EC25-J SoftBank AutoFOTA Application Note

LTE Standard Module Series

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About the Document

Revision History

Version	Date	Author	Description
1.0	2020-08-21	Herry GENG	Initial
1.1	2021-09-29	Darie HUANG	1. Updated SoftBank AutoFOTA upgrade process (Chapter 2); 2. Added Step 5 in SoftBank AutoFOTA procedures and updated Figure 5 (Chapter 3); 3. Added SoftBank AutoFOTA AT commands (Chapter 4); 4. Updated URC +QSBFOTA: "after <timeout> will update..." and added explanation of<timeout>; 5. Added examples of AT commands and URCs (Chapter 6); 6. Added description of <code>= 6 (Table 3).
1.2	2022-04-11	Darie HUANG	Added a note for SoftBank AutoFOTA (Chapter 1).

Contents

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1 Introduction

The SoftBank AutoFOTA mechanism is to upgrade the module's firmware version by regularly polling the available delta firmware package on SoftBank FOTA server according to the mandatory requirements of Japan's SoftBank certification. Quectel will update the delta firmware package from time to time and upload it to the SoftBank FOTA server to ensure that the firmware of the user terminal is the latest version.

This document mainly introduces the AutoFOTA process of Quectel's EC25-J module under LTE network. You do not need to perform any firmware upgrade related configuration since the module will report the upgrade status through URCs. Also, you can also configure relevant parameters through AT commands. For details of AutoFOTA AT commands, please refer to *Chapter 4.3*.

[1] Check the delta firmware package.
[2] Download the delta firmware package.
[3] Upgrade the firmware.
[4] Upgrade result notification.
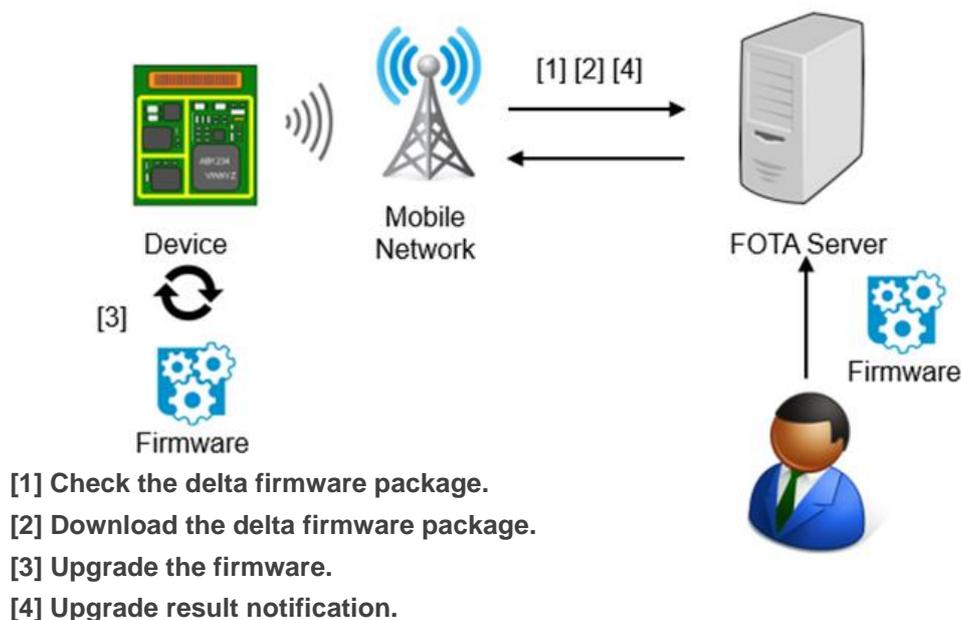
Figure 1: SoftBank AutoFOTA Mechanism

> **NOTE**
>
> 1. Do not shut down the module during the whole AutoFOTA process. When a new package is detected on the FOTA server, the module should not be powered off until it completes AutoFOTA upgrade successfully, otherwise the upgrading may fail.
> 2. If (U)SIM card only has single APN and is not allowed to carry the multiple data services at the same time, the external protocol stack data (RmNet and MBIM) and AutoFOTA features (including polling, download and upgrade) cannot be used simultaneously. It is recommended to use ECM which can be used simultaneously with AutoFOTA.

2 SoftBank AutoFOTA Process

2.1. Polling Cycle

The polling timer cycle is set to 14 days plus 0–24 (random) hours. When the polling timer expires, the module queries whether there is a new delta firmware package on the FOTA server.

● If there is a new delta firmware package, the module automatically downloads the delta firmware package and begins upgrade, and sets the next polling cycle to 14 days plus 0–24 (random) hours.

● If there is not a new delta firmware package, the next polling cycle is set to 14 days plus 0–24 (random) hours directly.

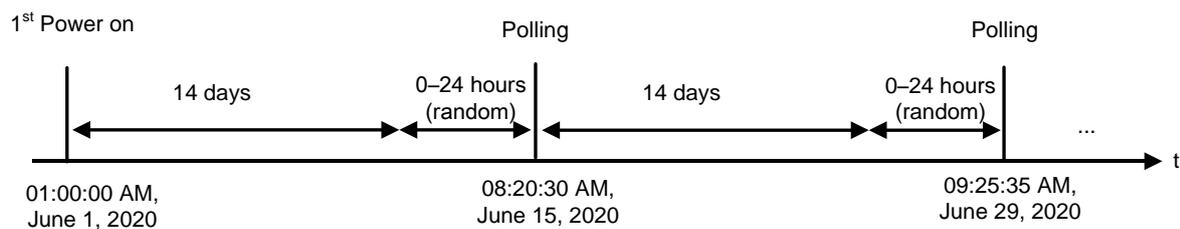**Figure 2: Polling Cycle (When the Module is Always Active)**
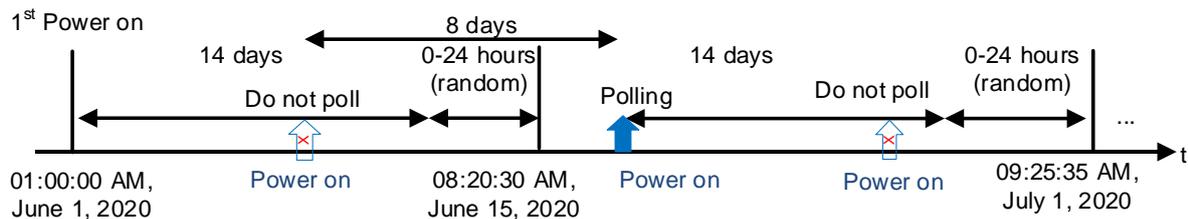
Figure 3: Polling Cycle (Taking Module to be Powered on Every 8 Days as An Example)

2.2. Upgrade Process
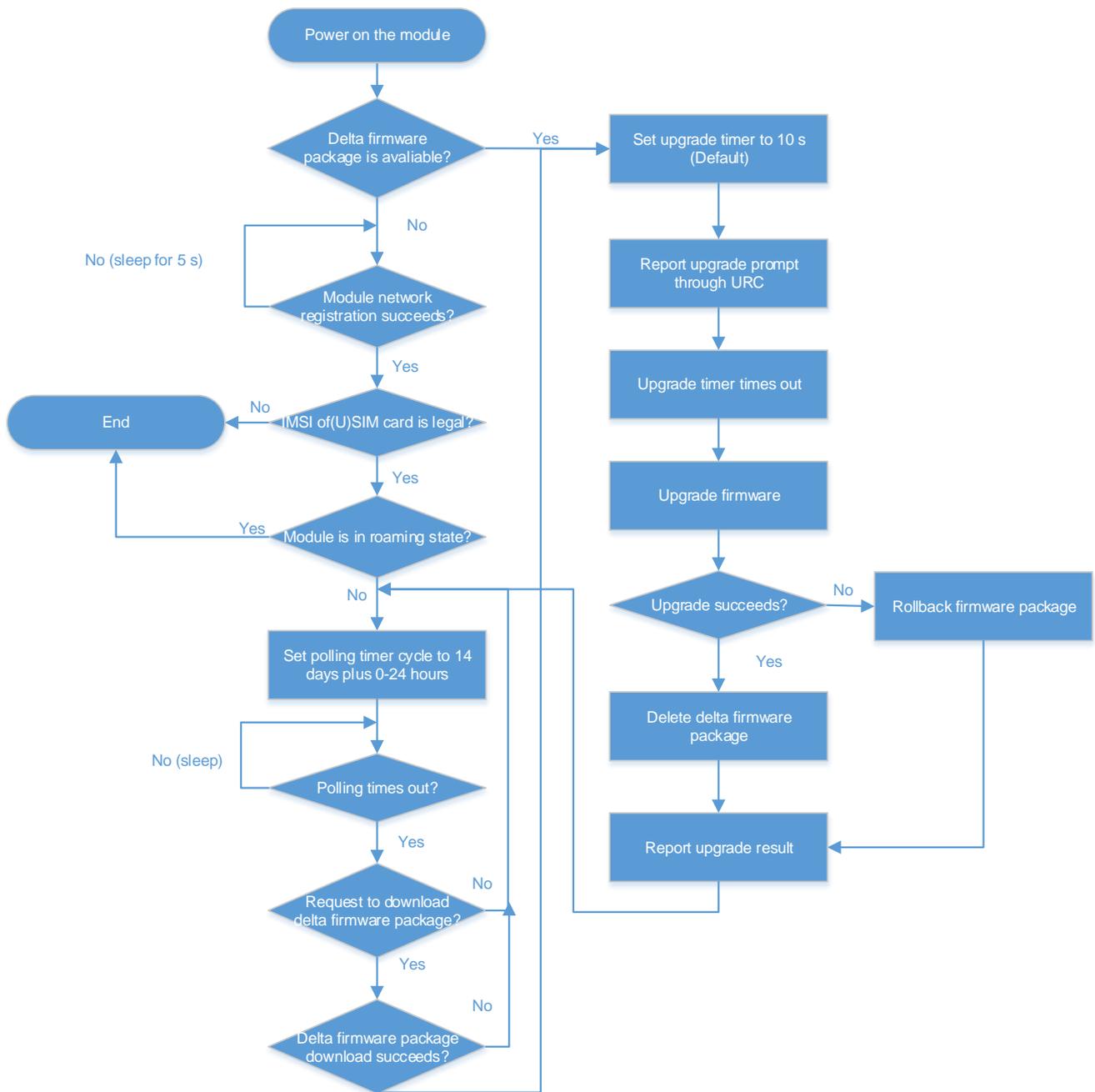
Figure 4: SoftBank AutoFOTA Flow Chart

> **NOTE**
>
> Please use a SoftBank (U)SIM card to ensure the legality of the IMSI.

3 SoftBank AutoFOTA Procedures

The following figure illustrates the SoftBank AutoFOTA upgrade procedures when the delta firmware package is stored on the FOTA server.

Step 1: If there is a new firmware to upgrade, Quectel makes the corresponding delta firmware package.
Step 2: Quectel uploads the package to the FOTA server.
Step 3: When the polling times out, the module downloads the delta firmware package automatically.
Step 4: After downloading the delta firmware package successfully, the module starts AutoFOTA upgrade automatically.
Step 5: The module sends the upgrade result to the FOTA server.

Figure 5: SoftBank AutoFOTA Procedures

4 SoftBank AutoFOTA AT Commands

4.1. AT Command Introduction

4.1.1. Definitions

- **<CR>**   Carriage return character.
- **<LF>**   Line feed character.
- **<...>**   Parameter name. Angle brackets do not appear on the command line.
- **[...]**   Optional parameter of a command or an optional part of TA information response. Square brackets do not appear on the comm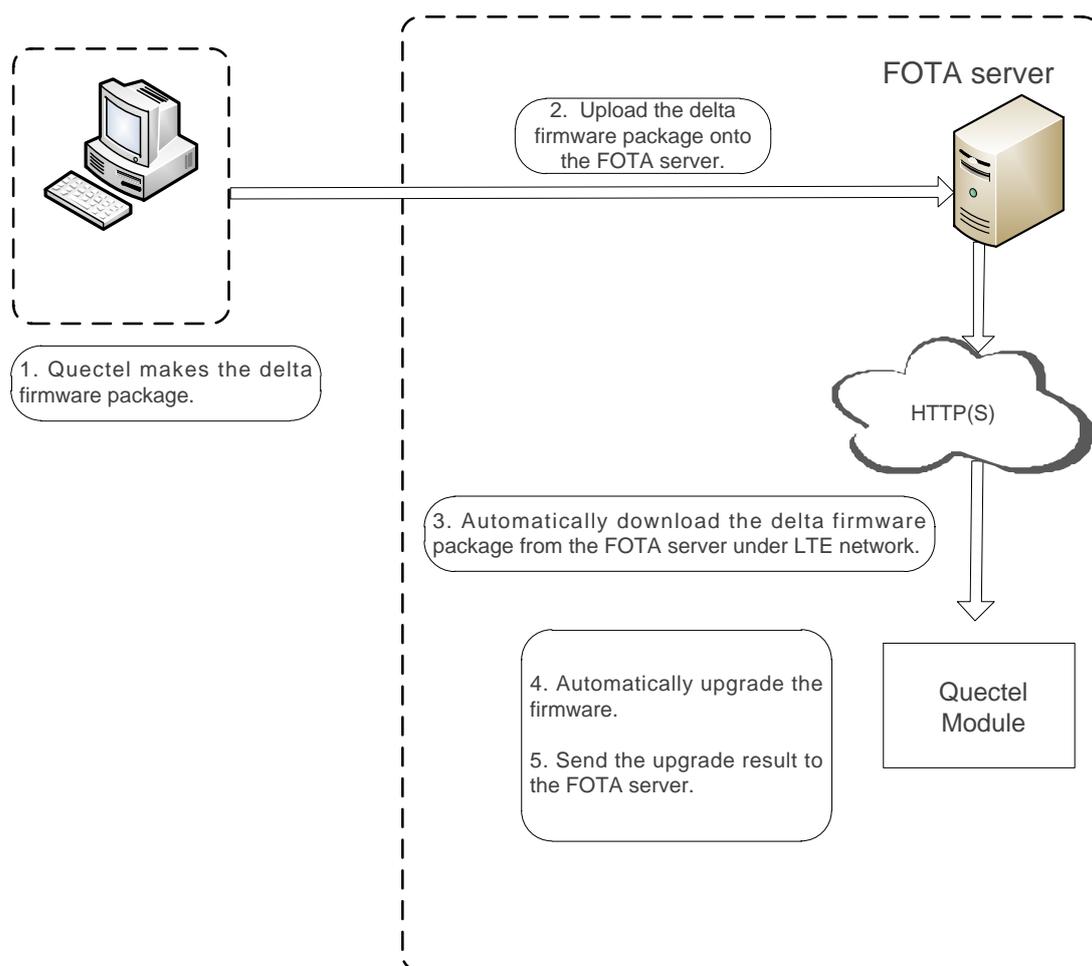and line. When an optional parameter is not given in a command, the new value equals to its previous value or the default settings, unless otherwise specified.
- **Underline**   Default setting of a parameter.

4.1.2. AT Command Syntax

All command lines must start with **AT** or **at** and end with **<CR>**. Information responses and result codes always start and end with a carriage return character and a line feed character: **<CR><LF><response><CR><LF>**. In tables presenting commands and responses throughout this document, only the commands and responses are presented, and **<CR>** and **<LF>** are deliberately omitted.

Table 1: Types of AT Commands

Command Type	Syntax	Description
Test Command	**AT+<cmd>=?**	Test the existence of corresponding Write Command and return information about the type, value, or range of its parameter.
Read Command	**AT+<cmd>?**	Check the current parameter value of a corresponding Write Command.
Write Command	**AT+<cmd>=<p1> [,<p2>[,<p3>[...]]]**	Set user-definable parameter value.
Execution Command	**AT+<cmd>**	Return a specific information parameter or perform a specific action.

4.2. Declaration of AT Command Examples

The AT command examples in this document are provided to help you learn about how to use the AT commands introduced herein. The examples, however, should not be taken as Quectel's recommendation or suggestions about how you should design a program flow or what status you should set the module into. Sometimes multiple examples may be provided for one AT command. However, this does not mean that there exists a correlation among these examples and that they should be executed in a given sequence.

4.3. Description of SoftBank AutoFOTA AT Commands

4.3.1. AT+QSBFOTA="protect_tm" Configure Delay Time

This command configures the delay time for starting AutoFOTA upgrade after the delta firmware package is downloaded successfully.

AT+QSBFOTA="protect_tm"	Configure Delay Time
Write Command **AT+QSBFOTA="protect_tm"[,<time>]**	Response If the optional parameter is omitted, query the current setting: **+QSBFOTA: "protect_tm",<time>** **OK** If the optional parameter is specified, configure the delay time: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<time>	Integer type. The delay time for starting AutoFOTA upgrade after the delta firmware package is downloaded successfully. Range: 0–60. Default: 10. Unit: second.

> **NOTE**
>
> 1. If **<time>** is 0, it means that the module starts AutoFOTA upgrade immediately after the delta firmware package is downloaded successfully. In such a case, no URC will be reported.
> 2. If **<time>** is not 0, after the delta firmware package is downloaded successfully, the URC **+QSBFOTA: "after <timeout> will update..."** is reported. **<timeout>** equals **<time>** in **AT+QSBFOTA="protect_tm"**.
> 3. You can configure the delay time to have enough time to stop or handle the ongoing tasks before the upgrade starts.

4.3.2. AT+QSBFOTA="update"　Start AutoFOTA Upgrade Immediately

This command starts AutoFOTA upgrade immediately.

AT+QSBFOTA="update"　Start AutoFOTA Upgrade Immediately	
Write Command **AT+QSBFOTA="update",<para>**	Response **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

<para>	Integer type. Whether to start AutoFOTA upgrade immediately.
	1　Start immediately, not required to wait for the delay time

> **NOTE**
>
> 1. Execute this command between the reporting of **+QSBFOTA: "after <timeout> will update..."** and **+QSBFOTA: "update","start"**, otherwise an error is returned.
> 2. Execute this command to start AutoFOTA upgrade immediately if the ongoing tasks have been stopped or completed before **<timeout>** reaches.

4.3.3. AT+QSBFOTA="poll_cycle"   Set Polling Cycle

This command sets the polling cycle of AutoFOTA.

AT+QSBFOTA="poll_cycle" Set Polling Cycle	
Write Command **AT+QSBFOTA="poll_cycle"[, <cycle>]**	Response If the optional parameter is omitted, query the current setting: **+QSBFOTA: "poll_cycle",<cycle>** **OK** If the optional parameter is specified, configure the polling cycle: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<cycle>   Integer type. The polling cycle of AutoFOTA. Range: 120–1209600. Default: 1209600. Unit: second.

> **NOTE**
>
> This command is for your test, only applicable to specific firmware version, and please contact Quectel Technical Support for details.

5 Description of URCs

URCs are reported to inform the AutoFOTA upgrade status.

5.1. Polling Start

Polling Start	
+QSBFOTA: "poll","start"	Polling start.

5.2. Polling Result

Polling Result	
+QSBFOTA: "poll","end",<code>	Polling result.

Parameter

<code>	Integer type. Result code. For more details, see *Table 3*.

5.3. Download Start

Download Start	
+QSBFOTA: "download","start"	Module starts to download the delta firmware package from SoftBank FOTA server.

5.4. Download Result

Download Result	
+QSBFOTA: "download","end",<code>	The download result of delta firmware package.

Parameter

<code>	Integer type. Result code. For more details, see *Table 3*.

5.5. Upgrade Prompt

Upgrade Prompt	
+QSBFOTA: "after <timeout> will update..."	The module is about to start the AutoFOTA upgrade.

Parameter

<timeout>	Integer type. The delay time for starting AutoFOTA upgrade after the delta firmware package is downloaded successfully. Range: 0–60. Default: 10. Unit: second. **<timeout>** equals **<time>** in **AT+QSBFOTA="protect_tm"**.

5.6. Upgrade Start

Upgrade Start	
+QSBFOTA: "update","start"	The module starts the AutoFOTA upgrade.

5.7. Upgrade Result

Upgrade Result	
+QSBFOTA: "update","end",<code>	The AutoFOTA upgrade result.

Parameter

<code>   Integer type. Result code. For more details, see **Table 3**.

6 Example

This chapter introduces the detailed example on the AutoFOTA upgrade process.

```
AT+QSBFOTA="protect_tm",10          //Set the delay time to 10 seconds.
OK

+QSBFOTA: "poll","start"            //Polling starts, check and download the delta firmware
                                      package.

+QSBFOTA: "download","start"        //Start to download.

+QSBFOTA: "download","end",0        //Succeed in downloading.

+QSBFOTA: "after 10 seconds, will update..." //Wait for 10 seconds after the delta firmware package is
                                      downloaded successfully and then start AutoFOTA
                                      upgrade.
AT+QSBFOTA="update",1                //Start AutoFOTA upgrade immediately.
OK

+QSBFOTA: "update","start"          //Start AutoFOTA upgrade.

+QIND: "FOTA","START"               //Start DFOTA upgrade.

+QIND: "FOTA","UPDATING",1
...
+QIND: "FOTA","UPDATING",100

+QIND: "FOTA","END",0               //Succeed in AutoFOTA upgrade.

+QSBFOTA: "update","end",0          //Succeed in DFOTA upgrade.

+QSBFOTA: "poll","end",0            //Succeed in polling.
```

NOTE

See *documcnt [1]* for details of URC **+QIND: "FOTA"**.

7 Appendix References

Table 2: Related Document

Document Name
[1]   Quectel_EC2x&EG2x-G&EG9x&EM05_Series_DFOTA_Application_Note

Table 3: Summary of <code> Result Codes

<code>	Description
0	Success
1	Failed to poll
2	Failed to download
3	Failed to upgrade
4	Network error
5	Failed to get the token
6	UE in roaming state

Table 4: Terms and Abbreviations

Abbreviation	Description
DFOTA	Delta Firmware Upgrade Over-The-Air
FOTA	Firmware Over-The-Air
HTTP(S)	Hypertext Transfer Protocol (Secure)
IMSI	International Mobile Subscriber Identity

LTE	Long-Term Evolution
UE	User Equipment
(U)SIM	(Universal) Subscriber Identification Module
URC	Unsolicited Result Code

LTE   Long-Term Evolution