EC2x&EG9x&EG25-G Series

QuecOpen Partition Adjustment Guide

LTE Standard Module Series

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About the Document

Revision History

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-	2020-06-13	Zhaomeng XIAO	Creation of the document
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1 Introduction

Quectel LTE Standard EC2x series, EG9x series and EG25-G modules support QuecOpen® solution. QuecOpen is an open-source embedded development platform based on Linux system. It is intended to simplify the design and development of IoT applications. For more information on QuecOpen®, see ***document [1]***.

This document mainly introduces how to adjust the Linux partition used to store, read and write user applications and configuration parameter data in the firmware package and how to make and load the UBI file system of the corresponding partition in QuecOpen® solution.

1.1. Applicable Modules

Table 1: Applicable Modules

Module Series	Module
EC2x series	EC25 series
	EC21 series
	EC20 R2.1
EG9x series	EG95 series
	EG91 series
EG25-G	EG25-G

NOTE

This document only applies to QuecOpen® modules with 512 MB RAM + 256 MB ROM.

2 QuecOpen® Linux Partition Introduction

The following table describes the relevant partitions in the Linux operating system used to store, read and write user applications and configuration parameter data in QuecOpen® solution. Except for the partitions described in the following table, no other partitions can be modified and cannot be used to store, read or write user applications and configuration parameter data.

Table 2: Adjustable Partition Overview

User Partition	Default Size	Available Size	Partition Format	Mount Point	Use
usr_data	90.5 MB	About 88.5 MB	UBI file system	*\usrdata*	● Store, read and write user applications and configuration parameter data.
sys_back	58 MB	Disabled	Image	Not mounted	● *rootfs* volume backup. ● Recommend not to use it.
system	284.5 MB	About 230.9 MB	UBI file system	\ (Root directory)	● *rootfs* volume. ● Store, read and write user applications and configuration parameter data.

For matters needing attention related to the use and adjustment of these partitions, see ***Chapter 3.3*** for details.

NOTE

For the backup and restoration solutions of user application and crucial parameters, see ***document [2]***.

3 Partition Adjustment

The *partition.mbn* file is the partition table written to the module, located in the *\update* directory of the firmware package. The *partition_nand.xml* configuration file is used to make *partition.mbn*, and its content is shown in the figure below.

```
        <partition>
            <name length="16" type="string">0:usr_data</name>
            <size_kb length="4">126564</size_kb>
            <pad_kb length="4">512</pad_kb>
            <which_flash>0</which_flash>
            <attr>0xFF</attr>
            <attr>0x01</attr>
            <attr>0x00</attr>
            <attr>0xFF</attr>
            <img_name type="string">usrdata.ubi</img_name>
        </partition>
        <partition>
            <name length="16" type="string">0:sys_back</name>
            <size_kb length="4">58880</size_kb>
            <pad_kb length="4">512</pad_kb>
            <which_flash>0</which_flash>
            <attr>0xFF</attr>
            <attr>0x01</attr>
            <attr>0x00</attr>
            <attr>0xFF</attr>
            <img_name type="string">mdm9607-perf-sysfs.ubi</img_name>
        </partition>
        <partition>
            <name length="16" type="string">0:system</name>
            <flags length="4">0xFFFFFFFF</flags>
            <flags length="4">0xFFFF</flags>
            <which_flash>0</which_flash>
            <attr>0xFF</attr>
            <attr>0x01</attr>
            <attr>0x00</attr>
            <attr>0xFF</attr>
            <img_name type="string">mdm9607-perf-sysfs.ubi</img_name>
        </partition>
    </partitions>
</nandboot>
```

Figure 1: partition_nand.xml Configuration File

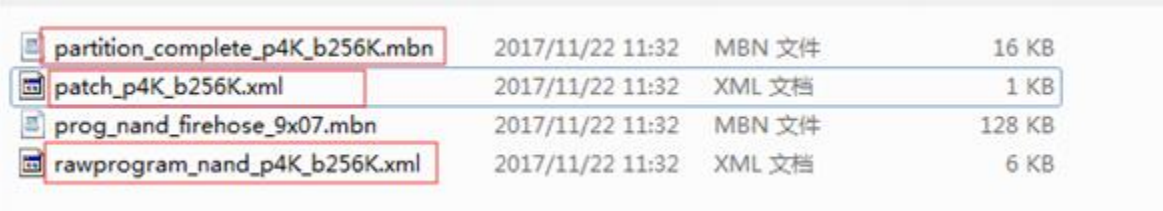
Table 3: Tag Description of partition_nand.xml Configuration File

Tag	Description	Description
<partition> and </partition>	The content between the two tags is the configuration information of one partition	
<name>	Partition name	
<size_kb>	The size of the NAND occupied by the partition	Unit: KB Size: must be an integer multiple of 128 KB
<pad_kb>	The size of the partition used for redundancy	Size: generally 128512 KB
<which_flash> and <attr>	-	The attributes of the five tags: <which_flash> and 4 <attr> shown in the above figure are configured according to that of *system* partition.
<img_name>	UBI file system image	

3.1. Add a Partition

The steps to add a partition are as follows:

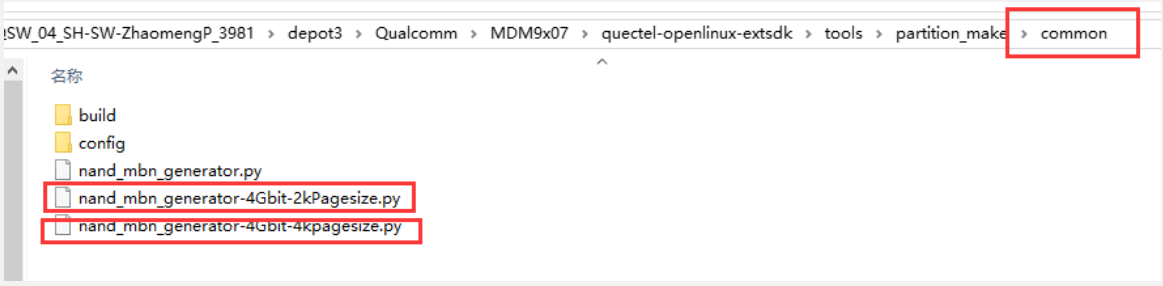
1. Add the content of a <partition> tag in the *partition_nand.xml* configuration file by referring to the configuration of other partitions;
2. Copy *partition_nand.xml* to the environment of the *partition.mbn* partition table, and create a new *partition.mbn* file; and the steps for creating *partition.mbn* partition table are as follows:
   1) Copy the module SDK package to the Linux system environment, which needs to be installed in advance;
   2) Select the *\partition_make* directory, and copy the modified *partition_nand.xml* to the *\partition_make\common\config* directory;
   3) In the *\partition_make\common\build* directory, execute the *partition_gen.sh* script to generate the *partition.mbn* file;
3. After the generation of *partition.mbn*, execute the *build.py* script in the *partition_make\common\build* directory, and regenerate the following three files in the *\firehose* directory in the SDK package (except *prog_nand_firehose_9x07.mbn*); use these three files replace the corresponding files in the *\update\firehose* directory in the original firmware package (the corresponding file names are the same, and no need to do any operation on *prog_nand_firehose_9x07.mbn*).



4. Replace the old *partition.mbn* file in the firmware package with the new *partition.mbn* file;
5. Download the firmware in Firehose mode through the QFlash tool.
6. Perform firmware version burning and the partition adding takes effect.

NOTES

1. When executing the *partition_gen.sh* script, if there is a permission restriction problem reported, you need to execute the **sudo chmod -R 777 ./*** command in the *\partition_make* directory to modify the related permissions.
2. You need to use the *\partition_make* directory provided by Quectel after March 15, 2018.
3. The firmware download in Firehose mode through the QFlash tool is related to the totalsize, pagesize, totalpage, blocksize and other attributes of the NAND flash used by the specific module. The firmware download in Firehose mode through the QFlash tool is related to the totalsize, pagesize, totalpage, blocksize and other attributes of the NAND flash used by the specific module. The *\partition_make* directory provides NAND flash with the totalsize attribute of 4 Gbit and a pagesize of 4 KB by default. If the totalsize attribute of the NAND flash in the module used is 4 Gbit and the pagesize is 2 KB, you must use the *nand_mbn_generator-4Gbit-2kPagesize.py* file in the *\partition\make\common* path shown in the following figure to replace the *nand_mbn_generator.py* file; if the totalsize attribute of the NAND flash in the module is 4 Gbit and the pagesize is 4 KB, you need to use the *nand_mbn_generator-4Gbit-4kPagesize.py* file shown in the following figure to replace the *nand_mbn_generator.py* file.



3.2. Delete a Partition

To delete a partition, delete the content contained in the corresponding <partition> tag in the *partition_nand.xml* configuration file.

3.3. Matters Needing Attention

- Do not adjust the order of the partitions, especially the first 3 partitions in all partitions.
- If you have not confirmed with Quectel's engineers in advance, please do not delete the existing partition of Quectel's original firmware package.
- You can adjust the size of the *usr_data* partition according to actual needs, but do not change the partition name and partition mount point. If DFOTA function is required, the total space of the *usr_data* partition must be at least 60 MB. If the user application and module firmware need to be upgraded together, the space of the user application also needs to be reserved, but the total space cannot exceed the total available space (about 88.5 MB) of the *usr_data* partition.
- The *usr_data* partition is loaded by default in the *find_partitions.sh* script located in *\etc\init.d* directory. If the partition fails to mount, it will be automatically reformatted and then used. Therefore, there is a risk of loss of applications or data stored in the partition. The file data stored in the partition is open and can be adjusted according to your own programming needs. For specific implementation methods, see the codes in *find_partitions.sh*.
- The *sys_back* partition backs up the *system* partition. If the *system* partition stores data too large (85% or more of the available size of the *system* partition), the size of the *sys_back* partition needs to be adjusted accordingly, but please note that its size must be at least the *system.ubi* file size plus 6 MB.
- The *system* partition should be placed last, and the added partition can be inserted in front of it. After changing any one of the three partitions, note to calculate whether the space finally reserved for the *system* partition is enough; if the system partition space is not enough, it may not be loaded when the module is boot, cuasing repeated restoration of it. After you add your application to the *system.ubi* file system, the size of the re-generated *system.ubi* file cannot exceed 50 MB, or 6 MB smaller than the *sys_back* partition.

NOTE

Large data with the size of 85% or more of the available size of the *system* partition is not recommended to be added to the system partition when it is in use.

4 UBI File System Generation and Loading

If you have added a new partition, you need to generate the UBI file system corresponding to the partition. The specific method is as following.

4.1. Generate New UBI File System

For how to add a partition, see ***Chapter 3.1***. After the partition is added, you need to make a UBI file system image and see ***document [2]*** for the specific method.

4.2. Download UBI File System to the Corresponding Partition

You can configure whether to download the UBI file system in *partition_nand.xml*. To download, add the UBI file name to be downloaded to the partition in the last line of the *<partition>* tag, and then put the generated UBI file system image file in the firmware package. When the firmware is downloaded, the file will be downloaded to the corresponding partition of NAND.

```
<partition>
    <name length="16" type="string">0:usr_data</name>
    <size_kb length="4">126564</size_kb>
    <pad_kb length="4">512</pad_kb>
    <which_flash>0</which_flash>
    <attr>0xFF</attr>
    <attr>0x01</attr>
    <attr>0x00</attr>
    <attr>0xFF</attr>
    <img_name type="string">usrdata.ubi</img_name>
</partition>
```

NOTE

When downloading the firmware in Firehose mode through QFlash tool, see ***Chapter 3.1*** to replace the corresponding configuration file in the *\firehose* directory.

4.3. Load UBI File System

When the system restarts, execute the *EC20FXX_OCPU_SDK\ql-ol-sdk\ql-ol-rootfs\etc\init.d\find_partitions.sh* script to load the UBI file system. For details, see the codes in the script shown as below. UBI file system loading is divided into two steps. The first step is to add UBI file system, and the second step is to mount UBI volume.

```
eval FindAndMountVolume${fstype} usrfs /data
eval FindAndMount${fstype} modem /firmware
#quectel add for usr_data partition mount
eval FindAndMountUsrdata${fstype} usr_data /usrdata
```

NOTE

The newly added UBI file system needs to be mounted behind the *usr_data* file system, please do not change the order randomly.

5 Appendix References

Table 4: Related Documents

SN	Document Name	Description
[1]	Quectel_EC2x&EG9x&EG25-G_Series_QuecOpen_Quick_Start_Guide	Quick start guide applicable for EC2x series, EG9x series and EG25-G QuecOpen modules
[2]	Quectel_EC2x&EG9x&EG25-G_Series_QuecOpen_User_Application_and_Critical_Parameter_Backup_and_Restoration_Solution	User application and critical parameter backup and restoration solution applicable for EC2x series, EG9x series and EG25-G QuecOpen modules

Table 5: Terms and Abbreviations

Abbreviation	Description
DFOTA	Delta Firmware Over-The-Air
UBI	Unsorted Block Image
SDK	Software Development Kit