Rockchip Introduction Partition

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Preface

Overview

The Rockchip Android system platform uses a parameter file to configure some system parameters, such as firmware version, model name, memory partition information.

The Parameter file is a very important system configuration file. It is best to modify the configuration function after understand it completely,which avoid the system does not work properly due to incorrect configuration of the parameter file.

The size of the parameter file is limited to 64 KB.

Chipset Version

Chipset	SDK Version
All chipset	All

Intended Audience

This document (this guide) is mainly intended for:

Technical support engineers
Software development engineers

Revision History

Version	Author	Date	Change Description
V1.0.0	Yifeng.Zhao	2011-04-11	parameter instruction
V1.1.0	Yifeng.Zhao	2011-09-05	Complete functional documentation
V1.2.0	Yifeng.Zhao	2012-10-16	Add RK30 and RK292X configurations
V1.3.0	Yifeng.Zhao	2013-04-15	Add GPIO configurations
V1.4.0	Yifeng.Zhao	2018-01-23	Add GPT configurations
V1.4.1	Yifeng.Zhao	2020-02-21	Modify style
V1.5.0	Jason.Zhu	2020-06-16	Add partition definition specification

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1. Parameter Preview

The parameter file is mainly used to define partition table. It can support two partition formats: GPT partition and legacy CMDLINE partition. There will be some differences in the contents of parameter files for different projects and different platforms.

The document use the parameter file of RK3326 to explanation.

The parameter file for GPT：

```
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),0x00002000@0x00006000(tr
ust),0x00002000@0x00008000(misc),0x00002000@0x0000a000(dtb),0x00002000@0x0000c000
(dtbo),0x00000800@0x0000e000(vbmeta),0x00010000@0x0000e800(boot),0x00030000@0x000
1e800(recovery),0x00028000@0x0004e800(backup),0x00002000@0x00076800(security),0x0
0070000@0x00078800(cache),0x002d0000@0x000e8800(system),0x00008000@0x003b8800(met
adata),0x00070000@0x003c0800(vendor),0x00020000@0x00430800(oem),0x00000400@0x0045
0800(frp),-@0x00450c00(userdata:grow)
uuid:system=af01642c-9b84-11e8-9b2a-234eb5e198a0
```

The parameter file for CMDLINE：

```
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
CMDLINE:console=ttyFIQ0 androidboot.console=ttyFIQ0 initrd=0x62000000,0x00800000
mtdparts=rk29xxnand:0x00002000@0x00004000(uboot),0x00002000@0x00006000(trust),0x0
0002000@0x00008000(misc),0x00002000@0x0000a000(dtb),0x00002000@0x0000c000(dtbo),0
x00000800@0x0000e000(vbmeta),0x00010000@0x0000e800(boot),0x00030000@0x0001e800(re
covery),0x00028000@0x0004e800(backup),0x00002000@0x00076800(security),0x00070000@
0x00078800(cache),0x002d0000@0x000e8800(system),0x00008000@0x003b8800(metadata),0
x00070000@0x003c0800(vendor),0x00020000@0x00430800(oem),0x00000400@0x00450800(frp
),-@0x00450c00(userdata)
```

The main differences between GPT partition and legacy CMDLINE partition are：

- Defined **"TYPE: GPT"**

- Add "grow" flag in Last partition, For example: **"userdata:grow"**
- Define UUID for system or rootfs, For example: **"uuid:system=af01642c-9b84-11e8-9b2a-234eb5e198a0"**
- Parameter files will not be burned into NVM (EMMC, NAND, etc.), and only mtdparts partition definitions and UUIDs will be used. Other informations are only defined for compatibility with upgrade tools.

2. Details Information

2.1 FIRMWARE_VER:9.0

Item	FIRMWARE_VER
Type	Decimal number，format: X.X
value	0 - 255
description	The firmware version will be used as packaging updata.img, and the upgrade tool will identify the firmware version based on this code.

2.2 MACHINE_MODEL:RK3326

Item	MACHINE_MODEL
Type	Strings
Length(max)	255
description	Machine model, use for package updata.img, you can modify it for display in upgrade tool according to different projects, which also determine whether the firmware matches correctly device as upgrading firmware in recovery.

2.3 MACHINE_ID:007

Item	MACHINE_ID
Type	Strings
Length(max)	255
description	The Product development ID, which consists of characters and numbers, use for package updata.img. There are different IDs in different projects, which can be used to identify machine models. Also, determine if the firmware matches correctly device as upgrading firmware in recovery.

2.4 MANUFACTURER:rk3326

Item	MANUFACTURER
Type	Strings
Length(max)	255
description	Vendor information, which use to package updata.img, can be modified by yourself for the upgrade tool display.

2.5 MAGIC:0x5041524B

Item	MAGIC
Type	Hexadecimal number
Value	0x5041524B(fix)
description	Magic number can not be modified. Some new APs use DTS instead of magic number. But for compatibility, please do not delete or modify.

2.6 ATAG:0x60000800

Item	ATAG
Type	Hexadecimal number
value	32 bits ddr address
description	ATAG data stroage address. Some new APs use DTS instead of this. But for compatibility, please do not delete or modify.

2.7 MACHINE:3226

Item	MACHINE
Type	Strings
Length(max)	255
description	This code uses to Kernel identification and match to the kernel, which can not be modified.

The following table lists the values for several Chipset:

Chipset	MACHINE
RK29xx	2929
RK292X	2928
RK3066	3066
RK3126C	3126c
RK3326	3326
RK3399	3399
RK3308	3308

2.8 CHECK_MASK:0x80

Item	MACHINE_MODEL
Type	Hexadecimal number
Length(max)	0x80(fix)
description	Reserved, please do not modify it.

2.9 TYPE:GPT

This code specify the partition defined in the file CMDLINE for the upgrade Tool to create GPT and write to NVM（NAND，EMMC，etc.）storage devices instead of the parameter file.

2.10 CMDLINE：

"console=ttyFIQ0 androidboot.console=ttyFIQ0"，which is serial port definition。

initrd=0x62000000,0x00800000，The first parameter is the location where RAMDISK is loaded into SDRAM, the second parameter is the size of RAMDISK.

The definition of androidboot.xxx is used as android started. There are some platforms define in the dts of the kernel. This part of the definition is generally no need to modified and remain the value of the SDK default.

The partition preview:

```
mtdparts=rk29xxnand:0x00002000@0x00002000(uboot),0x00002000@0x00004000(trust),0x0
0002000@0x00006000(misc),
0x00008000@0x00008000(resource),0x00010000@0x00010000(kernel),0x00010000@0x000200
00(boot),0x00020000@0x00030000(recovery),
0x00038000@0x00050000(backup),0x00002000@0x00088000(security),0x00100000@0x0008a0
00(cache),0x00400000@0x0018a000(system),
0x00008000@0x0058a000(metadata),0x00080000@0x00592000(vendor),0x00080000@0x006120
00(oem),0x00000400@0x00692000(frp),-@0x00692400(userdata)
```

Partition definition instruction:

1. For compatibility , all the Rockchip SOCs are identified by rk29xxnand.
2. Single partition description:

For example: 0x00002000@0x00008000(boot), the value before the @ symbol is the partition size, the value after the @ symbol is the starting position of the partition, and the characters in the brackets are the names of the partitions. The unit of all values is sector, and one sector is 512 bytes. In the above example, the start position of the boot partition is 0x8000 sectors, and the size is 0x2000 sectors (4MB).

3. For good performance, each partition start-address requires 32KB (64 sectors) alignment, and the size also requires an integer multiple of 32KB.
4. If you use the image in the format of sparse , the partition will be erased during the upgrade. For better compatibility, the corresponding partition is preferably aligned by 4MB, and the size is also configured as an integer multiple of 4MB.
5. Using GPT partition, the address defined in the parameter is the real logical address (LBA). For example, U-Boot is defined at 0x4000, as it loader into EMMC and NAND, the logical address is also 0x4000.

Name	Parameter Address	EMMC Logic Address	NAND Logic Address	Size
GPT	--	0	0	32KB
LOADER	--	0x40	0x40	4MB-32KB
Reserve	--	0x2000	0x2000	4MB
UBOOT	0x4000	0x4000	0x4000	4MB
TRUST	0x6000	0x6000	0x6000	4MB

The last partition needs to specify parameter "grow" , the tool will allocate the remaining space to the last partition.

6. Using the legacy cmdline partition, if it is EMMC , the space of 0-4MB is reserved for the loader. The partition defined in the parameter needs to add 4MB. For example, U-Boot is defined at 0x2000, as actually write into EMMC, the logical address to be the same with GPT partition, that is 0x4000. If it is NAND , in order to be compatible with the legacy, all addresses are real logical addresses. For example, U-Boot is defined at 0x2000, the logical address is also 0x2000, which is different from GPT.

Name	Parameter Address	EMMC Logic Address	NAND Logic Address	Size
Reserve	--	0	0	32KB
LOADER	--	0x40	0x40	4MB-32KB
parameter	--	0x2000	0x0	4MB
UBOOT	0x2000	0x4000	0x2000	4MB
TRUST	0x4000	0x6000	0x4000	4MB

Note: Using NAND FLASH, The address 0x40 may write with the loader image，its share 0-4MB space with the parameter, and the valid data will not be overwritten.

3. Partition Definition Specification

1. All partitions which are written by bootrom, pre-loader, uboot and trust must be palced before recovery partition.
2. Any new partitions added by the customer, which are written by the pre-loader, uboot and trust, should be placed before the recovery partition;
3. The misc, vbmeta and security partitions which is used by rockchip should be placed before the recovery partition.