HDK Android Software User Manual

Revision History

Revision	Date	Description
0.1	06-07-2020	Initial release.
0.2	06-11-2020	Revised for clarification.
0.3	06-18-2020	Revise the prop. part
1.0	06-20-2020	1st official release

Software version tracking

SW release	codeaurora HLOS release	Note
XR1-HDK-0001-01	LA.UM.7.8.r1-08200-SDM710.0-1	Moonbear HDK r1

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1 Introduction

1.1 Purpose

The purpose of this document is to provide users with information on how to obtain, build and program Android software in the HDK developer's kit, including:

- Set up a development environment for Android build.
- Obtain Android base source code.
- Apply necessary patches.
- Build the Android from source.
- Identify necessary OS images.
- Flash the images to the HDK kit.

1.2 Conventions

This documentation uses the following typographical conventions:

- Function declarations, function names, type declarations, attributes, and code samples appear in a different font, for example, #include.
- Code variables appear in angle brackets, for example, <number>.
- Commands to be entered appear in a different font, for example, **copy a:*.* b:**.
- Button and key names appear in bold font, for example, click **Save** or press **Enter**.

1.3 Technical assistance

For assistance or clarification on information in this document, please send the question and inquiry to jorjin.xr1@jorjin.com.tw for the technical assistance.

2 Development environment setups

2.1 Requirements

Development environment for Android build is listed as followed,

Item description	Version	Source/Vendor	Purpose
Linux development workstation Minimum requirements: - Quad core CPU, for example Intel i7-2600 at 3,4GHz or better 16GB RAM - At least 250GB storage space	N/A	N/A	Android build machine
Ubuntu 14.04 LTS 64-bit	14.04 LTS	Ubuntu Community/Canonical, Ltd.	Android build host OS
Open JDK for Linux	JDK 1.8	Oracle	Building Android
Repo	-	Android Open Source Project	Android source management tool

Table 2-1 Required hardware and software

2.2 Install host OS

Ubuntu 14.04, 64-bit is the Android build OS version recommended. Other versions of Ubuntu or other Linux distributions are not supported and might need additional tweaks in order to successfully build the Android from source.

1. Create an installation CD and install it onto the computer by following the instructions at http://releases.ubuntu.com/

2. Use apt-get to install the additional required packages. Refer to https://source.android.com/source/initializing.html for the required packages.
3. Make bash the default shell (Android build scripts contain Bash shell dependencies that
require the system default shell /bin/sh to invoke bash) using one of the following options:
    i. Reconfigure the package. Use the command sudo dpkg-reconfigure dash.
    ii. Manually change the symlink /bin/sh > dash to /bin/sh > bash using the following commands:

    sudo rm /bin/sh

    sudo ln –s /bin/bash /bin/sh

    Refer to the Ubuntu Wiki page at https://wiki.ubuntu.com/DashAsBinSh for more information.

2.3 Install JDK

Refer to https://source.android.com/source/initializing.html for general Android build-related information including JDK installation, and http://openjdk.java.net for more OpenJDK information.

2.4 Install repo

The repo tool is a source-code configuration-management tool used to download Android code. The tool is a front end to Git written in Python that uses a manifest file to aid the download code organized as a set of projects stored in different Git repositories.

Refer to https://source.android.com/source/downloading.html for more information and installation instructions.

2.5 Prepare adb, fastboot, and USB driver

adb and fastboot utilities are both part of the platform-tools provided by Google. Please refer to https://developer.android.com/studio/releases/platform-tools?hl=HU#downloads for the download site of the platform-tools.

Both adb and fastboot need to communicate with the HDK via USB interface, please refer to the https://source.android.com/setup/build/initializing#configuring-usb-access for the USB configurations.

3 Prepare the Android source

3.1 Software packages

The software release is divided into release packages. The release packages are obtained from separate sources and then combined according to the instructions given below to form a complete Android BSP. The package sources are shown as followed:

Source	From Jorjin	From www.codeaurora.org
Item	• HDK patches	• Open source HLOS software

Table 3-1 Release packages

3.2 Prepare the Android software

The Android open source software is hosted at www.codeaurora.org. Please follow the instructions below to download the Android open source software:

1. In an empty directory, use the repo init command with the correct branch and manifest as given to properly initialize the Android repository.

   $ repo init -u git://codeaurora.org/platform/manifest.git -b release -m LA.UM.7.8.r1-08200-SDM710.0.xml --repo-url=git://codeaurora.org/tools/repo.git --repo-branch=caf-stable

   Parameters:

   - -u: Specify a URL from which to retrieve a manifest repository.
   - -m: Select a manifest file within the repository.
   - -b: Specify a revision, that is, a particular manifest-branch.
   - --repo-url: URL: repo repository location
   - --repo-branch: REVISION: repo branch or revision

2. Use the repo sync to pull the source.

$ repo sync

3.3 Apply the HDK proprietary patch

In order to complete the Android build, a copy of the proprietary files need to be obtained. For more information, please contact Jorjin or send the inquiry to jorjin.xr1@jorjin.com.tw .

3.4 Apply the HDK enabling patch

Use the command below to apply HDK patches to Android source tree:

$ cd [Android source directory]/kernel/msm-4.9

$ chmod a+x patch_all.sh

$ ./patch_all.sh

Please contact Jorjin for the HDK enabling patch.

4 Build the Android source

Follow the steps below to build the Android source:

1. In a bash shell, change directory to the Android source tree base directory.

    $ cd [Android source directory]

2. Configure the build environment shell settings.

    $ source build/envsetup.sh

3. Type the lunch command to select the build configuration, or enter with no parameters to see an interactive menu for making selections.

    $ lunch sdm710-userdebug

Build type	Description
user	Limited access; suited for production
userdebug	Like user but with root access and debug capability; preferred for debugging

Table 4-1 Android build type

4. Run make command to start the build (shown with – j option to run parallel builds for faster build times on a multicore build machine).

    $ make –j$(number of processor)

5 Flash the images to the device

5.1 Identify the OS images

If the build process finishes successfully, the target OS images will be located in the directory [Android source]/out/target/product/sdm710.

The OS images are listed below:

OS image	Description
boot.img	Linux ramdisk and kernel image
abl.elf	Applications boot loader
dtbo.img	Device tree image
vendor.img	Vendor image
vbmeta.img	Verified boot image
userdata.img	User data/configuration image
persist.img	System related persist image
system.img	Android system image

Table 5-1 image list and descriptions

5.2 Program the Android images using fastboot

To program the Android image, the adb and fastboot utility, both are part of platform-tools provided by Google, are needed, and the steps below described the flash procedure:

1. Make sure the proper battery is plugged in.
2. Plug the USB type C cable into the device.
3. Wait till the adb port is available.

   $ adb wait-for-device

4. Use the command below to put the device into the fastboot mode.

   $ adb reboot bootloader

5. Make sure the device is in fastboot mode.

   $ fastboot devices

6. Flash each image using the following fastboot command.

    $ fastboot flash boot boot.img

    $ fastboot flash abl abl.elf

    $ fastboot flash dtbo dtbo.img

    $ fastboot flash vendor vendor.img

    $ fastboot flash vbmeta vbmeta.img

    $ fastboot flash userdata userdata.img

    $ fastboot flash persist persist.img

    $ fastboot flash system system.img

7. Reboot the device.

    $ fastboot reboot

Appendix

A.1 Related resources

Name	Resource
Android Open Source Project Page	https://source.android.com
Android Developer Resources	https://developer.android.com/index.html
Code Aurora Forum	https://www.codeaurora.org
Downloading the Source	https://source.android.com/setup/build/downloading
Establishing a Build Environment	https://source.android.com/setup/build/initializing
OpenJDK	https://openjdk.java.net