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Telechips Android Firmware Upgrade Guide

TCCxxxx_Android_Firmware_Upgrade_Guide

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Revision History

Date	*Version*	*Description*
2012.05.18	0.1	Ice cream sandwich initial release

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1. *Overview*

This guide provides useful information for understanding how to upgrade Android device with new image or images package. Additionally, basic information about Telechips Android platform – various boot mode, partition structure, and etc.- will be also provided.

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2. Basics

Telechips Android platform supports 2 types of flash memory.

1) Internal Storage
   This memory has two separate areas.
   One is used for various Android basic partitions(system, data etc..) and the other is mainly used to store multimedia data.
   The former is called system area and the latter is called Internal Storage(NAND / eMMC).
   Internal Storage memory can be omitted and internal flash or eMMC is used only for Android basic partitions. FAT32 or NTFS can be used for NAND or eMMC
   Two areas are accessed as if they are separated physically.

2) External Stotage – this is removable memory that you can write to and is mainly used for storing multimedia data.

When you turn on Android device, it boots into one of several different boot modes listed at Tables 1.
System area of internal storage is divided into several partitions which contain boot images, system images, data etc. You can overwrite these partitions by copying image or upgrading device, which allows you to install different modification of the operating system.
Copying/upgrading procedure will be described in 5. How to flash devices in detail.

3. Boot modes

There are several boot modes which can be entered by starting the Android device with different key combinations. Here is a list of them.

Name	***How to start***	***Description***
Normal boot mode	Press power button, and device will boot as normal	This is the way to start the phone as normal.
Recovery mode	Hold Volume up button and press reset button	In this mode, you can upgrade your device with recovery image package.
Fastboot mode	Hold Back button and press reset button, press back button until screen shows bootloader console.	In this mode, you can flash boot, recovery and system images(*.img files) on to the device using fastboot command on the host computer.

Table 1 Boot Modes

4. MTD and Ext4(eMMC) Partitions

System area of internal flash memory contains following MTD partitions.

Partitions	Name	Size	Description
/dev/mtd/mtd0	boot	10MB	Hold boot.img (the kernel and initrd.)
/dev/mtd/mtd1	kpanic	5MB	Android kernel panic handler (apanic) writes kernel dump data when kernel panic is occurred.
/dev/mtd/mtd2	system	300MB	Holds the Android platform. Mounted read-only
/dev/mtd/mtd3	splash	4MB	Used for vendor's splash image
/dev/mtd/mtd4	cache	150MB	Used by various purpose: 1. Stores OTA image 2. Radio or bootloader upgrades 3. Used temporarily for downloading file If there is no need for OTA update, this partition can be shrunk.
/dev/mtd/mtd5	userdata	Variable	Holds all the user applications and data
/dev/mtd/mtd6	recovery	5MB	Hold recovery.img (a kernel and intrd) used for rebuilding / updating the device. A copy is stored in /system/recovery.img which is flashed onto the mtd6 partition when the device is turned off.
/dev/mtd/mtd7	misc	1MB	Used for communicating with boot loader

Table 2 MTD Partitions

Notes> The size can be changed according to the display and NAND size.

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System area of internal flash memory contains following block device(eMMC) partitions.

Partitions	Name	Size	Description
/dev/block/mmcblk0p1	boot	10MB	Hold boot.img (the kernel and initrd.)
/dev/block/mmcblk0p2	System	300MB	Holds the Android platform. Mounted read-only
/dev/block/mmcblk0p3	Userdata	Variable	Holds all the user applications and data
/dev/block/mmcblk0p4	Extended	-	Linux Extended Partition
/dev/block/mmcblk0p5	Cache	150MB	Used by various purpose: 1. Stores OTA image 2. Radio or bootloader upgrades 3. Used temporarily for downloading file If there is no need for OTA update, this partition can be shrunk.
/dev/block/mmcblk0p6	Recovery	10MB	Hold recovery.img (a kernel and intrd) used for rebuilding / updating the device. A copy is stored in /system/recovery.img which is flashed onto the mmcblk0p6 partition when the device is turned off.
/dev/block/mmcblk0p7	Kpanic	5MB	Android kernel panic handler (apanic) writes kernel dump data when kernel panic is occurred.
/dev/block/mmcblk0p8	Splash	1MB	Used for vendor's splash image
/dev/block/mmcblk0p9	misc	1MB	Used for communicating with boot loader

Table 3 EMMC Block Device Partitions

Notes> The size can be changed according to the display and eMMC size.

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5. How to make images

5.1. fastboot images

After building Android source code, you will get several images as follows.

- boot.img – contains the kernel and initrd
- recovery.img – contains files used for rebuilding/updating the system
- system.img – contains the Android platform/apps of the specified Android version
- userdata.img – yaffs2 or ext4 image for userdata partition

You can download these images to corresponding MTD or eMMC partition independently by using fastboot mode.

The following command makes fastboot update file

$ make updatepackage (output will be out/target/product/<your product>/xxx-img-xxx.zip)

and all MTD partitions can be downloaded at once as following

$ fastboot update out/target/product/<your product>/xxx-img-xxx.zip

5.2. Preparing recovery image package

To update overall system at once, recovery image package should be used.

Recovery image package includes following images.

- boot.img
- recovery.img
- system files
- radio (only for phone application) or bootloader images

To make recovery images package

1. run make

$ make otapackage (output will be out/target/product/<your product>/xxx-ota-xxx.zip)

or

$ make dist (output will be out/dist/xxx-ota-xxx.zip)

2. Copy zip file to SD card
3. This file should be renamed as “update.zip” to be used for updating system

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6. Upgrading device

This section describes how to copy an image file to the device and upgrade device in detail.

6.1. Choosing upgrading methods

There are three alternative ways that can be used to flash Android device with new image.

1) Copying an image to device using fastboot commands
   This approach is slightly more complicated and involves using fastboot tool to flash system images independently.
   To use this method, Telechips original bootloader which support fastboot protocol must be used.

2) Upgrading the device using recovery mode
   This approach involves using updated radio image(only for phone application) and recovery image on the eMMC or NAND storage area.
   This method can be activated by magic key during boot or Settings menu.

3) OTA update
   OTA update involves getting updated files through wireless network includes WiFi and 3G network etc.
   Because this method can be fully implemented by android device manufacturers, Telechips will provide only simple example to be referred.

Before upgrading the device, decide which of these methods is appropriate.
If you want to flash a special whole partition, please use fastboot mode.
If you want to update system fully or incrementally, please use recovery mode.

6.2. Upgrading the device using fastboot

This approach can be done by using fastboot method and will completely replace a particular MTD or eMMC partition by overwriting it with an image file.
Image files must end with the .img suffix.
Follow the steps below to flash a image file to the device.

1) Boot the device in fast boot mode.
   To enter fastboot mode, power up the device(or reboot it) while holding down BACK key.
   Hold BACK key down until the bootloader screen is visible.
   The device is now in fastboot mode and is ready to receive fastboot commands.

2) Connect the device to host computer over USB if it isn't currently connected.

3) Use fasboot command from PC to erase image that you are going to overwrite,
   e.g. for system partition
   ```
   $ fastboot erase system
   ```

4) Use fastboot command to flash partition
   e.g. for system partition (with image file stored current dir)
   ```
   $ fastboot flash system system.img
   ```

5) Reboot device using this command from host computer.
$ fastboot reboot

For information about other fastboot commands, use
$ fastboot

6.3. Upgrading the device using recovery mode

This method will update whole MTD partitions by overwriting various files(including entire image files.)
Recovery image package includes

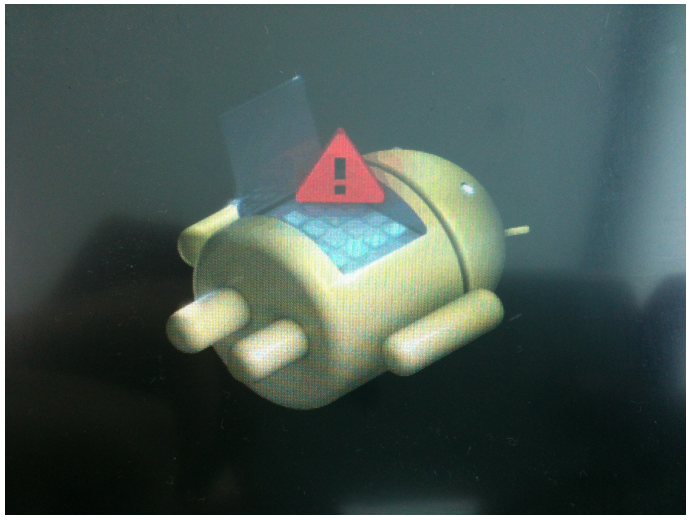
- A boot image
- A recovery image
- System files
- A radio image (only for phone application)
- Bootloader image

The recovery image package must be renamed as update.zip.
After preparing package, follow the following steps.
There are 2 methods to boot into recovery mode

1. Using magic key
2. Using Settings menu

6.3.1 Using magic key

1. Copying update file to the root of SD card
2. Ensure that SD card containing update file
3. Reboot the device into recovery mode by holding down the HOME key during reboot.*
   When the device enters recovery mode, it displays a android



4. Press HOME key and menu for selecting functions will be displayed.

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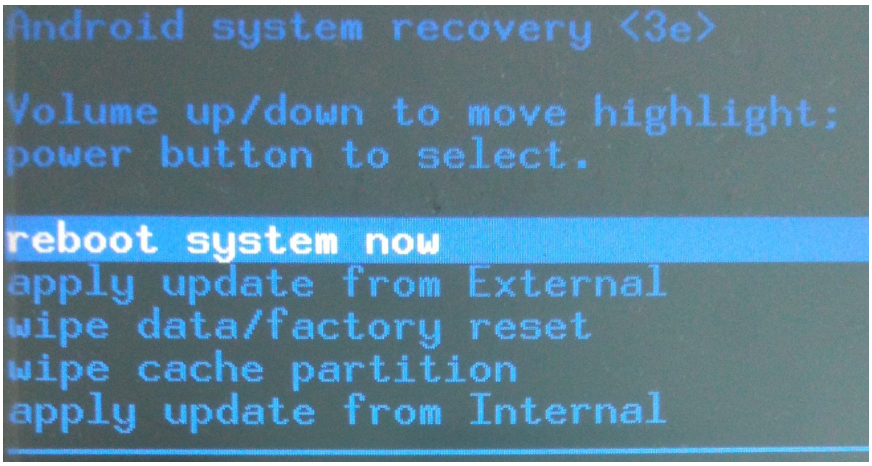
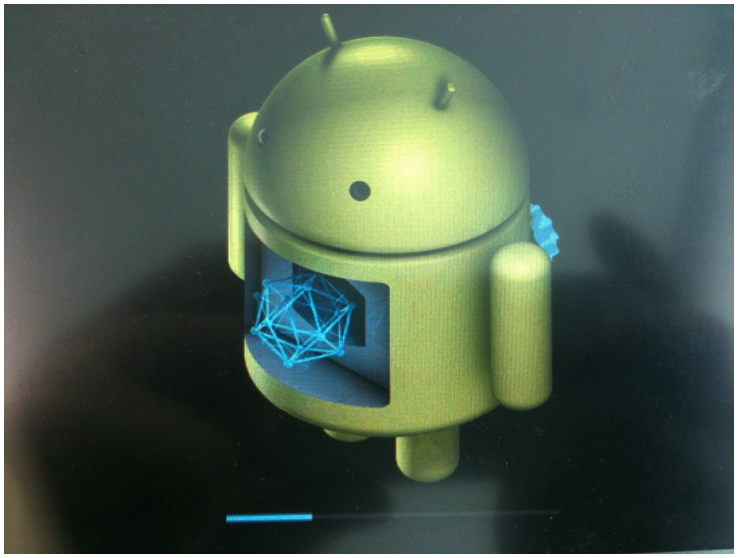


This menu includes following items.

1) Reboot system now
2) Apply sdcard:update.zip
3) Wipe data / factory reset
4) Wipe cache partition

To start upgrade, place cursor to item 2 and press Enter key.
Progressive bar will be displayed and upgrade is started



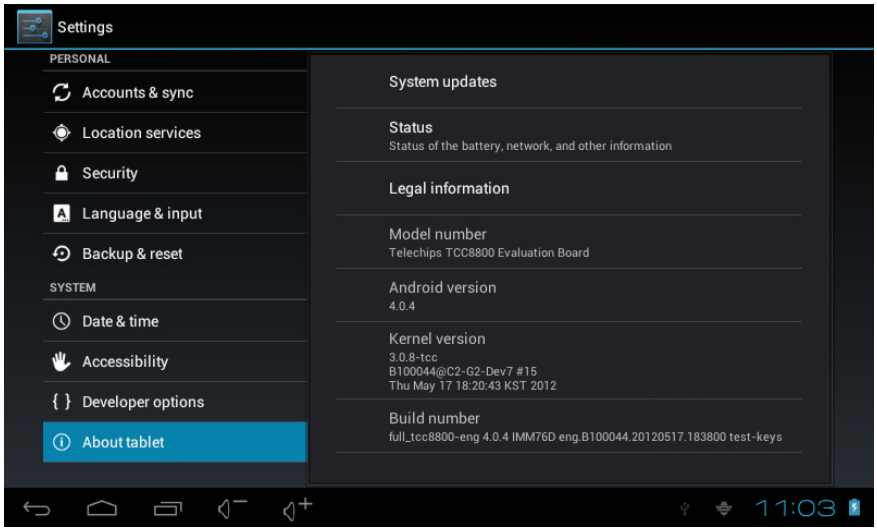
When the progressive bar completes, the installation is finished
After finishing upgrade, the device will automatically reboot into normal mode.

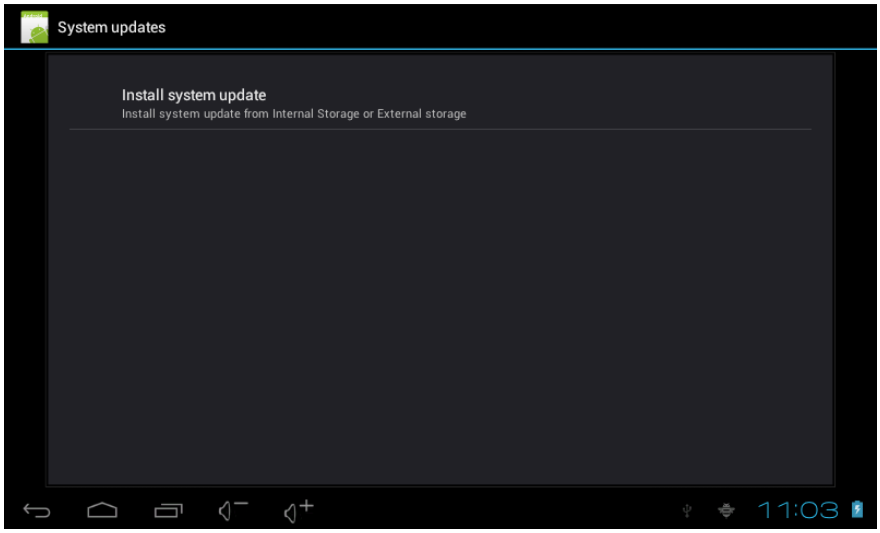
Notes> You can copy update file to the device by using adb.

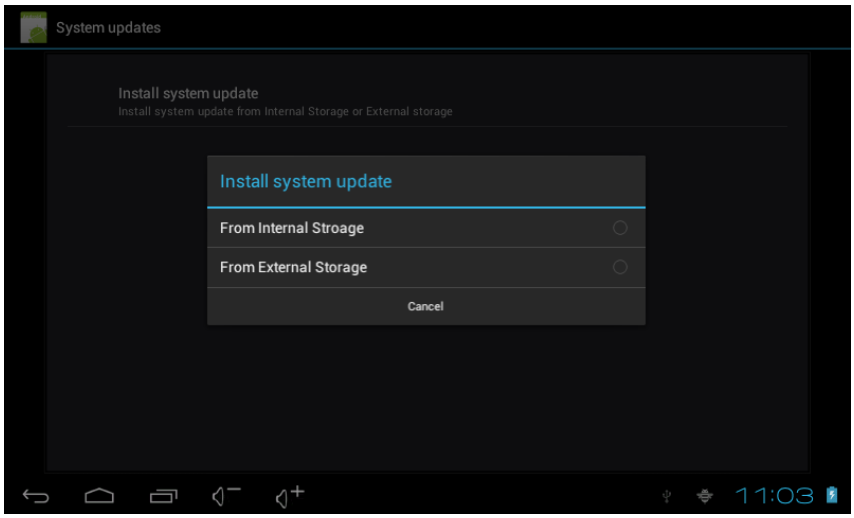
1. Copying update file to the root of SD card
2. Ensure that SD card containing update file
3. Reboot the device into recovery mode by holding down the HOME key during reboot.*
   When the device enters recovery mode, it displays a ! icon

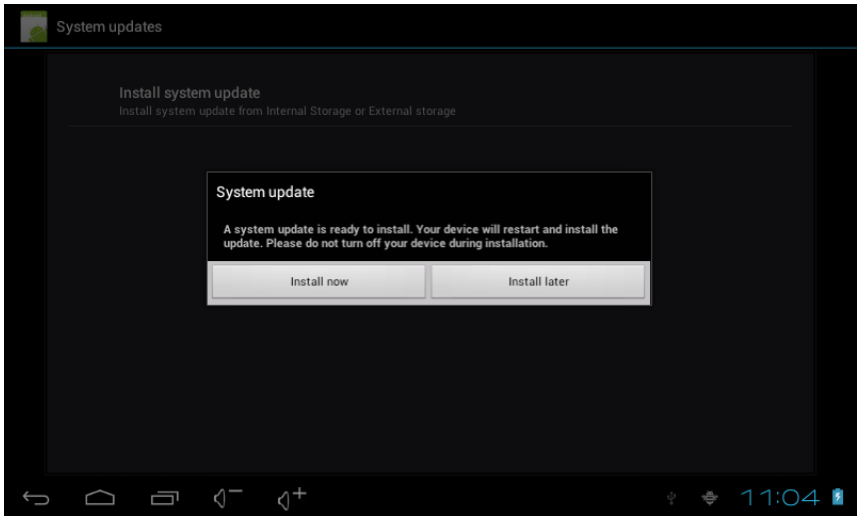
6.3.2 Using Settings menu

1. Copying update file to the root of Internal Storage or External storage
2. Select Settings->About phone->System updates->Install system update menu
3. After selecting ‘Install system update’ menu, select ‘From Internal Storage’ or ‘From External storage’









4. System will reboot into recovery mode and updates system files automatically.
5. After updating system files, it will reboot into normal mode automatically.

6.4. OTA updates

Currently Not Support FOTA Package Update

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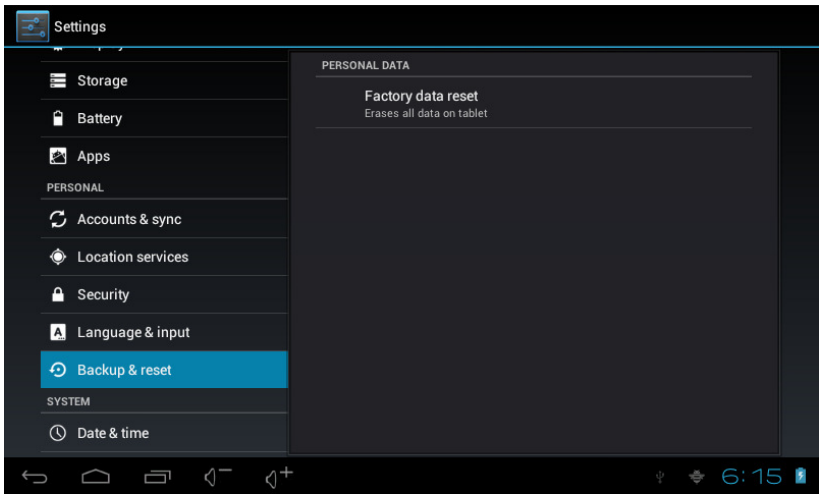
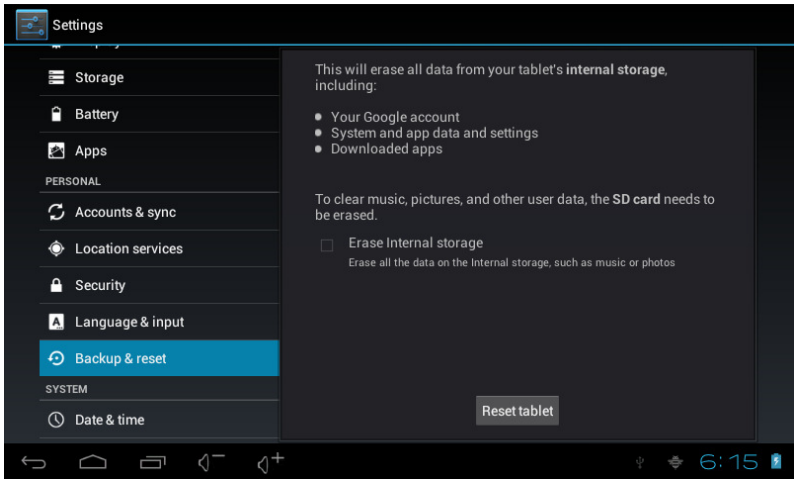
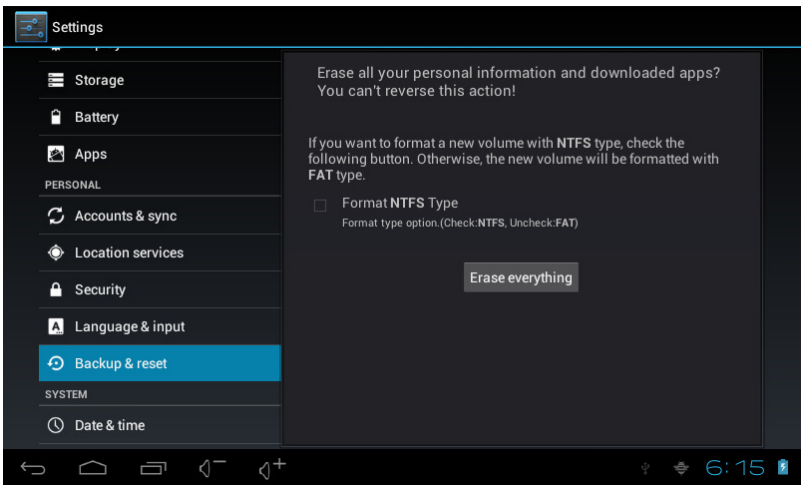
7 Reset device to factory settings

You can reset device to factory settings as follows.

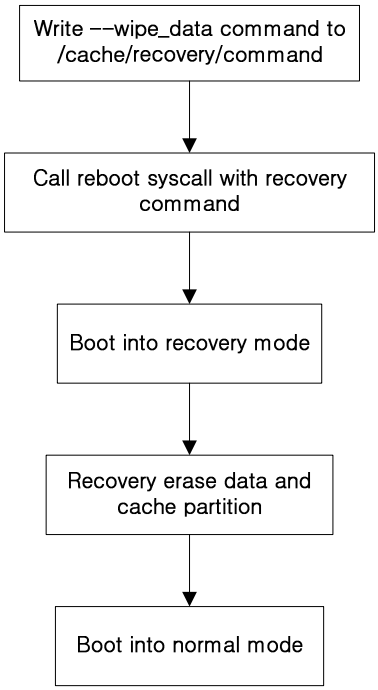
Select Settings->Backup & Reset ->Factory data reset







If you select ‘Erase everything’, it will restart into recovery mode and wipes out /data folder contents.


Write --wipe_data command to /cache/recovery/command
Call reboot syscall with recovery command
Boot into recovery mode
Recovery erase data and cache partition
Boot into normal mode

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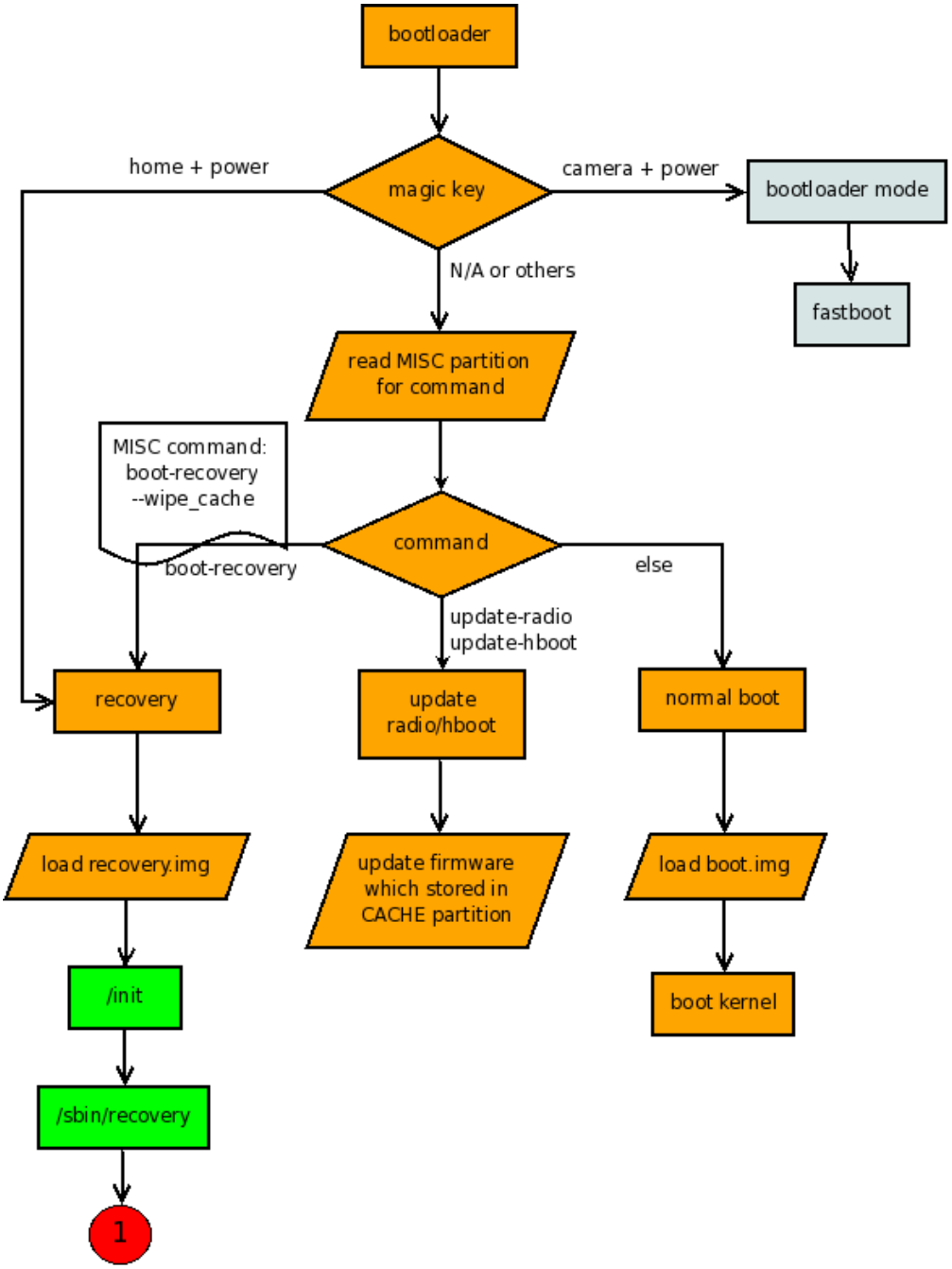
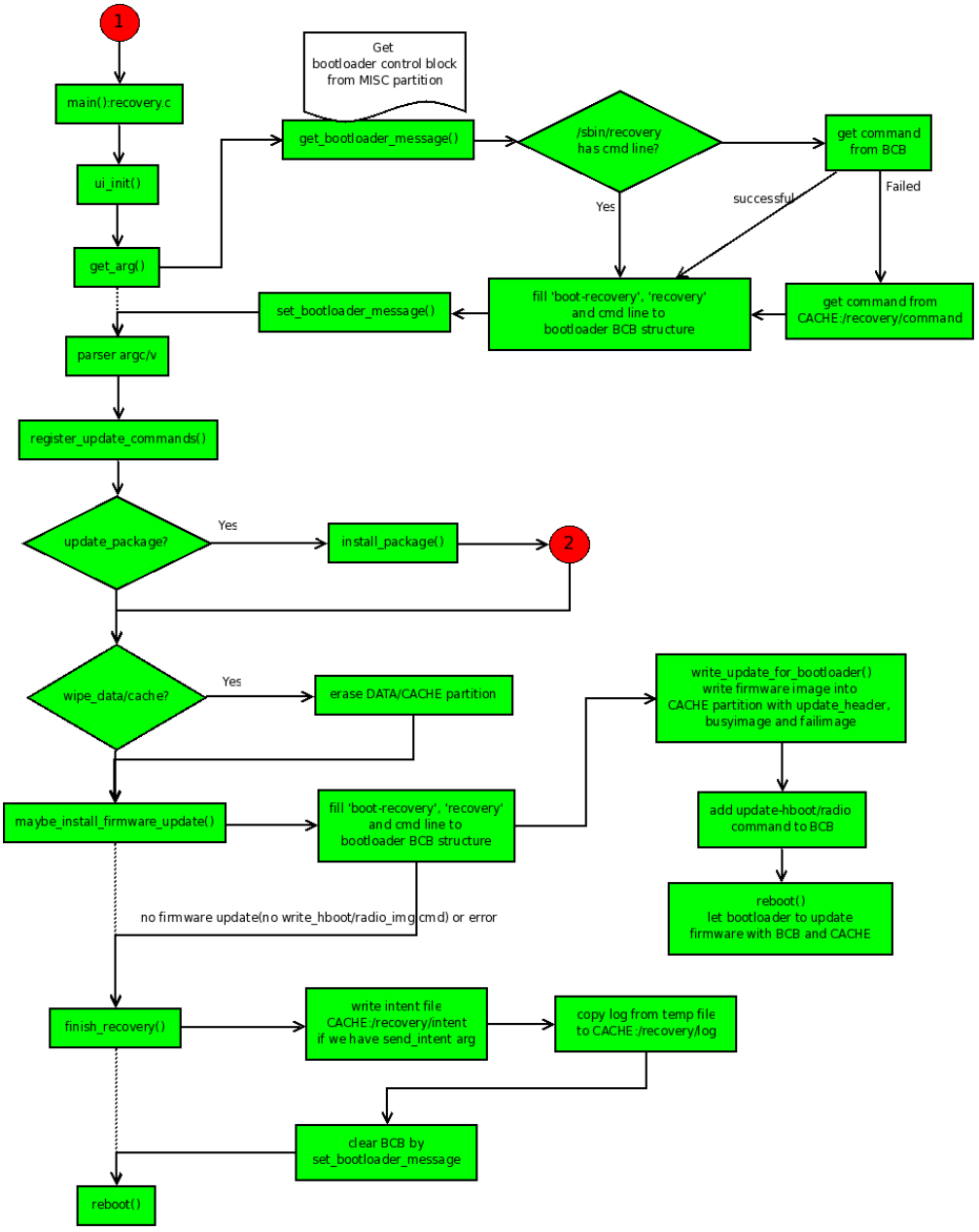
Appendix

1. Recovery Mechanism

This describes recovery mechanism and how to communicates bootloader and Android system. (It is quoted from China Linux Forum, http://blog.chinaunix.net/u/14459/showart_1911144.html).





2. How to Update Bootloader

The OTA package can contain a bootloader image and can be updated in recovery mode. If you remove following line

TARGET_NO_BOOTLOADER := true

in the BoardConfig.mk and copy your bootloader image which is renamed lk.rom to bootloader.img to device directory (device/<your vendor name>/<your product name>/bootloader.img), the Android build system adds your bootloader image to OTA package file.

3. How to Get Tools

To flash an image/recovery image package to android device, you need to have access to the proper tools.

If you are flashing android device using the recovery image method, you need the adb tool to copy it

to External Storage or Internal storage.
If you are flashing android device using fastboot method, you need the fastboot tool in addition to the adb tool

1) adb tool
The adb tool is included in the Android SDK.
If you have already installed Android SDK, you will find adb in the SDK.

2) fastboot tool
fastboot source code is available in the Telechips Android source repository and is compiled whenever you build from that tree
You will file the fastboot executable in this location.
<build-dir>/out/host/<platform>/bin/