

BC95 DFOTA User Guide

NB-IoT Module Series

Rev. BC95_DFOTA_User_Guide_V1.0

Date: 2018-01-24

Status: Released



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About the Document

History

Revision	Date	Author	Description
1.0	2018-01-24	Gary TANG/ Hayden WANG	Initial



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1 Introduction

This document mainly introduces how to use DFOTA (Delta Firmware Upgrade Over-The-Air) to remotely upgrade firmware on IoT platform for Quectel BC95 module with V100R100C10B657SP1 version or later.



2 Preparations

2.1. Enable omCapability

Please ensure the device has registered on IoT platform successfully and can send data normally before upgrading firmware via DFOTA.

In addition, omCapability function should be enabled in the profile that is imported to the device, so that firmware upgrade task can be created. The omCapability function can be achieved by adding the following codes marked in red to the device profile. Please get the detailed profile development guidelines from the IoT platform.

A reference profile template is given as below:

```
{
    "devices": [
         {
             "manufacturerId": "Huawei",
             "manufacturerName": "Huawei",
             "model": "NBIoTDevice",
             "protocolType": "CoAP",
             "deviceType": "SmartDevice",
             "omCapability":{
                      "upgradeCapability" : {
                      "supportUpgrade":false
                      },
                      "fwUpgradeCapability" : {
                      "supportUpgrade":true,
                      "upgradeProtocolType":"LWM2M",
                      "downloadProtocolType":"CoAP"
                      }
                      },
              "serviceTypeCapabilities": [
                  {
                      "serviceId": "Brightness",
                      "serviceType": "Brightness",
                       "option": "Master"
```





2.2. Generate Public-private Key Pair

1. Log on the IoT platform, and download offline signature tool through "**MANAGEMENT**" -> "**Tool**", as shown below.

Ø	OceanConnect		En	2	Ξ
ð	MANAGEMENT	Tool			
Ô	Accounts				
ñ	🗲 Tool	OFF-LINE SIGNATURE TOOL			
\$ ²		signtool.zip	 DESCRIPTION OF FUNCTION: 1. "Generate a digital signature public-private key pair": "Generate a digital signature public-private key pair": "Generate a private key encrypts the password ": Password box, must be selected. Description of password complexity : 1) The password must contain a combination of at least two characters: A:Z B:Z C: "Generate a public-private key pair": Eluton, Click to generate the public public.pem, private key and the same time, save the Save As dialog box. Package digital signature": Package digital signature": 		

Figure 1: Download Offline Signature Tool

2. Open the offline signature tool, set the "Signature Algorithm" as RSA2048+SHA256 from the drop-down menu, input password (such as Huawei123), and click "Generate Key" button, then *public.pem* and *private.pem* files will be generated.



R Offline Signtool	23
Huawei Offine Signtool	
Generate Public and Private Key Signature Algorithm Passward of Private Key RSA2048+SHA256 Generate Key Generate Key	
Softv 4 Generate Key Success!	
Software Package Verify Public Key File Insert Public Key File Software Package to be Verified Do Verify	

Figure 2: Generate Public and Private Key

3. Enter "APP MANAGEMENT" -> "Application" -> "Upgrade Authentication Management", and click "Upload" to upload public key file *public.pem* to the IoT platform, as shown in figures below.

ø) OceanConnect					En	2	Ξ
ð	APP MANAGEMENT	App List > Queo	telWS			3	⊥ Upload) Refresh
Ô	Home			2				
ŝ	Applications 1	Information	Statistics	Upgrade Authentication Management	NB-IOT Settings	App Flow Control		
\$?								
		Public Key						
		File	Device Type	Manufacturer Name	Time			
		public.pem	All Type	QWERTY	2017-11-02 16:58:07			

Figure 3: Upload Public Key File (1)



©)	OceanConnect				En	R	Ξ
ð		App List > Quectel	Upload Public Key			⊥ Upload	D Refresh
 ● ◆ 	Home	Information S	PUBLIC KEY FILE The file can not exceed 1M, and must be p Upload	ttings	App Flow Control		
		File [DEVICE TYPE AII Type · MANUFACTURER NAME				
		public.pem /	Select one or input the filter OK Cancel	8:58:07			

Figure 4: Upload Public Key File (2)

2.3. Sign Firmware Upgrade Package

2.3.1. Get Delta Firmware Package

Please get the delta firmware package from the module supplier.

2.3.2. Sign Delta Firmware Package

- 1. Open the offline signature tool, set the "Signature Algorithm" as RSA2048+SHA256 from the drop-down menu.
- 2. Click "**Insert Private Key File**" button to import the previously generated private key file *private.pem*, and the input password which is allocated by the IoT platform.
- 3. Select the software package which needs be signed, and click "**Do Signature**" button.
- 4. If prompt of "**Sign Success**" pops up, then a new delta firmware package ended with "signed" (e.g. *patch_signed.zip.*) will be generated into the same directory where the original delta firmware package is stored.



🕅 Offline Signtool	X
Huawei Offline Signtool	
Generate Public and Private Key Signature Algorithm Passwa	rd of Private Key
1 RSA2048+SHA256 -	••••
Generate Key	
Coffeenan Davlana Cira	
Private Key File	
Insert Private Key File E:\\\B\\ref\FOTA\\psw\\	private.pem
Software Package to be Signed	
3 E:\NB\BC95B8HBR01A02W16_TO_BC95B8HBR01A	Select
100%	
Success!	
Softwa 4	
Sign Success!	
50	Select

Figure 5: Sign Delta Firmware Package

2.4. Upload Signed Delta Firmware Package to IoT Platform

Log on the IoT platform, enter "**Repository**" -> "**Firmware**" -> "**Tool**", and click "**Add Firmware**" to upload the signed delta firmware package, as shown below.



©)) OceanConnect		Upload Firmware Package			En	R	Ξ
Ū		Device Type	 Firmware Package * 			2	+ Add Fir	O Reload
Ð	Home	Firmware N	The file can't exceed 35M, and must be zi Click to	b upload	tion Upload Time			
Ŷ	Group	softwareu	Version *	all	2017-11-02 17:0		⊻	î
	Alarm Nule Engine	softwareu…	Device Type *	ull	2017-11-02 17:0		$\underline{+}$	Î
	o ⁱ Model	softwareu	3 WaterMeter		2017-11-02 19:2		$\underline{+}$	Ĩ
	i∃ Batch Task ▼	softwareu	Manufacturer Name *	bgf	2017-11-02 19:4		$\underline{+}$	Ϊ.
	Repository A	V150_o2	Please input appropriate device manufacturer of this firmware	e 2W	2017-11-02 20:2		$\underline{+}$	Î
	• Firmware 1	old_news	· Model *	sdfsf	4 2017-11-03 10:2		⊻	Î
	Software	softwareu	Please input appropriate device model of this firmware	ARY	✓ ²⁰ × ^{10:5}		⊻	Î
		softwareu		ARY	2017-11-06 11:5		\checkmark	÷

Figure 6: Upload Signed Delta Firmware Package to IoT Platform

NOTE

Please note that the device type, manufacture name, model and protocol should be in accordance with such information in the profile, otherwise it may fail to upload the signed firmware package.

3 Firmware Upgrade via DFOTA

3.1. Create Firmware Upgrade Task

1. Refer to the steps below to add a group.

©)) OceanConnect					En	R	Ξ
Ð	QUECTELWS	Group Mana	igement			2	+ Add Group	D Reload
Ð	HomeDevice	Name	Add Group	3	dren			
¢	🖿 Group 👖	Angla_test	* Group Name					
	Alarm	Arnold_BC	Description	Group description, the maximum input of				
	▶ Rule Engine ● ⁱ Model	Arnold_tes		1024 characters				
	i⊟ Batch Task -	Flametest			J			
	🖺 Repository 🔺	Janet_B8_	4 Sav	eCancel				
	Package Management	Janet_Test	a	89f7be7-a924-4a97-b919-fc00fd4d1a9b	1			
	Firmware Software	ST_B657SP3TE	EST fe	eaa5c7e-8888-4c73-8c44-247b539f15c4	1			
		SW_TEST	5	fb61bd2-1d17-4d74-8c82-4b7081fd6a21	0			

Figure 7: Add a Group



2. Assign the device that needs to upgrade to the group.

©)	OceanConnect							En	Я	Ξ
Ð	FOTA_TEST	Group Management	> Flametest					3	Lange Assign D	D Reload
<u>,</u>	Home		2							
	Device	Information	Device							
•	Group 1	Statua	Name	ID	Pagian	Application	Customer			
	🌲 Alarm	Status	Name		Region	Application	Gustomer			
	Rule Engine	 Online 	name	477650e4-4987	name	FOTA_test				
	e ^ë Model 🔹									
	🗄 Batch Task 🔹									
	Repository 🔹									



3. Create a batch task through "Batch Task" -> "Software" -> "Firmware Upgrade".

©)) OceanConnect								En	R	
Ð	Home	Batch Task							3	+ Create B	D Reload
Ð	Group										•
æ	🗍 Alarm	Bundle Sync	hronization	Bundle U	lpgrade	Bundle Delete	App Upgrade		Mor	e 🗸	
.	▶ Rule Engine	Status	Task Name		Device Type	Group	Create Time	Success Rate	Sensor Upgra	de	
	🕤 Model 🔻								Pre Upgrade		_
	🗄 Batch Task 🔹	Success	sp1tosp2_01 ID:5a001e72e4b0d.		MultiSensor	Flametest	2017-11-06 16:33:54	^{100%} 2	Firmware Upg	rade	
	Register Devices Device Command	Failed	B657toB657SP	0	MultiSensor	flametest2	2017-09-11 14:57:33	0% Export			
	Configure Devices	Failed	test2 ID:59b5f7e4e4b0f	•	MultiSensor	flametest2	2017-09-11 10:41:40	0% Export			
	Repository	Failed	B657A02V02A0	. 1	MultiSensor	flametest2	2017-09-10 12:14:45	0% Export			

Figure 9: Create a Batch Task



4. Input task name, repeat type and repeat times.

Ŵ) OceanConnect	Firmware Upgrade			En	R	Ξ
Ð	💼 Home					+	C
	Device	Information	Select Devices Select Package			Create B	Reload
Ð	Group		Geleci Devices Geleci i aunage				
A 3	🔔 Alarm				Mor	e 🗸	
*	Rule Engine	* Task Name		Rate			
	🕤 Model 🗸 🗸		1				
	i≣ Batch Task ▲	* Repeat Type	Custom -				
	Register Devices						
	Device Command	* Repeat Times	5				
	Location Upload						
	Configure Devices			2			
	Software						
	Repository -			>	×		

Figure 10: Input Task Name, Repeat Type and Repeat Times

5. Select device group that needs to upgrade.

Ŵ) OceanConnect	Firmware Upgrade	En 🔉 E
ð	FOTA_TEST	1 2 3	+ D Create B Reload
•	Device	Information Select Devices Select Package	More 🛩
Ŷ	Group	Select Device Groups	Rate
	Rule Engine	Group Name Devices Description	
	∃ Batch Task	✓ Flametest 1	
	Register Devices Device Command	flametest2 1	
	Location Upload	Other Other Devices	
	Configure Devices Software		2
	Repository -		$\langle \rangle \times$



6. Select the proper delta firmware package, and click the " $\sqrt{}$ " button to create the firmware upgrade task.

©)) OceanConnect	Firmware Upgrade				En Q E
Ð	FOTA_TEST	1	2	3		+ Ö Create B Reload
Ð	Device	Information	Select Devices	Select Package		
¢	Group	Select Firmware			Bata	More V
	➢ Rule Engine	Search By Device Type			hate	
	o [®] Model ▼ E Batch Task ▲	Firmware Name Version	Device Type Manufactur M	Iodel Protocol		
	Register Devices	softwareupd 001to002	⊥ MultiSensor eSDK_Hu v	01 CoAP		
	Device Command Location Upload	osoftwareupd 002to001	MultiSensor eSDK_Hu v	01 CoAP		
	Configure Devices	osoftwareupd B657SP1	MultiSensor eSDK_Hu v	01 CoAP		2
	Software	osoftwareupd C88toSP2	MultiSensor eSDK_Hu v	01 CoAP		
	Repository •	osoftwareupd B657roB	MultiSensor eSDK_Hu v	01 CoAP		

Figure 12: Select Proper Delta Firmware Package

3.2. Upgrade the Firmware

After the upgrade task is created, UE will initiate an uplink CoAP data package, then it starts upgrading once the IoT platform identifies the UE is connected with the network. It may take several minutes for the firmware to upgrade. After upgrading process is completed, "Success" will be shown in the "**Task Detail**".

Ŵ) OceanConnect	Task Detail		En Q E
ð	FOTA_TEST	Task Name: B657updating	Task ID: 59ae1525e4b099bba41ceadc	+ O Create B Reload
•	 Device Group 	Task Status: Success Success Rate: 100% Total: 1	Group: Flametest Device Type: MultiSensor Manufacturer Name: eSDK_Huawei	More ¥
¢	▲ Alarm Nule Engine	Complete: 1 Successful: 1 Failure: 0	Model: v01 Protocol: CoAP Version: B657to1	
	● ^{°°} Model	Create Time: 2017-09-05 11:08:21 Repeat Type: No	Firmware Name: softwareupdatepackage.bin Repeat Times:	
	Register Devices Device Command	Task List		
	Location Upload	Status T Device Name Device ID	Description	
	Configure Devices Software	Success name 477650e4-498	87-4fa2-a5c5-86b6bde130 Firmware updated successfully	
	Repository 🔹			×





4 Important Notes

This chapters lists some important notes during firmware upgrading via DFOTA.

4.1. In Firmware Download Stage

- 1. When the module notifies the MCU to start downloading firmware package by sending "FIRMWARE DOWNLOADING", the module cannot be powered off, and MCU cannot send any AT commands related to data communication, either.
- 2. If it is failed to download or verify the firmware package, the module will send "FIRMWARE DOWNLOAD FAILED" to MCU. Then the module will send "FIRMWARE UPDATE OVER", which indicates that DFOTA task is over, and the MCU can perform other tasks as usual.

4.2. In Firmware Upgrade Stage

After firmware package is downloaded and verified successfully, the module will send "FIRMWARE UPDATING" to notify the MCU that it is updating. At this point, the module cannot be powered off, and MCU cannot send any AT commands related to data communication, either.

4.3. In Network Recovery Stage

After the firmware upgrade process is completed, the module will reboot automatically, and enter into network recovery stage.

- If firmware is upgraded successfully, the module will send "FIRMWARE UPDATE SUCCESS" to MCU. Then the IoT platform will issue an instruction to stop DFOTA upgrade task, and the module will send "FIRMWARE UPDATE OVER", which indicates that DFOTA task is over, and the MCU can perform other tasks as usual.
- 2. If firmware upgrading is failed, the module will send "FIRMWARE UPDATE FAILED" to MCU. Then the IoT platform will troubleshoot and stop DFOTA upgrade task, and the module will send "FIRMWARE UPDATE OVER", which indicates DFOTA task is over, the firmware version is not changed and the MCU can perform other tasks as usual.



4.4. Upgrade Elapsed Time

The upgrade elapsed time depends on the size of the delta firmware package. The larger the package is, the longer it may take to upgrade. Therefore, it may take 10 minutes or even longer for some firmware versions to upgrade.