, execute the below command.

root@iWave-G15M/\$echo “uart_test_mesage” > /dev/<node>

Example

```
root@iWave-G15M/$ echo iW-RainboW-G15M > /dev/ttyxc2
```

- To receive the data by UART, execute the below command.

```
root@iWave-G15M/$ cat /dev/<node>
```

Example

```
root@iWave-G15M/$ cat /dev/ttyxc2
```

Note: The default UART baud rate is 9600bps.

5.6 PCIe Device Test

- Connect the PCIe device in iW-RainboW-G15M-Q7 platform before powering ON.
- To list out the PCIe device, connected with board, execute the below command.

```
root@iWave-G15M/$ lspci
00:00.0 Class 0604: 16c3:abcd
01:00.0 Class 0280: 1814:3090
```

5.7 RTC Test

- To list out the date options, execute the below command.

```
root@iWave-G15M/$ date --help
BusyBox v1.20.2 () multi-call binary.
Usage: date [OPTIONS] [+FMT] [TIME]
Display time (using +FMT), or set time
[-s,--set] TIME Set time to TIME
-u,--utc      Work in UTC (don't convert to local time)
-R,--rfc-2822 Output RFC-2822 compliant date string
-l[SPEC]      Output ISO-8601 compliant date string
               SPEC='date' (default) for date only,
               'hours', 'minutes', or 'seconds' for date and
               time to the indicated precision
-r,--reference FILE Display last modification time of FILE
-d,--date TIME Display TIME, not 'now'
-D FMT        Use FMT for -d TIME conversion
Recognized TIME formats:
hh:mm[:ss]
[YYYY.]MM.DD-hh:mm[:ss]
```

YYYY-MM-DD hh:mm[:ss]

[[[[[YY]YY]MM]DD]hh]mm[:ss]

'date TIME' form accepts MMDDhhmm[[YY]YY][:ss] instead

- To view the date, execute the below command.

```
root@iWave-G15M/$date -R
```

Tue, 27 Nov 2012 02:30:58 +0000

- To set the date and time, execute the below command.

```
root@iWave-G15M/$date -s
```

Example

```
root@iWave-G15M/$date -s 2012.11.27-02:30:45
```

- To update the set date and time into hardware clock, execute the below command.

```
root@iWave-G15M/$hwclock -w
```

5.8 WDOG timer Test

- To list out the options, execute the below command.

```
root@iWave-G15M/$cd /unit_tests
```

```
root@iWave-G15M/$./wdt_driver_test.out
```

- To test execute the below command and the platform will reset after cancelling the application.

```
root@iWave-G15M/$./wdt_driver_test.out <timeout> <sleep> <test>
```

Example

```
root@iWave-G15M/$./wdt_driver_test.out 2 1 0
```

5.9 Sensors Test

The iW-RainboW-G15M-Q7 platform will support the below sensor devices.

- Light sensor
- Magneto meter (e-compass)
- Accelerometer
- Barometer
- To test the Light sensor execute the below command.

```
root@iWave-G15M/$cd /iwtest/
```

```
root@iWave-G15M/$./rainbow_lightsensor.out
```

- To test the magneto meter execute the below command.

```
root@iWave-G15M/$../rainbow\_magnetometer.out
```

- To test the accelerometer execute the below command.

```
root@iWave-G15M/$../rainbow\_accelerometer.out
```

- To test the barometer execute the below command.

```
root@iWave-G15M/$../rainbow\_barometer.out
```

5.10 Multimedia Test

The iW-RainboW-G15M-Q7 platform will support the below audio and video devices.

- Camera
- TV-IN Analog decoder
- AC97 Audio
- HDMI audio
- Gstreamer package to play video/audio files
- VPU Test

Testing device Requirements

To test Multimedia devices supported by iW-RainboW-G15M-Q7 platform, following Items are required:

- HMDI monitor.
- Head Phone with Mic.

5.10.1 Camera Test

- The CMOS and MIPI are the camera interfaces will be detected in below nodes.

```
CMOS \(Optional\) - /dev/video0
```

```
MIPI - /dev/video1
```

Note: Refer the section [Optional features settings](#) to add the CMOS camera support.

- To list out the available options in overlay application, execute the below command.

```
root@iWave-G15M/$.cd /unit\_tests
```

```
root@iWave-G15M/unit_tests~$../mxc\_v4l2\_overlay.out -help
```

- To test the overlay application, execute the below command.

```
root@iWave-G15M/unit_tests~$../mxc\_v4l2\_overlay.out -ow <output width> -oh <output height> -di <video device>
```

Example

```
root@iWave-G15M/unit_tests~$./mxc_v4l2_overlay.out -ow 800 -oh 480 -di  
/dev/video1
```

- To test the capture application, execute the below command.

```
root@iWave-G15M/unit_tests~$./mxc_v4l2_capture.out -ow <output width> -oh <  
output height> -d <video device> -c <no of frames> <YUV file>
```

Example

```
root@iWave-G15M/unit_tests~$./ mxc_v4l2_capture.out -ow 800 -oh 480 -d  
/dev/video1 -c 10 test.yuv
```

- To display the captured file, execute the below command.

```
root@iWave-G15M/unit_tests~$./mxc_v4l2_output.out -iw <input width> -ih <input  
height> <YUV file>
```

Example

```
root@iWave-G15M/unit_tests~$./ mxc_v4l2_output.out -iw 800 -ih 480 test.yuv
```

5.10.2 TV-IN Analog decoder

- TV-IN analog decoder will be detected in below node.

```
TVIN Analog decoder - /dev/video0
```

- To list out the available options in tvin application, execute the below command.

```
root@iWave-G15M/$cd /unit_tests  
root@iWave-G15M/unit_tests~$./mxc_v4l2_tvin.out -help
```

- To test the overlay application with interlace format, execute the below command.

```
root@iWave-G15M/unit_tests~$./mxc_v4l2_tvin.out -ow <output width> -oh <output  
height> -vm <video mode>
```

Example

```
root@iWave-G15M/unit_tests~$./mxc_v4l2_tvin.out -ow 800 -oh 480 -vm 0
```

- To test the overlay application with de-interlace format, execute the below command.

```
root@iWave-G15M/unit_tests~$./mxc_v4l2_tvin.out -ow <output width> -oh <output  
height> -vm <video mode>
```

Example

```
root@iWave-G15M/unit_tests~$./mxc_v4l2_tvin.out -ow 800 -oh 480 -vm 1
```

- To test the capture application with PAL standard input, execute the below command.

```
root@iWave-G15M/unit_tests~$./mxc_v4l2_capture.out -iw <input width> -ow <output  
width> -oh <output height> -d <device> -c <no of frames> <YUV file>
```


Example

```
root@iWave-G15M/unit_tests~$ ./mxc_v4l2_capture.out -iw 720 -ih 576 -ow 720 -oh 576 -d /dev/video0 -i 2 -c 100 test.yuv
```

- To display the captured file for PAL standard, execute the below command.

```
root@iWave-G15M/unit_tests~$ ./mxc_v4l2_output.out -iw <input width> -ih <input height> <YUV file>
```

Example

```
root@iWave-G15M/unit_tests~$ ./mxc_v4l2_output.out -iw 720 -ih 576 -c 100 test.yuv
```

- To test the capture application with NTSC standard input, execute the below command.

```
root@iWave-G15M/unit_tests~$ ./mxc_v4l2_capture.out -iw <input width> -ow <output width> -oh <output height> -d <device> -t <capture top> -c <no of frames> <YUV file>
```

Example

```
root@iWave-G15M/unit_tests~$ ./mxc_v4l2_capture.out -iw 720 -ih 480 -ow 720 -oh 480 -d /dev/video0 -t 3 -i 2 -c 100 test.yuv
```

- To display the captured file for NTSC standard, execute the below command.

```
root@iWave-G15M/unit_tests~$ ./mxc_v4l2_output.out -iw <input width> -ih <input height> <YUV file>
```

Example

```
root@iWave-G15M/unit_tests~$ ./mxc_v4l2_output.out -iw 720 -ih 480 -c 100 test.yuv
```

5.10.3 Audio Test

Note: AC97 Audio In/Out feature source is not included in this default BSP release. But this special feature is tested and BSP support is available for customers on need basis. Please contact iWave support team (support.ip@iwavesystems.com) for more details and to get support on this special Feature.

- To insert the AC97 audio module, execute the below command.

```
root@iWave-G15M/$cd /iwtest
```

```
root@iWave-G15M/iwtest~$insmod imx-ssi.ko
```

```
root@iWave-G15M/iwtest~$insmod snd-soc-rt5610.ko
```

```
root@iWave-G15M/iwtest~$insmod snd-soc-imx-mx2.ko
```

```
root@iWave-G15M/iwtest~$insmod snd-soc-imx-3stack-rt5610.ko
```

- To list the available audio interfaces, execute the below command.

```
root@iWave-G15M~$aplay -l
```

- The registered audio interfaces will be displayed on terminal as shown below,

```
**** List of PLAYBACK Hardware Devices ****
```

```
card 0: Dummy [Dummy], device 0: Dummy PCM [Dummy PCM]
```

```
Subdevices: 8/8
```

```
Subdevice #0: subdevice #0
```

```
Subdevice #1: subdevice #1
```

```
Subdevice #2: subdevice #2
```

```
Subdevice #3: subdevice #3
```

```
Subdevice #4: subdevice #4
```

```
Subdevice #5: subdevice #5
```

```
Subdevice #6: subdevice #6
```

```
Subdevice #7: subdevice #7
```

```
card 1: imxhdmisoc [imx-hdmi-soc], device 0: IMX HDMI TX mxc-hdmi-soc-0 []
```

```
Subdevices: 1/1
```

```
Subdevice #0: subdevice #0
```

```
card 2: rt5610audio [rt5610-audio], device 0: rt5610 HIFI rt5610-hifi-0 []
```

```
Subdevices: 1/1
```

```
Subdevice #0: subdevice #0
```

- To play an audio file, execute the below command.

```
root@iWave-G15M~$aplay -D plughw:<card>,<subdevice> /<path to audio  
file>/<audiofile_name>
```

Example

```
root@iWave-G15M~$aplay -D plughw:2,0 /unit_tests/audio8k16S.wav
```

- To record an audio file, execute the below command.

```
root@iWave-G15M~$arecord -D plughw:<card>,<subdevice> -d <duration in sec>  
/<path to audio file>/<audiofile_name>
```

Example

```
root@iWave-G15M~$arecord -D plughw:2,0 -d 10 /unit_tests/test.wav
```

5.10.4 Gstreamer

- To play a video/audio file using gplay, execute the below command.

```
root@iWave-G15M~$gplay /<path to file>/<file_name>
```

Example

```
root@iWave-G15M~$gplay /iwtest/tfr.mp4
```

Note: In gplay, the video/audio files will be played on the default display/audio device only.

- To list the available plug-ins, execute the below command.

```
root@iWave-G15M~$gst-inspect
```

- To play a video file using a particular audio and video device, execute the below command.

```
root@iWave-G15M~$gst-launch playbin2 uri=file:///<video file> audio-sink="alsasink
device=plughw:<card>,<subdevice>" video-sink="mf_w_v4lsink device=/dev/<video
device>"
```

Example

```
root@iWave-G15M~$gst-launch playbin2 uri=file:///iwtest/fast.mov audio-
sink="alsasink device=plughw:1,0" video-sink="mf_w_v4lsink device=/dev/video19"
```

- To play an audio file using a particular audio device, execute the below command.

```
root@iWave-G15M~$gst-launch playbin2 uri=file:///<audio file> audio-sink="alsasink
device=plughw:<card>,<subdevice>"
```

Example

```
root@iWave-G15M~$gst-launch playbin2 uri=file:///unit_tests/audio8k16S.wav audio-
sink="alsasink device=plughw:1,0"
```

5.10.5 VPU Test

- The iW-RainboW-G15M platform will support the following hardware encoder and decoder formats.

Table 1: Codec list

Encoder	Decoder
mpeg4	MJPEG, mpeg2
H.263	mpeg4, VC1
H.264	RV8/9/10, DIVX
MJPEG	H.264, H.263
	VP8, AVS

5.10.5.1 Encoder

- To list out the available options in vpu application, execute the below command.

```
root@iWave-G15M~$ /unit_tests/mxc_vpu_test.out -H
```

- To encode the frames, execute the below command.

```
root@iWave-G15M~$ /unit_tests/mxc_vpu_test.out -E "-o <file_name> -f <format> -c  
<count_value> -w <capture_width> -h <capture_height> -b <bitrate>"
```

Example

```
root@iWave-G15M~$ /unit_tests/mxc_vpu_test.out -E "-o test.mpeg4 -f 0 -c 200 -w 720  
-h 480 -b 4096"
```

- Repeat the above steps to encode the different types of Encoder formats.

5.10.5.2 Decoder

- To list out the available options in vpu application, execute the below command.

```
root@iWave-G15M~$ /unit_tests/mxc_vpu_test.out -H
```

- To decode the frames, execute the below command.

```
root@freyscale~$ /unit_tests/mxc_vpu_test.out -D "-i <file_name> -f <format> -c  
<count_value> -w <captured_width> -h <captured_height>"
```

Example

```
root@freyscale~$ /unit_tests/mxc_vpu_test.out -D "-i test.mpeg4 -f 0 -c 200 -w 720 -h  
480"
```

- Repeat the above steps to decode the different types of Decoder formats.

5.10.6 GPU Test

- The i.MX6 Processors supports OpenGL ES. To test GPU ,execute the below command

```
root@iWave-G15M~$ /opt/viv_samples/tiger/tiger
```

```
root@iWave-G15M~$ /opt/viv_samples/es20/vv_launcher/vv_launcher
```

6 APPENDIX A - PROXY SETTING

- The Ubuntu package manager requires network access to download packages.
- If the Ubuntu host is on a network that requires a network proxy, this can be configured in the Gnome menu option "System -> Preferences -> Network Proxy" as shown in below.

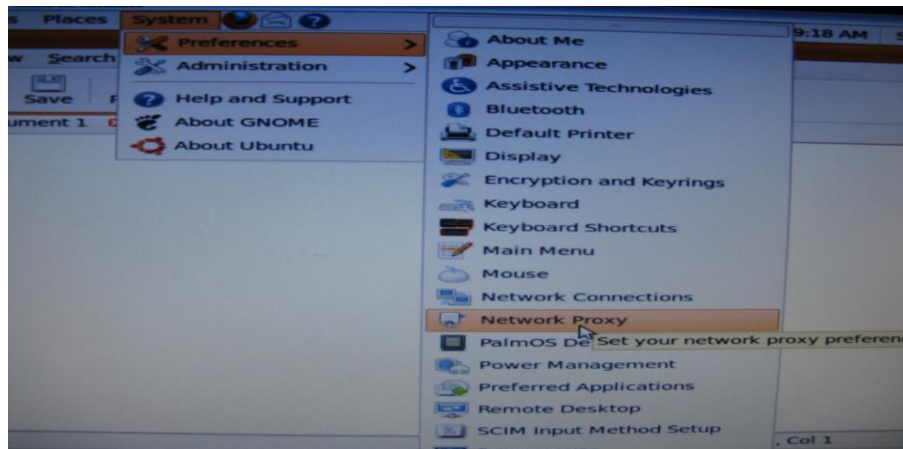


Figure 22: Network Proxy

- Once the settings are filled in, click on the "Apply System Wide" button.

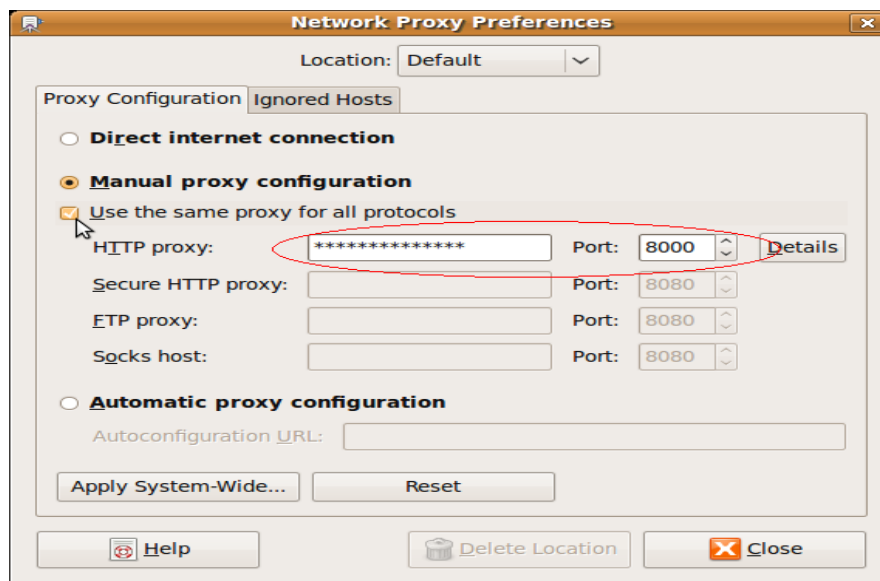


Figure 23: Network Proxy Settings

- Close all the old terminal windows and open a new terminal window to get the new values.
- To check the settings, execute the below command.

```
user@ubuntu:~$ env | grep proxy  
http_proxy=http://example:8000/  
ftp_proxy=ftp://example:8000/  
https_proxy=https://example:8000
```

7 APPENDIX B - TFTP & NFS SERVER CONFIGURATION

This section describes to setup a TFTP server and NFS server Ubuntu Linux distributions.

- The following host pc setup is required only once per host.
- Install the nfs-kernel-server, tftpd and xinetd

```
$sudo apt-get install nfs-kernel-server xinetd tftpd tftp -y
```

7.1 TFTP server

- Create the tftp configuration file and insert the following content.

```
$sudo nano /etc/xinetd.d/tftp  
service tftp  
{  
protocol = udp  
prot = 69  
socket_type = dgram  
wait= yes  
user = <user_name>  
server = /usr/sbin/in.tftpd  
server_args = /tftpboot -s  
disable = no  
}
```

Example

```
service tftp  
{  
protocol = udp  
prot = 69  
socket_type = dgram  
wait = yes  
user = iwave  
server = /usr/sbin/in.tftpd  
server_args = /tftpboot -s  
disable = no  
}
```

- Change the ownership of the directory.

```
$ sudo mkdir /tftpboot
```

```
$ sudo chmod -R 777 /tftpboot
```

```
$ sudo chown -R <user_name>:<user_name> /tftpboot
```

- Start the tftp services,

```
$ sudo service xinetd stop
```

```
$ sudo service xinetd start
```

- Verify the TFTP is running correctly or not

```
$ netstat -na | grep LIST | grep 22
```

7.2 NFS

- Open file /etc/exports by below comment

```
$ sudo vim /etc/exports
```

- Insert the following line in /etc/exports file

```
<path to rootfs> *(rw, sync, no_root_squash)
```

Example

```
/home/iwave/LTIB_iMX6/ltib/rootfs *(rw, sync, no_root_squash)
```

- If you change this configuration file, you have to restart the NFS server:

```
$ sudo /etc/init.d/nfs-kernel-server stop
```

```
$ sudo /etc/init.d/nfs-kernel-server restart
```


8 APPENDIX C – APPLICATION COMPILATION

Application compilation for iW-RainboW G115M platform

To run any application in the G15M platform, it is necessary to compile the application with G15M cross-compiler.

- Create one application called test.c
- Execute the following command to compile the test application in your host.

```
$/opt/freescale/usr/local/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12/fsl-linaro-toolchain/bin/arm-none-linux-gnueabi-gcc -o test.out Test.c
```
- It will create a binary file with the name of test.out
- Copy it into root folder in the micro SD rootfs.
- To run the test.out application in the G15D platform, execute the following command.

```
root@iWave-G15M~$./test.out
```

9 APPENDIX D – LTIB PACKAGE SELECTION

iW-RainboW-G15M-Q7 platform's BSP comes with necessary file systems. This section explains how to include any package into the rootfs.

- Enter into the ltib folder.

```
host@host~$cd <path_to_ltib_folder>/ltib
```

- Execute the following command to enter into the ltib configuration menu as shown below.

```
host@host/<path_to_ltib_folder>/ltib~$ ./ltib -c
```

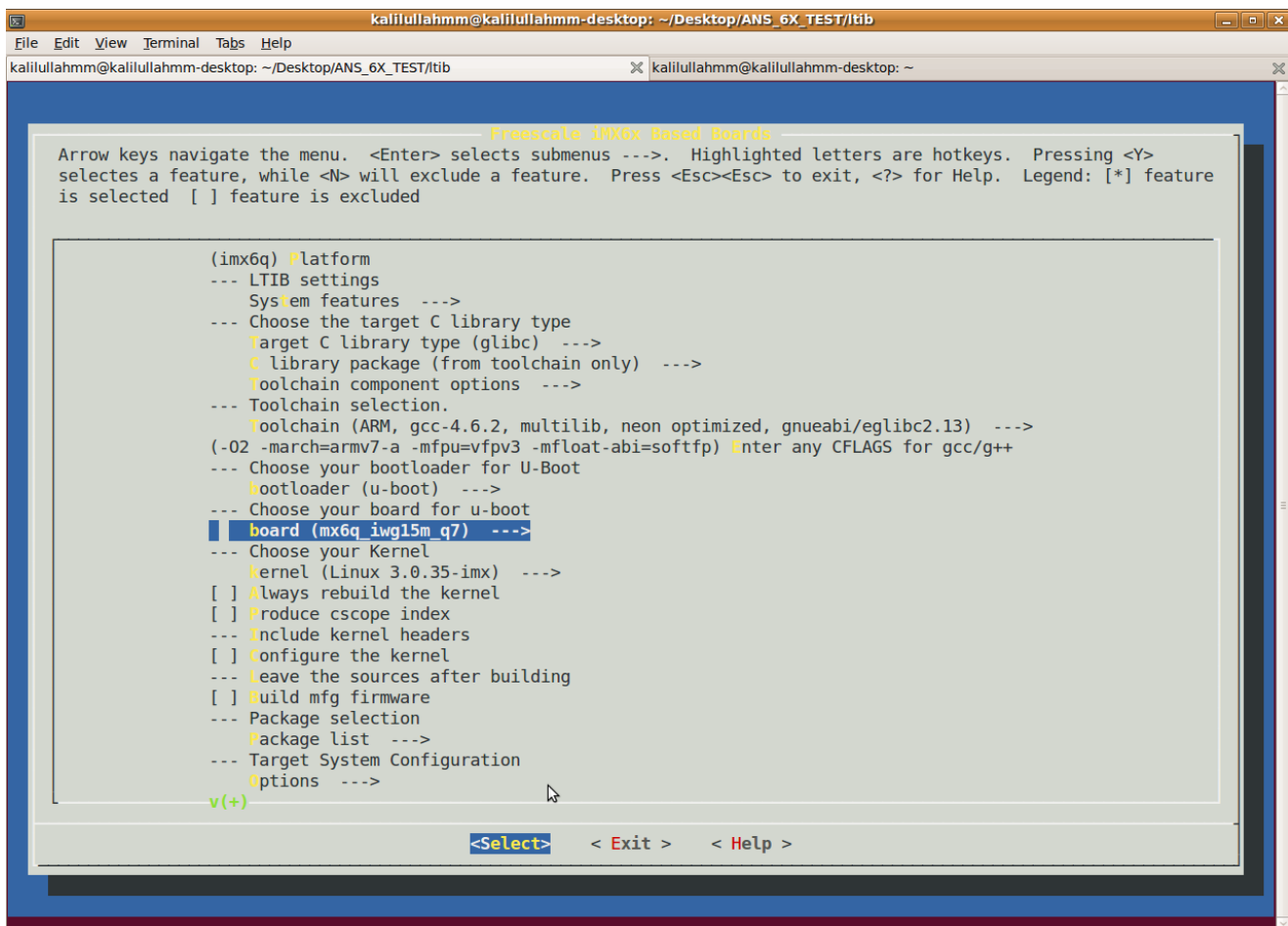


Figure 24: LTIB menu

- To select the package hit “space bar”. Select any one package from the list as shown below.

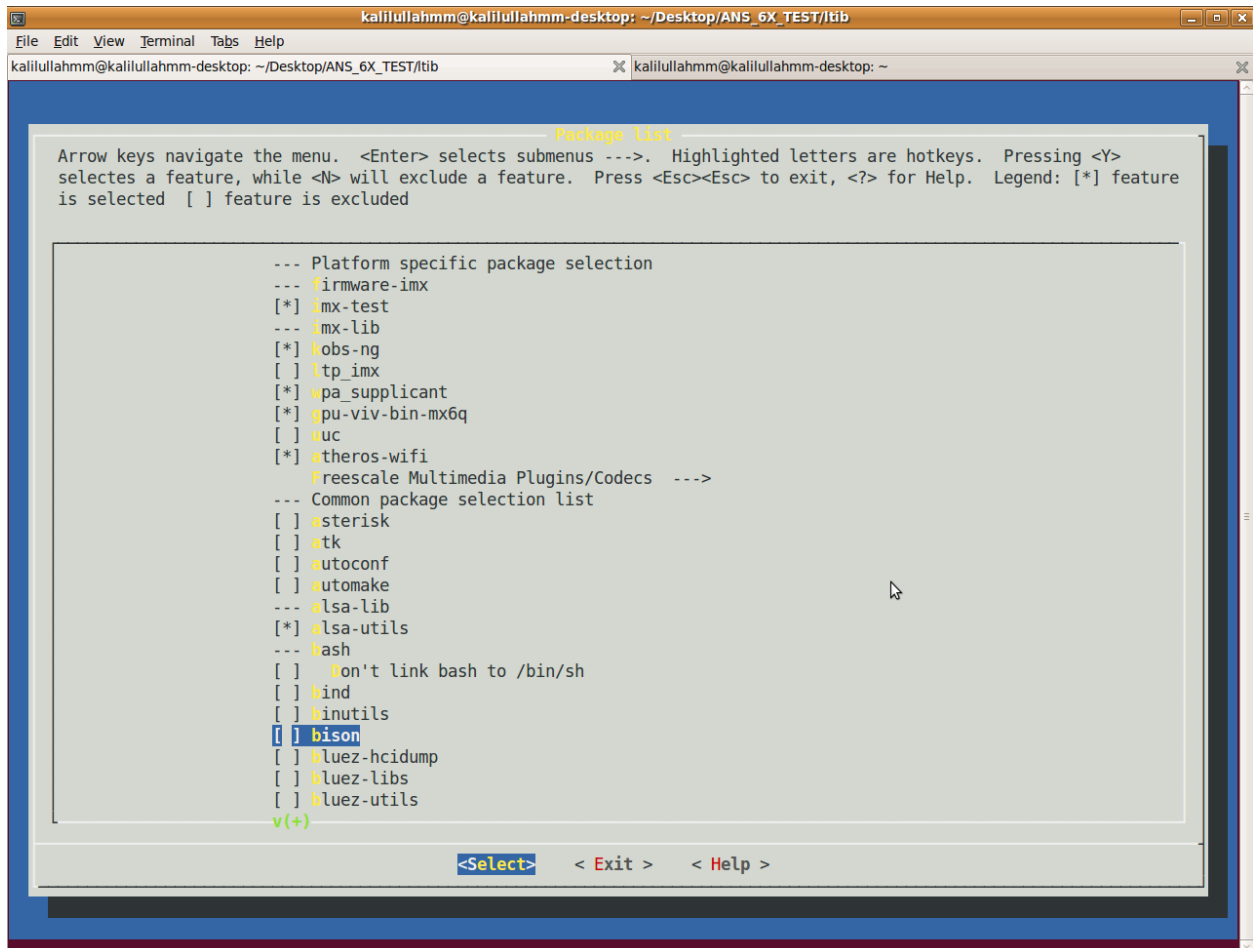


Figure 25: LTIB packages selection

- Select Exit to save the configuration. And the selected package will be built.

10 APPENDIX E - MANUAL BINARY PROGRAMMING

This section explains the step by step procedure to flash the binaries into micro SD card manually.

10.1 SD card partition

Note: Refer this section, if a New Micro SD card is using or the iWave provided SD card is corrupted.

This chapter describes the steps to prepare an SD/MMC card to boot the iW-RainboW-G15M-Q7 platform.

- Insert SD card using SD card reader to the PC. Execute mount command to see the attached nodes and mount points.

\$mount

- SD card may attach to the dev nodes either sdb/sdc/sdd/sde. Assume the SD card is attached to /dev/sdb node.
- Unmount if /dev/sdb is mounted in any mount point. SD card should not be mounted while partitioning.

Note: In the complete document make sure of SD card partitions to be used i.e. sda or sdb or sdc or sdd

\$umount /dev/sdb

- Start partitioning using fdisk command.

\$sudo fdisk /dev/sdb

- After running fdisk it will change shell prompt to

Command (m for help):

- Press 'p' to view already existing partitions. Delete all existing partitions using command 'd' until all the partitions are deleted. Keep giving command 'd' until below message gets displayed.

Note: Enter individual partitions like 1,2,3...respectively

Command (m for help): d

No partition is defined yet!

- Press 'n' to create new partition (going to create first partition).

Command (m for help): n

Command action

e extended

p primary partition (1-4)

- Press 'p' to create primary partition. Give 1 as partition number. Then give first cylinder as '7'(Based on the total cylinders we have to change the size) Because first 7 cylinders is for U-Boot.bin purpose and Last cylinder as half of displayed size (e.g below case 1038 is displayed, give approximate half size, 512)

p

Partition number (1-4): 1

First cylinder (1-1038, default 1): 7

Last cylinder, +cylinders or +size{K,M,G} (1-1038, default 1038): 512

- Press 'n' to create new partition (going to create second partition).

Command (m for help): n

Command action

e extended

p primary partition (1-4)

- Press 'p' to create primary partition. Give 2 as partition number. Just press enter for First and Last cylinder. Because, First & Last cylinder locations will be displayed from end of 1st partition to end of disk.

p

Partition number (1-4): 2

First cylinder (513-1038, default 513): 513

Last cylinder, +cylinders or +size{K,M,G} (513-1038, default 1038): press ENTER

Note: press enter without entering any arguments

- Assign file system to created partitions. Partition 1 as FAT16 and partition 2 as LINUX.

Command (m for help): t

Partition number (1-4): 1

Hex code (type L to list codes): 6

Changed system type of partition 1 to 6 (FAT16)

Command (m for help): t

Partition number (1-4): 2

Hex code (type L to list codes): 83

- List out partition types in SD. Press 'p' to view. Below message will be displayed

Command (m for help): p

Disk /dev/sdb: 1021 MB, 1021837312 bytes

31 heads, 62 sectors/track, 1038 cylinders

*Units = cylinders of 1922 * 512 = 984064 bytes*

Disk identifier: 0x00000000

Device	Boot	Start	End	Blocks	Id	System
/dev/sdb1		7	512	492001	6	FAT16
/dev/sdb2		513	1038	505486	83	Linux

- Now the partitions are created as above. Save these changes by pressing 'w'.

Command (m for help): w

- Again make sure both the partitions are unmounted.

\$umount /dev/sdb1

\$umount /dev/sdb2

\$umount /dev/sdb1

- Now we are going to format both the partitions. Partition 1 as DOS (windows) partition and 2nd partition as EXT3 (Linux).

\$sudo mkdosfs /dev/sdb1

\$sudo mkfs.ext3 /dev/sdb2

- Now SD card is ready to use.

Note: Remove the SD card and insert again then the respective partitions can be viewed by following command.

\$mount

10.2 Manual binary program

- Insert SD card using SD card reader to the PC. Execute mount command to see the attached nodes and mount points.

\$mount

- SD card may attach to the dev nodes either sdb/sdc/sdd/sde. Assume the SD card is attached to /dev/sdb node.

- Execute the below command to dump u-boot image,

*\$sudo dd if=<path into uboot.bin>/u-boot.bin of=/dev/<mount point of sdcard> bs=512
seek=2 skip=2 conv=fsync*

- Copy ulmage into SD card windows partition.

\$cp <path_to_ulmage>/ulmage /media/<mount_point_of_sdcard VFAT partition>

- Untar the tar file rootfs.tar.gz inside the SD card Linux partition.

*\$sudo tar -xvzf <path_to_rootfs.tar.gz>/rootfs.tar.gz -C
/media/<mount_point_of_sdcard EXT3 partition>*

- Unmount the sd card from the host PC.

\$umount /media/<mount point Sdcard windows partition>

\$umount /media/<mount point Sdcard Linux partition>

11 APPENDIX F – QUICK REFERENCE

11.1 Serial port settings iW-RainboW-G15M-Q7 basic settings

Refer the below sections for iW-RainboW-G15D platform basic settings and host serial port settings.

Table 2: Basic Settings

Section	Document Name
Powering ON iW-RainboW-G15D	iW-RainboW-G15D-QuickStartGuide
Debug UART Setting	
Linux Test Environment	

11.2 Boot mode and boot media settings

iW-RainboW-G15D platform supports two boot mode options and different boot devices for booting.

Table 3: Boot settings

Category	Section	Document name
Boot mode selection	Boot mode setting	iW-RainboW-G15D-QuickStartGuide (or) i.MX6-QsevenSOM-HardwareUserGuide
Boot device selection	Boot media setting	

11.3 Peripheral connection procedure

iW-RainboW-G15M-Q7 platform supports different peripherals. For peripherals connection procedure, refer the below mentioned section in corresponding document.

Table 4: Peripheral connections

Peripheral	Section	Document Name
Micro SD	Micro SD Slot	i.MX6-QsevenSOM-HardwareUserGuide Generic Q7 Carrier_HardwareUserGuide
Standard SD/MMC	SD/MMC Card Slot	
SATA	SATA0 Interface	
USB Host	Gigabit Ethernet & USB	
USB OTG	USB OTG	
Ethernet	Gigabit Ethernet & USB	
CAN0	CAN0 Interface	
CAN1	Secondary CAN (Optional)	
UART0(Debug)	9-Pin D-Sub Debug UART	
UART2	Secondary UART	
PCIe	PCIe0 Interface	
AUDIO	AC'97 Interface	
HDMI	HDMI Interface	

12 APPENDIX G – LDO BYPASS MODE

All production version SOMs with the labelling as shown in the figure below supports LDO Bypass mode. From Linux BSP release REL1.2 onwards, the LDO Bypass mode is enabled by default. Follow the below procedure to disable the LDO Bypass mode in u-boot and Linux source for the pre-production SOMS.



Figure 26: Sudoers File

12.1 U-Boot

- Undefine the “CONFIG_MX6_INTER_LDO_BYPASS” Macro in the u-boot configuration. It is defined in the below path

u-boot-2009.08/include/configs/mx6_iwg15m_q7.h

- Refer the Section [U-Boot](#) to compile the U-Boot source

12.2 Linux Kernel

Refer the section [Optional features settings](#) to set the LDO BYPASS mode.

13 APPENDIX H – PERMANENT MAC ADDRESS

This section will have the information to set permanent MAC address for the iW-RainboW-G15M-Q7 platform in u-boot level. Please note that this is one time programming.

- To list out the options, execute the below command.

```
iWave-G15 >imxotp
```

- To blow the MAC address permanently, execute the below command.

```
iWave-G15 >imxotp --force blow 22 <lower 32 bit hex value>
```

```
iWave-G15 >imxotp --force blow 23 <upper 16 bit hex value>
```

Example

```
iWave-G15 >imxotp --force blow 22 AABBCDD
```

```
iWave-G15 >imxotp --force blow 23 EEFF
```

14 APPENDIX I – HOST PC STATIC IP ASSIGN

This section will have the information to set the static IP address in the host PC. Here the Windows Host is used.

- Open the “Control Panel” in PC and open the “Network Connections” in the Control Panel folder.

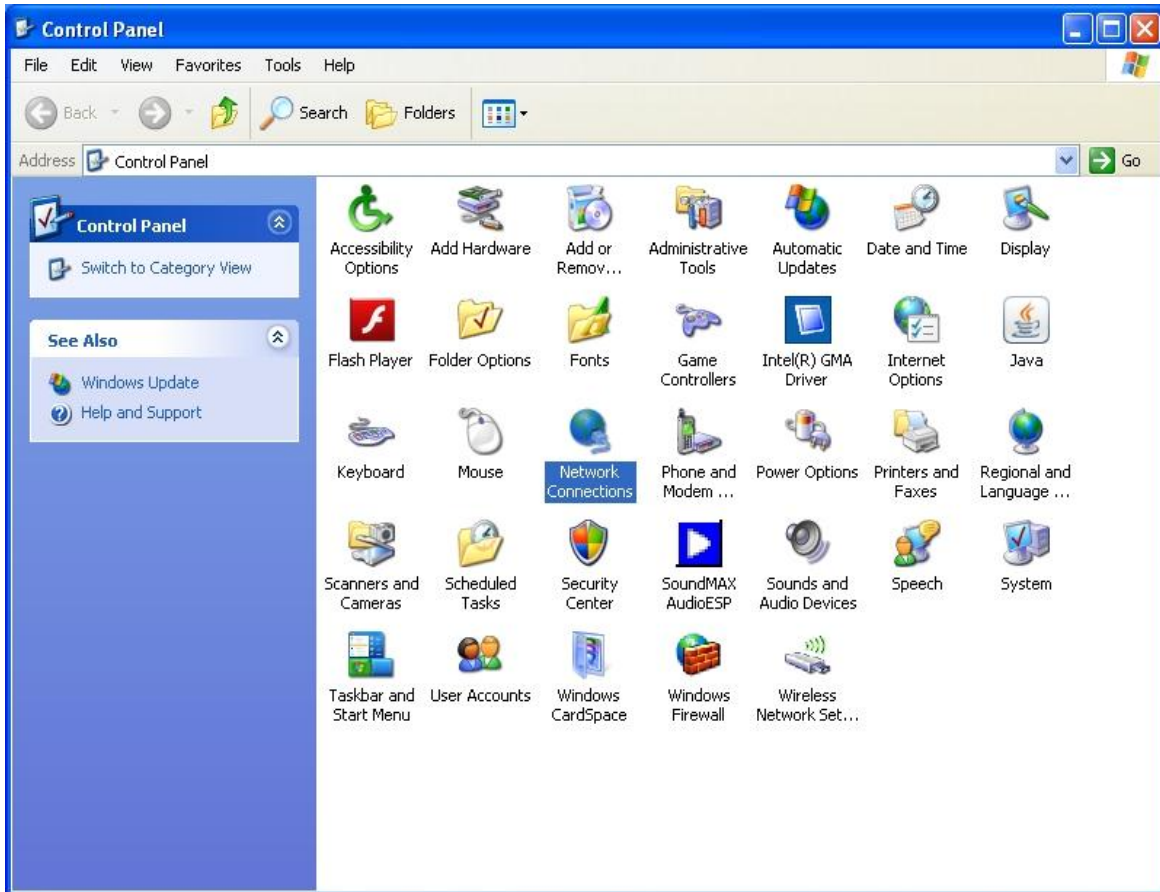


Figure 27: Set IP - 1

- Right Click the “Local Area Connection Connected” and select the “Properties” on drag box

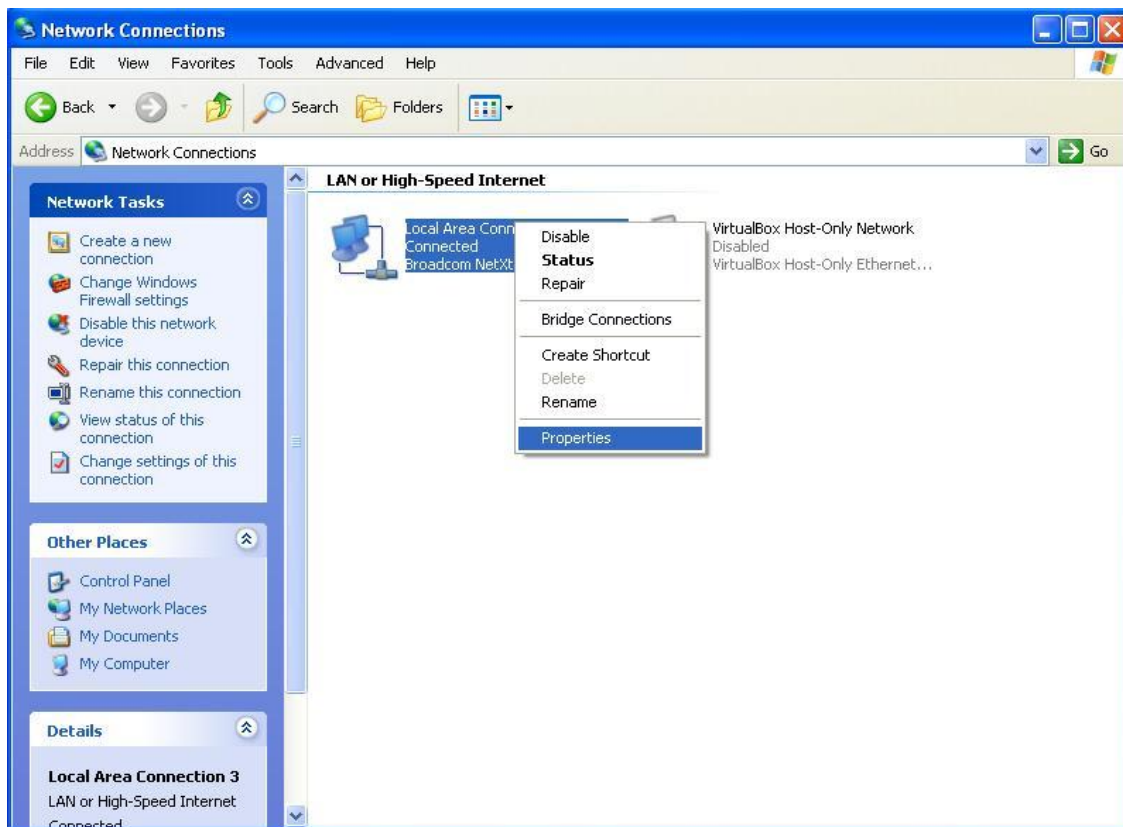


Figure 28: Set IP 2

- The “Local Area Connection Properties” Pop-Up window will be displayed as below

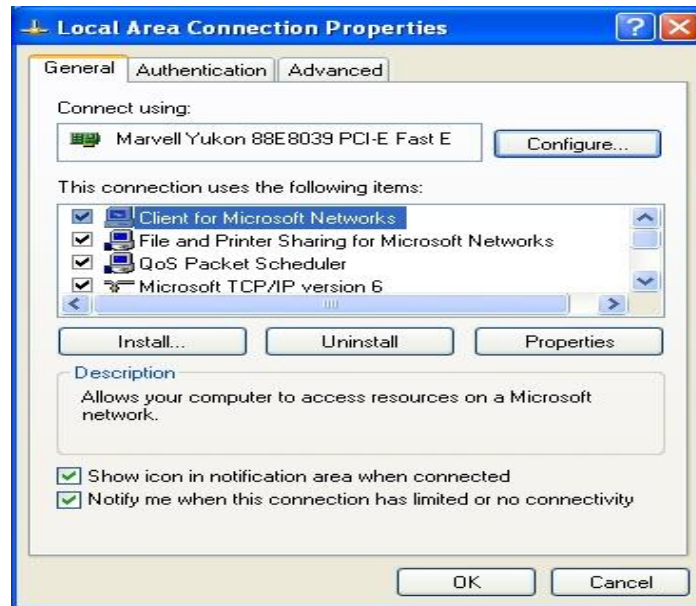


Figure 29: Set IP - 3

- Select “Internet Protocol (TCP/IP)” and click the “Properties” button in “Local Area Connection Properties” Pop-Up window



Figure 30: Set IP 4

- The “Internet Protocol (TCP/IP)” Pop-Up window will be displayed as below

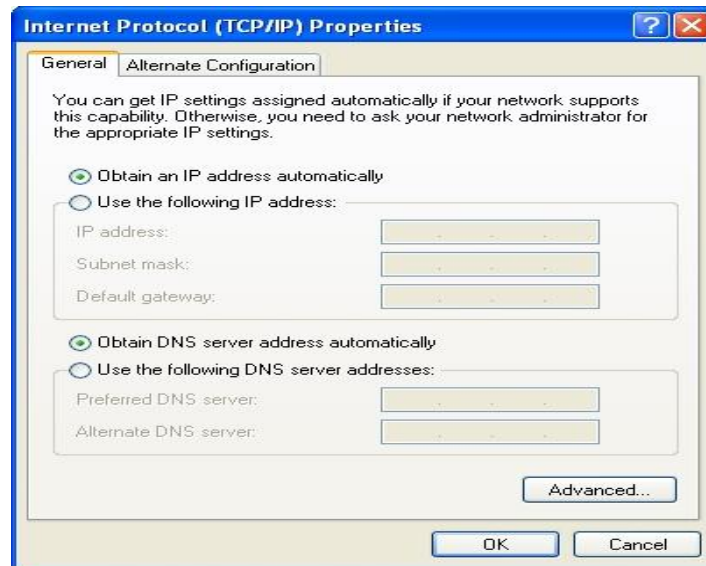


Figure 31: Set IP 5

- Click “Use the following IP address” and set the “IP address:” to 192.168.1.1 and “Subnet mask:” as 255.255.255.0 and click the OK button

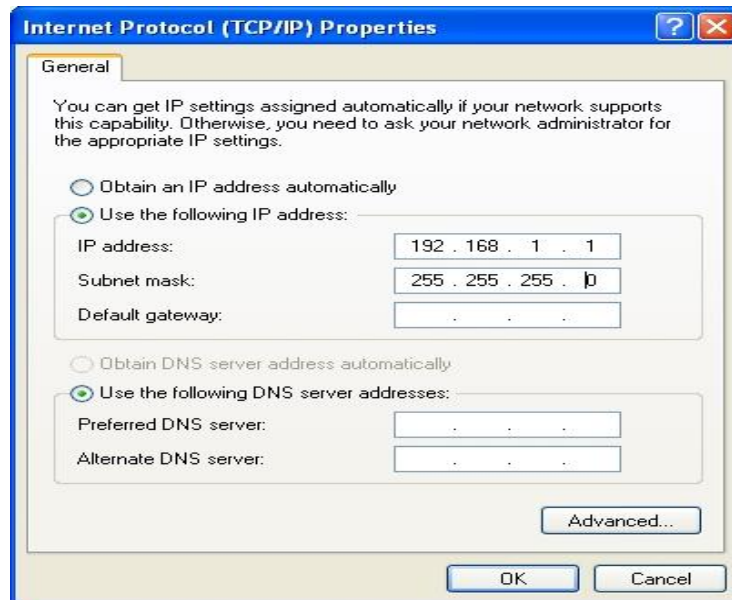


Figure 32: SetIP 6

- Finally, the below screen will display, Press OK button on that screen



Figure 33: Set IP – 7

15 FREQUENTLY ASKED QUESTIONS

1. How to power ON the iW-RainboW-G15M-Q7 platform?

Refer the section [Serial port settings iW-RainboW-G15M-Q7 basic settings](#) for iW-RainboW-G15M-Q7 platform power ON procedure.

2. How to connect the Debug port of iW-RainboW-G15M-Q7 with host PC / What are the settings to be done in host side to connect the debug port of iW-RainboW-G15M-Q7 platform?

Refer the section [Serial port settings iW-RainboW-G15M-Q7 basic settings](#) for iW-RainboW-G15M-Q7 platform Debug port settings.

3. How to enter into Linux test environment in iW-RainboW-G15M-Q7 platform?

Refer the section [Serial port settings iW-RainboW-G15M-Q7 basic settings](#) for iW-RainboW-G15M-Q7 platform uboot and linux console.

4. How to connect the Peripherals to iW-RainboW-G15M-Q7 platform?

To connect the peripherals with iW-RainboW-G15M-Q7 platform, Refer the section [Peripheral connection procedure](#).

5. How to change the boot mode settings for iW-RainboW-G15M-Q7 platform/ How to switch to serial downloader mode in iW-RainboW-G15M-Q7 platform?

Refer the section [Boot mode and boot media settings](#)Serial port settings iW-RainboW-G15M-Q7 basic settings for iW-RainboW-G15M-Q7 platform boot mode settings.

6. How to change the boot media settings for iW-RainboW-G15M-Q7 platform / is it possible to change the boot device / what are the boot device is supported in iW-RainboW-G15M-Q7 platform?

Refer the section [Boot mode and boot media settings](#)Serial port settings iW-RainboW-G15M-Q7 basic settings for iW-RainboW-G15M-Q7 platform boot mode settings.

7. How to get the default environment variables in u-boot level after the environment variables modification/ Is it possible to erase the modified environment variables in u-boot level?

Execute the below command in u-boot console to get the default environment variables / erase the modified environment variables.

iWave-G15 >destroyenv

8. Why LCD display going off after some time, if the iW-RainboW-G15M-Q7 platform kept power ON for more than 15 minutes?

If you keep the iW-RainboW-G15M-Q7 platform in power ON condition for more than 15 minutes, execute the following command. Otherwise display will go to screen saver mode.

\$echo -e "\033[9;0]" > /dev/tty0

9. Is it possible to use 64bit host pc for BSP compilation?

To compile the BSP in 64 bit host pc following host package should be installed.

\$Sudo aptitude install ia32-libs

Please refer <http://www.debian-administration.org/articles/534>

10. Why host PC thrown an error “ulmage cannot build” while linux kernel compilation?

If the host thrown an error “ulmage cannot build” while linux kernel standalone compilation, install the below package on host package.

\$sudo apt-get install uboot-mkimage

11. Is the health of the file system maintained? If turn off the power of iW-RainboW-G15M-Q7 during Linux is booting normally / turned off the power without doing while running application.

If you power off the platform while running any application, the running application may corrupt.

12. How to set/change the MAC address in u-boot environment variables?

To set/change the MAC address in u-boot environment variables, refer the section [Ethernet test.](#)

13. How to make the cursor blink/unblink on the primary console display?

To disable the cursor blink on the primary console display, execute the below command.

\$echo 0 > /sys/class/graphics/fbcon/cursor_blink

To enable the cursor blink on the primary console display, execute the below command.

\$echo 1 > /sys/class/graphics/fbcon/cursor_blink

14. How to limit the no of running cores?

Refer the section [Optional features settings](#) to add the standard SD support

15. How to set the static IP address on the host PC?

Refer the section [*APPENDIX I – Host PC Static IP assign*](#)

16. How set the permanent MAC address for Ethernet?

Refer the section [*APPENDIX H – Permanent MAC address*](#)