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Rockchip Android AB System Usage Instruction

(Technical Department, R & D Dept. II)

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Revision History

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V1.1	Ji Dayao	2018/8/2	Add flashing tool instruction in Chapter2.4	
V1.2	Ji Dayao	2018/9/10	Add supplementary description of Android 9.0	
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1 Overview

This document describes the usage instruction of AB system upgrading which can be used on Rockchip Android software platforms with Android 9.0 and higher.

Using this upgrading method, all the partitions to be upgraded have a and b, and it will dramatically increase the requirement of memory space comparing with traditional Recovery upgrading method. Its advantage is AB upgrading is seamless upgrading, which can be finished according to the customized interactive strategy and protocol between the client and the server during Android system running process.

2 System configuration instruction

In Rockchip Android platforms, AB system function is disabled by default. If want to use AB system, need to do the configuration in Android system, U-BOOT and kernel dts. The details are described as below.

2.1 Android system configuration

Android system configuration includes:

1. Open the configuration item for AB upgrading in **device\rockchip\common\BoardConfig.mk**

Set BOARD_USES_AB_IMAGE configuration as true, which default value is false.

```
BOARD_USES_AB_IMAGE := false
```

2. In the corresponding directory of device\rockchip\rkxxx, confirm if there is parameter_ab.txt partition table file or not, if yes, skip this step directly. If there is no parameter_ab.txt file, execute according to below steps:

- (1) Create parameter_ab.txt partition table file

Copy a file from the corresponding parameter.txt, and then modify based on this

file. The key point is to divide two partitions a and b for each partition to be upgraded, and **finally delete recovery partition and modify the size of boot partition to be 64MB.**

An example of parameter_ab.txt is shown as below:

```
FIRMWARE_VER:9.0
MACHINE_MODEL:RK3326
MACHINE_ID:007
MANUFACTURER: RK3326
MAGIC: 0x5041524B
ATAG: 0x00200800
MACHINE: 3326
CHECK_MASK: 0x80
PWR_HLD: 0,0,A,0,1
TYPE: GPT
CMDLINE:mtdparts=rk29xxnand:0x00002000@0x00004000(uboot_a),0x00002000
@0x00006000(uboot_b),0x00002000@0x00008000(trust_a),0x00002000@0x0000
a000(trust_b),0x00002000@0x0000c000(misc),0x00008000@0x0000e000(resourc
e),0x00010000@0x00016000(kernel),0x00002000@0x00026000(dtb),0x00002000
@0x00028000(dtbo_a),0x00002000@0x0002a000(dtbo_b),0x00000800@0x0002c
000(vbmeta_a),0x00000800@0x0002c800(vbmeta_b),0x00020000@0x0002d000(
boot_a),0x00020000@0x0004d000(boot_b),0x00038000@0x0006d000(backup),0x
00002000@0x000a5000(security),0x000c0000@0x000a7000(cache),0x00300000
@0x00167000(system_a),0x00300000@0x00467000(system_b),0x00008000@0x0
0767000(metadata),0x000c0000@0x0076F000(vendor_a),0x000c0000@0x0082F0
00(vendor_b),0x00040000@0x008EF000(oem_a),0x00040000@0x0092F000(oem_
b),0x00000400@0x0096F000(frp),-@0x0096F400(userdata:grow)
uuid:system=af01642c-9b84-11e8-9b2a-234eb5e198a0
```

(2) Add fstab file fstab.rk30board_AB for AB

AB partition adds slotselect loading parameter (system partition adds slotselect parameter, and deletes oem partition item), and adds the partition nodes of frp, parameter, baseparameter and resource in parallel.

A reference file is shown as below:

```
# Android fstab file.
#<src>
# The filesystem that contains the filesystem checker binary (typically /system) cannot
# specify MF_CHECK, and must come before any filesystems that do specify MF_CHECK
/dev/block/by-name/system / ext4 ro,barrier=1 wait,avb,slotselect
/dev/block/by-name/metadata /mnt/vendor/metadata ext4 noatime,nodiratime,nosuid,nodev,noauto_da_alloc,discard wait
/dev/block/by-name/misc /misc emmc defaults defaults
/dev/block/by-name/frp /frp emmc defaults defaults
/dev/block/by-name/parameter /parameter emmc defaults defaults
/dev/block/by-name/baseparameter /baseparameter emmc defaults defaults
/dev/block/by-name/resource /resource emmc defaults defaults
/devices/platform/*usb* auto vfat defaults voldmanaged=usb:auto
/dev/block/zram0 none swap defaults zramsize=50%
# For sdmmc
/devices/platform/ff370000.dwmcc/mmc_host* auto auto defaults voldmanaged=sdcard1:auto,encryptable=userdata
# Full disk encryption has less effect on rk3326, so default to enable this.
/dev/block/by-name/userdata /data f2fs noatime,nodiratime,nosuid,nodev,discard,inline_xattr wait,check,notrim,encrypt
able=/mnt/vendor/metadata/key_file
/dev/block/by-name/cache /cache ext4 noatime,nodiratime,nosuid,nodev,noauto_da_alloc,discard wait,check
```

(3) Make BoardConfig configuration TARGET_RECOVERY_FSTAB under device\rockchip\rkxxx point to the newly created fstab.rk30board_AB file.

+

+ifeq (\$(strip \$(BOARD_USES_AB_IMAGE)), true)

+TARGET_RECOVERY_FSTAB :=

device/rockchip/rk3326/rk3326_evb/fstab.rk30board_AB

+endif

See the screenshot below:

```
diff --git a/rk3326_evb/BoardConfig.mk b/rk3326_evb/BoardConfig.mk
index c03eafe..7890e9a 100755
--- a/rk3326_evb/BoardConfig.mk
+++ b/rk3326_evb/BoardConfig.mk
@@ -14,3 +14,7 @@
# limitations under the License.
#
include device/rockchip/rk3326/BoardConfig.mk

+ifeq ($(strip $(BOARD_USES_AB_IMAGE)), true)
+TARGET_RECOVERY_FSTAB := device/rockchip/rk3326/rk3326_evb/fstab.rk30board_AB
+endif
```

2.2 kernel dts configuration

Add oem item, and add slotselect symbol to fsmgr_flags of vendor in parallel. The reference configuration is shown as below:

```
--- a/arch/arm64/boot/dts/rockchip/rk3326-863-lp3-v10-avb.dts
+++ b/arch/arm64/boot/dts/rockchip/rk3326-863-lp3-v10-avb.dts
@@ -24,7 +24,14 @@
        dev = "/dev/block/platform/ff390000.dwmcc/by-name/vendor";
        type = "ext4";
        mnt_flags = "ro,barrier=1,inode_readahead_blks=8";
        fsmgr_flags = "wait,avb";
        fsmgr_flags = "wait,avb,slotselect";
+
+};
+
+    oem {
+        compatible = "android,oem";
+        dev = "/dev/block/platform/ff390000.dwmcc/by-name/oem";
+        type = "ext4";
+        mnt_flags = "ro,barrier=1,inode_readahead_blks=8";
+        fsmgr_flags = "wait,slotselect";
+    };
+};
```

2.3 uboot configuration

In uboot, add CONFIG_ANDROID_AB=y configuration item in the configuration file of the specific chipset. The reference configuration is shown as below screenshot:

```
diff --git a/configs/rk3326_defconfig b/configs/rk3326_defconfig
old mode 100644
new mode 100755
index 0465f23..d64648c
--- a/configs/rk3326_defconfig
+++ b/configs/rk3326_defconfig
@@ -114,3 +114,4 @@ CONFIG_OPTEE_CLIENT=y
 CONFIG_OPTEE_V2=y
 CONFIG_OPTEE_ALWAYS_USE_SECURITY_PARTITION=y
 CONFIG_TEST_ROCKCHIP=y
+CONFIG_ANDROID_AB=y
```

2.4 Add partition for flash tool AndroidTool

Add the download item for B partition, and make all AB partitions flash the same images. Please refer to 《Rockchip Parameter File Format Ver1.3》 for the detailed method.

A flash tool screenshot is shown as below:



3 AB system and OTA package compiling

The steps to compile AB system image (**strictly follow below steps**):

lunch xxx

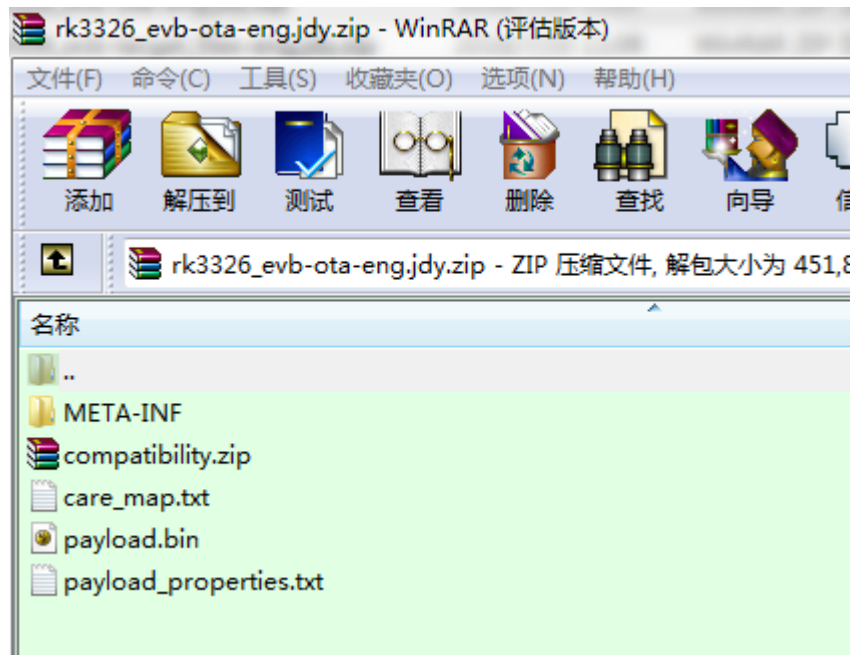
make -j32

make otapackage -j32

mkimage_ab.sh ota

Note: copy mkimage_ab.sh file from the directory of device/rockchip/common to the root directory of Android.

Refer to below for the contents of the upgrade package after compiled.



4 Validation method (client and server)

Rockchip AB system supports the seamless upgrading in normal system (upgrading is on-going, while downloading the upgrade package).

4.1 Seamless upgrading validation

During seamless upgrading process, the package can be downloaded and upgraded in parallel. Here we need a HTTP server and an upgrading client.

There are two methods to do the validation. Customers need to setup the upgrading client and upgrading server for the product and the upgrading client can refer to the default `update_engine_client` provided by Android. For the use of `update_engine_client`, please refer to the following verification method `update_device.py`, the script is finally upgraded by calling `update_engine_client` through `adb`.

Validation Method: `update_device.py`

`update_device.py` script changes Linux host to be HTTP server through `adb`, and then invokes `update_engine_client` to achieve the seamless upgrading.

Usage method is as below: execute the following command in Linux host (**must use Linux host but not Windows host, and make sure the Linux host adb function works normally**):

system/update_engine/scripts/update_device.py {upgrade package name}

Show the example as below:

```
jdy@jdy-Latitude-E6440:/media/jdy/LDSecond/rk3326/rk3326_0.X$ sudo system/update_engine/scripts/update_device.py ~/rk3326_evb-ota-eng.jdy.zip
[sudo] jdy 的密码:
INFO:root:Running: adb reverse tcp:1234 tcp:37213
INFO:root:Running: adb shell su 0 update_engine_client --update --follow --payload=http://127.0.0.1:1234/payload --offset=5501 --size=4519145
--headers="FILE_HASH=w2F5sNI8wF0hJHEyFgyEEz+uTLsLJl0Bz+MiIHCoQ7g=
FILE_SIZE=451914571
METADATA_HASH=s7dLj4bHgFLyP7aGTLT6tBkooj8Qfs6DWEfG348yyCo=
METADATA_SIZE=59119
USER_AGENT=Dalvik (something, something)
NETWORK_ID=0
"
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_IDLE (0), 0)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_UPDATE_AVAILABLE (2), 0)
127.0.0.1 - - [17/Jul/2018 17:24:40] "GET /payload HTTP/1.1" 206 -
INFO:root:Servicing request for /payload from /home/jdy/rk3326_evb-ota-eng.jdy.zip [5501, 451920072] length: 451914571
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 4.84229e-05)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.0100547)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.020061)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.0300673)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.0400735)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.0500798)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.0600861)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.0700924)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.0800987)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.0901049)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.100111)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.110118)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.120124)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.13013)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.140136)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.150143)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.160149)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.170155)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.180161)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.190168)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.200174)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.21018)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.220187)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.230193)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.240199)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.250205)
```

```
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.230193)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.240199)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.250205)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.260212)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.270218)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.280224)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.290231)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.300237)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.310243)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.320249)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.330256)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.340262)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.350268)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.360275)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.370281)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.380287)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.390293)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.4003)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.410306)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.420312)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.430318)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.440325)
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[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.460337)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.470344)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.48035)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.490356)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.500362)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.510369)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.520375)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.530381)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.540388)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.550394)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.5604)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.570406)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.580413)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.590419)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.600425)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.610432)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.620438)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.630444)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.64045)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_DOWNLOADING (3), 0.650457)
```



```
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.53)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.55)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.56)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.58)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.6)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.61)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.62)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.64)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.65)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.66)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.68)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.7)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.71)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.73)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.74)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.75)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.77)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.78)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.79)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.81)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.83)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.84)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.86)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.87)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.88)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.9)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.91)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.92)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.94)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.95)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.96)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.97)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 0.99)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 1)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 1)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_FINALIZING (5), 1)
[INFO:update_engine_client_android.cc(90)] onStatusUpdate(UPDATE_STATUS_UPDATED_NEED_REBOOT (6), 0)
[INFO:update_engine_client_android.cc(98)] onPayloadApplicationComplete(ErrorCode:kSuccess (0))
INFO:root:Running: adb reverse --remove tcp:1234
INFO:root:Server Terminated
dy@dyd-Latitude-E6440:/media/jdy/LDSecond/rk3326/rk3326_8.X$
```

The screenshots show the complete upgrading process. After upgrading successfully, there will be print information of UPDATE_STATUS_UPDATED_NEED_REBOOT as shown above. Now manually reboot the device, and it will switch to the newly upgraded system.

5 Notice

AB needs miniloader support. For RK3399, miniloader version requires V1.18 and higher. Please check with the corresponding project contact for the miniloader version of other chipsets.