MC25&M25&M56-R-OpenCPU DFOTA Application Note

GSM/GPRS/GNSS Module Series

Rev. MC25&M25&M56-R-OpenCPU_DFOTA_Application_Note_V1.1

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Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

Tel: +86 21 5108 6236
Mail: info@quectel.com

Or our local office, for more information, please visit:
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About the Document

History

Revision	Date	Author	Description
1.0	2019-05-30	Edwin WEN/ Waner PAN	Initial
1.1	2019-07-26	Allan LIANG	Updated the API of DFOTA and related description (Chapter 3.4, 4 and 5.2)

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1 Introduction

This document introduces the method of upgrading the firmware and application via DFOTA (Delta Firmware Upgrade Over-The-Air). Meanwhile, it describes how to program DFOTA and use the package tool.

2 Package Tool

The delta firmware package (.pack file) needs to be generated with the tool *OpenCPU_DFOTA_Package_Tool*, which is placed in directory *SDK\tools*.

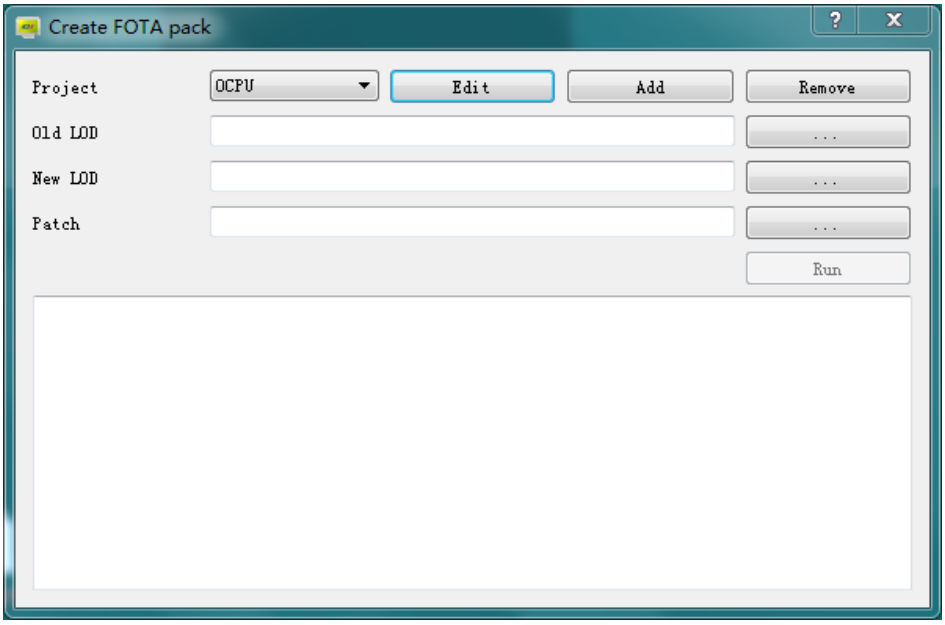

Figure 1: OpenCPU DFOTA Package Tool

The functions of the fields and buttons in the package tool are described as below.

- **Old LOD and New LOD**

Please select the .lod file running in the module in "**Old LOD**" field, and select the .lod file to be upgraded to the module in "**New LOD**" field.

- **Patch**

Select the storage path in "**Patch**" field where the .pack file packaged will be saved, and the packaged file can be renamed.

- **Edit**

Configure the base address and size of code flash.

- **Add and Remove**

The two fields are used to configure tool *OpenCPU_DFOTA_Package_Tool*. For normal usage, leave them as the default.

3 DFOTA Flow

Firmware or application upgrade process via DFOTA consists of the following steps:

Step 1: Save the .lod file including firmware .lod or application .lod that is downloaded to the module before.

Step 2: The application .lod file can be compiled to generate a new .lod file. And the firmware .lod is in folder *upgrade* of the new firmware package with the name "XXX_UPG.lod".

Step 3: Make the delta firmware package with the tool *OpenCPU_DFOTA_Package_Tool*.

Step 4: Put the package (.pack file) on customers' server.

Step 5: Launch upgrading processing by sending some commands locally or remotely.

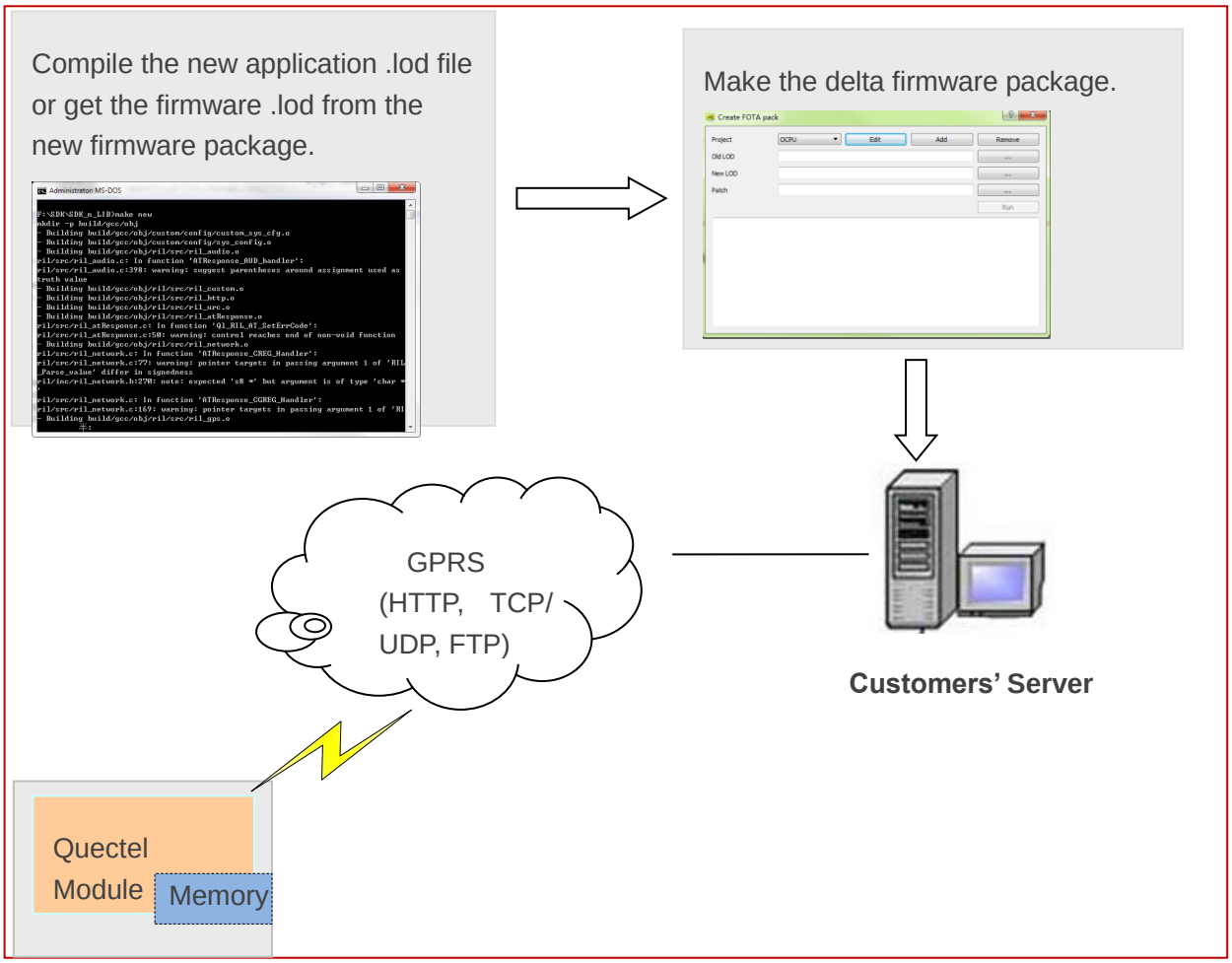

Figure 2: OpenCPU DFOTA Flow

3.1. Compile Application.lod File and Generate New .lod File

The application .lod file can be compiled to generate a new .lod file. And customers can compile the new codes that they want to upgrade to the module. *Quectel_MC25-OpenCPU_User_Guide*, *Quectel_M25-OpenCPU_User_Guide*, *or Quectel_M56-R-OpenCPU_User_Guide* introduces how to compile codes to generate a new .lod file.

NOTE

If customers only want to upgrade firmware, then this step can be skipped.

3.2. Make the Delta Firmware Package

Open *OpenCPU_DFOTA_Package_Tool* (path: *sdk\tools*), select the .lod file that is downloaded to the module before in "**Old .LOD**", select the .lod file that to be upgraded to the module in "**New .LOD**", select the generated path in "**Patch**" and the other parameters will be set by default. Click the "**Run**" button, then an .pack file named "DFOTA.pack" will be generated, and the file can be renamed.

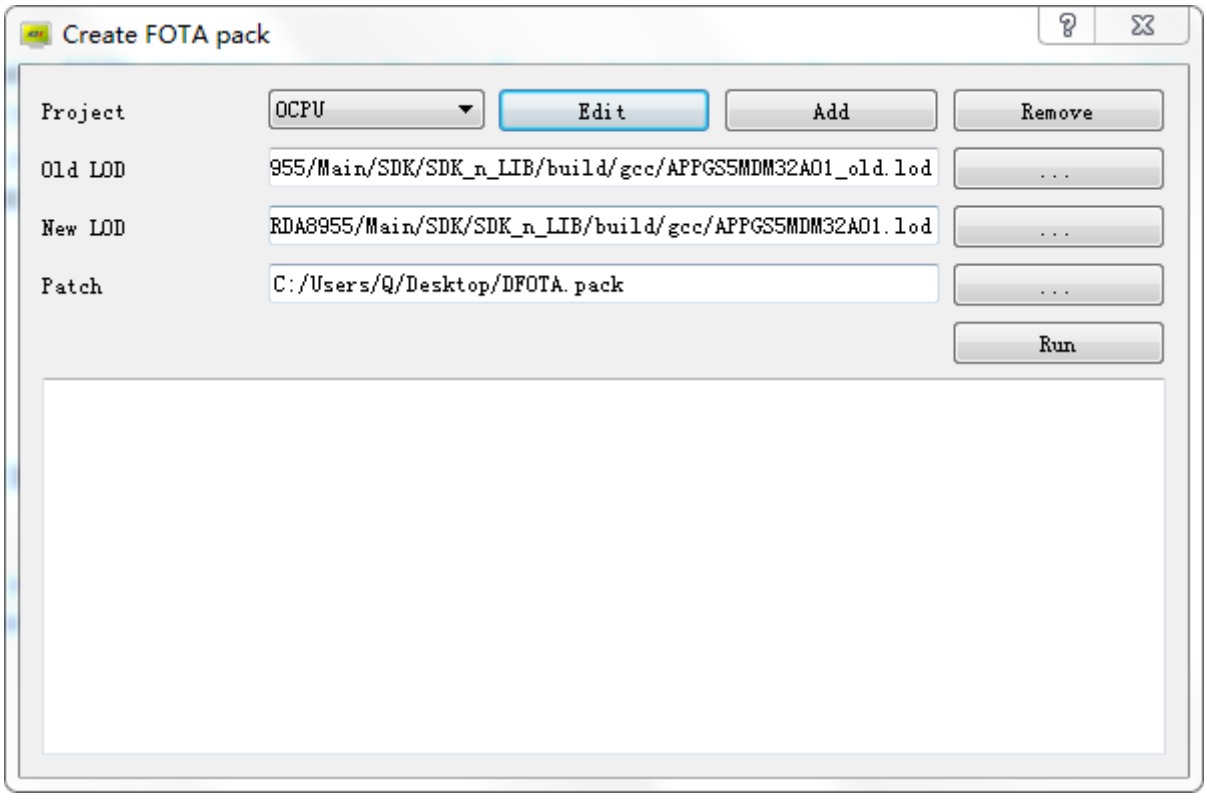

Figure 3: Make the Delta Firmware Package

The configuration of packaging firmware .lod and that of packaging application .lod are different. And the "**Edit**" button is used for the configuration. Please note that the DFOTA Reserved Size, Code Flash Base, and Code Flash Size for configuration of packaging firmware and application .lod files must follow the two figures shown below. Please refer to ***Chapter 3.2.1*** and ***3.2.2*** for details.

3.2.1. Configuration for Packaging Firmware .lod

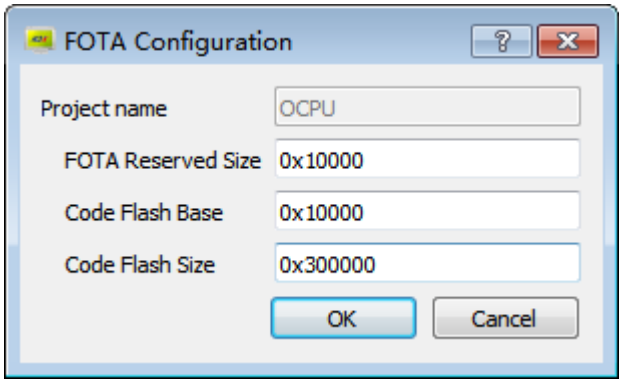

Figure 4: Configuration for Packaging Firmware .lod

3.2.2. Configuration for Packaging Application .lod

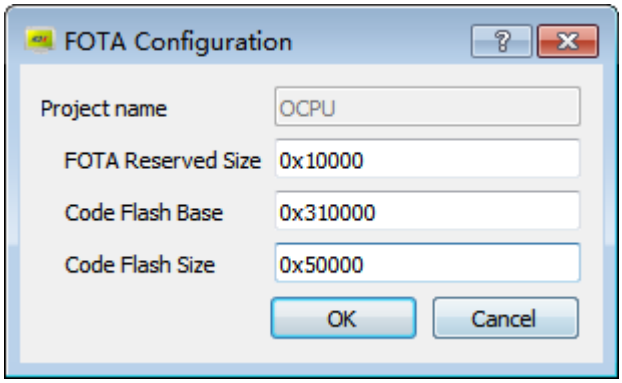

Figure 5: Configuration for Packaging Application .lod

3.3. Put the Generated .pack File on the Server

First of all, build a server that can be accessed by module via FTP or HTTP. Then put the generated .pack file *DFOTA.pack* (can be renamed) on the server.

3.4. Start DFOTA

The firmware or application upgrade process via DFOTA can be launched either locally or remotely. If the device is portable, a local method can be designed to launch the firmware or application upgrade via DFOTA, such as a button or a menu item; and if the device is unattended, a remote method to launch the firmware or application upgrade via DFOTA is recommended. For example, a call, a short message, or a special frame of TCP/UDP data can be used to start the firmware or application upgrade via DFOTA remotely. For remote method, upgrade command can be sent to a lot of devices simultaneously.

After receiving the upgrade command or request, the program just need to call one API **QI_DFOTA_StartUpgrade()** to start DFOTA.

4 DFOTA API

An API function can be called to complete related programming of OpenCPU DFOTA. The URL address, port and account information should be included in the API parameters.

4.1. Ql_DFOTA_StartUpgrade

This API function is used to start DFOTA upgrading process. Only this function needs be called to launch DFOTA when the update data is ready in FTP or HTTP server.

- **Prototype**

```
typedef bool (* Callback_Upgrade_State)(Upgrade_State state, s32 fileDLPercent);

s32 Ql_DFOTA_StartUpgrade(u8* url, ST_GprsConfig* apnCfg, Callback_Upgrade_State callbcak_UpgradeState_Ind);
```

- **Parameters**

url:

[In]: The URL address of the destination .pack file, along with other relative information such as port, username and password.

The URL format of HTTP is: http://hostname:port/filePath/fileName. If ":port" in the URL is omitted, it means the port is HTTP default port (80).

The URL format of FTP is: ftp://hostname:password/filePath/fileName:port@username:password. If ":port" in the URL is omitted, it means the port is FTP default port (21). If there is no username and password, "@username:password" ("@" must be included) can be omitted.

URL examples are given as below:

- ftp://www.jjj.com/filePath/xxx.pack:8021@username:passwerd
- ftp://www.jjj.com/filePath/xxx.pack@username:passwerd
- ftp://192.168.10.10/filePath/APP.pack
- http://23.11.67.89/filePath/xxx.pack
- http://www.quectel.com:8080/filePath/xxx.pack

apnCfg:
[In]: APN related parameters.

callbcak_UpgradeState_Ind:
[Out]: Callback function that reports the upgrade state. If it is Null, a default callback function "Dfota_Upgrade_States" will be used.

- **Return**

0: Indicates this function is successfully executed.
-1: Indicates this function failed.

5 How to Program DFOTA

Quectel provides two examples named *example_dfota_ftp.c* and *example_dfota_http.c*, which fully demonstrate how to upgrade the firmware or application via DFOTA.

Please refer to the following instructions to program the upgrade process via DFOTA.

5.1. Define DFOTA Downloading Protocol

DFOTA function is controlled by macros defined in the file *custom_feature_def.h*.

```
/*************************************************************************
 * DFOTA Feature Definition
 *************************************************************************/
#define __OCPU_DFOTA_BY_HTTP__
#define __OCPU_DFOTA_BY_FTP__
```

For FTP:
If the delta firmware package is downloaded from a FTP server, customers need to define the macro "__OCPU_DFOTA_BY_FTP__" and comment the macro "__OCPU_DFOTA_BY_HTTP__".

For HTTP:
If the delta firmware package is downloaded from a HTTP server, customers need to define the macro "__OCPU_DFOTA_BY_HTTP__" and comment the macro "__OCPU_DFOTA_BY_FTP__".

5.2. Execute DFOTA API

Set the APN according to the actual situation of customers and write the URL according to the required format. Then, call the function **QI_DFOTA_StartUpgrade()** to start the upgrade process. Please note that the URL must be written as required, otherwise the upgrade will fail. For more details of the URL format, please refer to ***Chapter 4***.

```
#define URL_ADDR                ftp://192.168.xxx. xxx/filePath/app.pack:21@abc:abc

ST_GprsConfig apnCfg;
Ql_strncpy(apnCfg.apnName, “CMNET”,    Ql_strlen(“CMNET”));
Ql_strncpy(apnCfg.apnUserId,    “123”, Ql_strlen(“123”));
Ql_strncpy(apnCfg.apnPasswd, “123”, Ql_strlen(“123”));

s32 ret = Ql_DFOTA_StartUpgrade(URL_ADDR, &apnCfg, CallBack_UpgradeState_Ind);
```

6 Appendix A Reference

Table 1: Reference Documents

SN	Document Name
[1]	Quectel_MC25-OpenCPU_User_Guide
[2]	Quectel_M25-OpenCPU_User_Guide
[3]	Quectel_M56-R-OpenCPU_User_Guide

Table 2: Abbreviations

Abbreviation	Description
App	OpenCPU Application
Core	Core System, OpenCPU Operating System
OS	Operating System
SDK	Software Development Kit
API	Application Programming Interface
DFOTA	Delta Firmware Upgrade Over-The-Air