DEVELOPMENT GUIDE

VAB-630

Linux BSP v1.0.1

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Revision History

Version	Date	Remarks
1.00	09/18/2017	Initial release

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1. Introduction

This Development Guide explains how to setup the necessary build environment in order for users to customize the Linux kernel and create their own system image for VAB-630.

The VAB-630 Linux BSP v1.0.1 is developed based on the debian-8.6.0-lxde-player (Debian 8.6) and it enables hardware features that are defined on the VAB-630 board.

1.1. BSP Package Contents

There are four folders in the package as listed below.

Source code folder	Description
VAB-630_Linux_source_code.zip	Kernel source code and U-Boot source code
Firmware folder	**Description**
VAB-630_Linux_EVK_v1.0.1.zip	Debian EVK system image and installation script files
Document folder	**Description**
VAB-630_Linux_BSP_v1.0.1_Development_Guide_v1.00_20170918.pdf	Development guide
VAB-630_Linux_EVK_v1.0.1_Quick_Start_Guide_v1.00_20170918.pdf	Quick start guide
Tools folder	**Description**
arm_201103_gcc4.5.2.tgz	Toolchain

VAB-630 Linux BSP contents

1.1.1. Source Code Folder Contents

VAB-630_Linux_source_code.zip: A complete and static Linux BSP including the VAB-630 meta-files and all the pre-downloaded required software packages to enable a complete offline build.

1.1.2. Firmware Folder Contents

VAB-630_Linux_EVK_v1.0.1.zip: contains installation script files and the precompiled U-boot and image for evaluating the VAB-630 board.

1.1.3. Document Folder Contents

VAB-630_Linux_BSP_v1.0.1_ Development_Guide_v1.00_20170918.pdf: This Development Guide explains how to setup the necessary build environment in order for users to customize the Linux kernel and create their own system image for VAB-630.

VAB-630_Linux_EVK_v1.0.1_ Quick_Start_Guide_v1.00_20170918.pdf: The Quick Start Guide provides an overview on how to boot the Linux EVK system image on the VAB-630 board and configure the supported hardware functions in the build.

1.1.4. Tools Folder Contents

arm_201103_gcc4.5.2.tgz: is a toolchain, which is a set of software development tools for building images for the VAB-630 board.

1.2. Version Information and Supported Features

- U-Boot version: 1.1.4
- Kernel version: 3.4.5
- Evaluation image: Debian 8.6
- Development based on debian-8.6.0-lxde-player (Debian 8.6)
- Supports SPI with eMMC boot
- Supports HDMI or LVDS display
- Supports ONation capacitive touch panel (through USB interface)
  - ONation 10.1" LVDS Panel VIA1001 OT101RBWDLT-00 (1280×800)
- Supports HDMI audio output
- Supports Micro USB 2.0 OTG port
- Supports Debug UART connector
- Supports 10/100Mbps Ethernet
- Supports Line-out and Mic-in
- Supports EMIO-2531 miniPCIe Wi-Fi & Bluetooth module
  - Supports Bluetooth A2DP and SPP profile
- Supports EMIO-5531 USB Wi-Fi & Bluetooth module
  - Supports Bluetooth A2DP and SPP profile
- Supports EMIO-2550 miniPCIe Mobile Broadband module
- Supports GPIO, UART and Watchdog timer

2. Build Environment Setup

This section guides you through setting up the build environment for development on the host machine. All instructions are based on Ubuntu14.04 LTS x64.

To make sure that the build process completes successfully, we recommend at least 120GB of disk space and 15GB of combined memory and swap space on the host machine.

2.1. Configuring Linux Host Machine

The following packages are required for the Linux development environment. The required packages can be installed using the commands below.

Extract the **arm_201103_gcc4.5.2.tgz** file to /usr/local/arm/ (If this folder does not exist in the system, please create it manually).

```
$ sudo tar -xzvf arm_201103_gcc4.5.2.tar.gz -C /usr/local/arm/
```

The cross compiler will be found in the **/usr/local/arm/arm_201103_gcc4.5.2/** directory.

Add the toolchain path in **~/.bashrc** file.

```
$ vi ~/.bashrc
export PATH=/usr/local/arm/arm_201103_gcc4.5.2/mybin/:$PATH
```

Make sure that the host machine is connected to the network and run the packages update.

```
$ sudo apt-get update
```

Install the required software packages for cross-compilation.

```
$ sudo apt-get install git-core gnupg flex bison gperf build-essential \
zip curl zlib1g-dev libc6-dev lib32ncurses5-dev lib32z1 lib32ncurses5 lib32bz2-1.0 \
x11proto-core-dev libx11-dev libgl1-mesa-dev g++-multilib mingw32 tofrodos \
python-markdown libxml2-utils u-boot-tools
```

3. Image Build

This section explains how to build U-Boot and Kernel binary for the VAB-630 system.

3.1. Extracting the VAB-630 BSP

The VAB-630_Linux_source_code.zip includes u-boot-1.1.4.tar.gz and Kernel_3.4.5.tar.gz.

Use the following command to extract the contents of the BSP.

```
$ unzip VAB-630_Linux_source_code.zip
```

3.2. Building the U-Boot Binary

This section describes how to build the U-Boot image from the source code.

Use the following command to extract the U-Boot source code.

```
$ tar -xzvf u-boot-1.1.4.tar.gz
```

In order to use the default configurations type the following command.

```
$ cd /u-boot-1.1.4
$ make wmt_config
```

To build the U-boot image with the ARM cross compiler.

```
$ make -j8 zuboot
```

When the process is completed, the **zuboot.bin** file will be stored in the u-boot-1.1.4 directory.

3.3. Building the Linux Kernel

This section describes how to build the kernel binary from the source code.

To begin, extract the kernel source code.

```
$ tar -xzvf Kernel_3.4.5.tar.gz
```

To use the default configuration and compile the kernel type the following command:

```
$ cd /Kernel_3.4.5
$ make vab630_linux_defconfig
$ make clean
$ make -j8 ubin
```

When the compilation process is completed, the **uzImage.bin** file will be stored in the Kernel_3.4.5 directory.

After the compilation, the /u-boot-1.1.4/ and /Kernel_3.4.5/ directory will contain the resulting binary files, as shown in the table below.

Binary files	Description
zuboot.bin	U-Boot boot loader
uzImage.bin	Kernel for VAB-630

Binary files generated

In order to install the Linux system on the VAB-630 board, please follow the commands below on how to copy the binary files into the VAB-630_Linux_EVK_V1.0.1 folder.

First, change these file names from zuboot.bin to u-boot.bin.

```
$ cd /u-boot-1.1.4
$ mv zuboot.bin u-boot.bin
```

Next, extract the package from the VAB-630_Linux_EVK_V1.0.1.zip, and then copy u-boot.bin and uzImage.bin files into the VAB-630_Linux_EVK_V1.0.1 folder.

```
$ cd /u-boot-1.1.4
$ cp -f u-boot.bin VAB-630_Linux_EVK_v1.0.1/bspinst/u-boot.bin
$ cd /Kernel_3.4.5
$ cp -f boot.img VAB-630_Linux_EVK_v1.0.1/bspinst/uzImage.bin
```

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