

# BC95 DFOTA User Guide

## NB-IoT Module Series

Rev. BC95\_DFOTA\_User\_Guide\_V1.0

Date: 2018-01-24

Status: Released



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

**Quectel Wireless Solutions Co., Ltd.**

7<sup>th</sup> Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: [info@quectel.com](mailto:info@quectel.com)

**Or our local office. For more information, please visit:**

<http://quectel.com/support/sales.htm>

**For technical support, or to report documentation errors, please visit:**

<http://quectel.com/support/technical.htm>

Or Email to: [support@quectel.com](mailto:support@quectel.com)

**GENERAL NOTES**

QUECTEL OFFERS THE INFORMATION AS A SERVICE TO ITS CUSTOMERS. THE INFORMATION PROVIDED IS BASED UPON CUSTOMERS' REQUIREMENTS. QUECTEL MAKES EVERY EFFORT TO ENSURE THE QUALITY OF THE INFORMATION IT MAKES AVAILABLE. QUECTEL DOES NOT MAKE ANY WARRANTY AS TO THE INFORMATION CONTAINED HEREIN, AND DOES NOT ACCEPT ANY LIABILITY FOR ANY INJURY, LOSS OR DAMAGE OF ANY KIND INCURRED BY USE OF OR RELIANCE UPON THE INFORMATION. ALL INFORMATION SUPPLIED HEREIN IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

**COPYRIGHT**

THE INFORMATION CONTAINED HERE IS PROPRIETARY TECHNICAL INFORMATION OF QUECTEL WIRELESS SOLUTIONS CO., LTD. TRANSMITTING, REPRODUCTION, DISSEMINATION AND EDITING OF THIS DOCUMENT AS WELL AS UTILIZATION OF THE CONTENT ARE FORBIDDEN WITHOUT PERMISSION. OFFENDERS WILL BE HELD LIABLE FOR PAYMENT OF DAMAGES. ALL RIGHTS ARE RESERVED IN THE EVENT OF A PATENT GRANT OR REGISTRATION OF A UTILITY MODEL OR DESIGN.

***Copyright © Quectel Wireless Solutions Co., Ltd. 2018. All rights reserved.***

# About the Document

## History

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

---

## Contents

About the Document .....	2
Contents .....	3
Figure Index .....	4
<b>1 Introduction .....</b>	<b>5</b>
<b>2 Preparations .....</b>	<b>6</b>
2.1. Enable omCapability .....	6
2.2. Generate Public-private Key Pair .....	7
2.3. Sign Firmware Upgrade Package .....	9
2.3.1. Get Delta Firmware Package .....	9
2.3.2. Sign Delta Firmware Package .....	9
2.4. Upload Signed Delta Firmware Package to IoT Platform .....	10
<b>3 Firmware Upgrade via DFOTA .....</b>	<b>12</b>
3.1. Create Firmware Upgrade Task .....	12
3.2. Upgrade the Firmware .....	15
<b>4 Important Notes .....</b>	<b>16</b>
4.1. In Firmware Download Stage .....	16
4.2. In Firmware Upgrade Stage .....	16
4.3. In Network Recovery Stage .....	16
4.4. Upgrade Elapsed Time .....	17

## Figure Index

FIGURE 1: DOWNLOAD OFFLINE SIGNATURE TOOL.....	7
FIGURE 2: GENERATE PUBLIC AND PRIVATE KEY.....	8
FIGURE 3: UPLOAD PUBLIC KEY FILE (1).....	8
FIGURE 4: UPLOAD PUBLIC KEY FILE (2).....	9
FIGURE 5: SIGN DELTA FIRMWARE PACKAGE.....	10
FIGURE 6: UPLOAD SIGNED DELTA FIRMWARE PACKAGE TO IOT PLATFORM.....	11
FIGURE 7: ADD A GROUP.....	12
FIGURE 8: ASSIGN THE DEVICE TO THE GROUP.....	13
FIGURE 9: CREATE A BATCH TASK.....	13
FIGURE 10: INPUT TASK NAME, REPEAT TYPE AND REPEAT TIMES.....	14
FIGURE 11: SELECT DEVICE GROUP.....	14
FIGURE 12: SELECT PROPER DELTA FIRMWARE PACKAGE.....	15
FIGURE 13: SUCCESSFUL FIRMWARE UPGRADE.....	15

# 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": "NBloTDevice",
      "protocolType": "CoAP",
      "deviceType": "SmartDevice",
      "omCapability":{
        "upgradeCapability" : {
          "supportUpgrade":false
        },
        "fwUpgradeCapability" : {
          "supportUpgrade":true,
          "upgradeProtocolType":"LWM2M",
          "downloadProtocolType":"CoAP"
        }
      },
      "serviceTypeCapabilities": [
        {
          "serviceId": "Brightness",
          "serviceType": "Brightness",
          "option": "Master"
        }
      ]
    }
  ]
}
```

```

    },
    {
      "serviceId": "WaterData",
      "serviceType": "WaterData",
      "option": "Optional"
    }
  ]
}

```

**NOTE**

For devices that were connected with IoT platform V1.2 once, usually it is needed to add the codes marked in red into the device profile to enable omCapability function.

## 2.2. Generate Public-private Key Pair

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

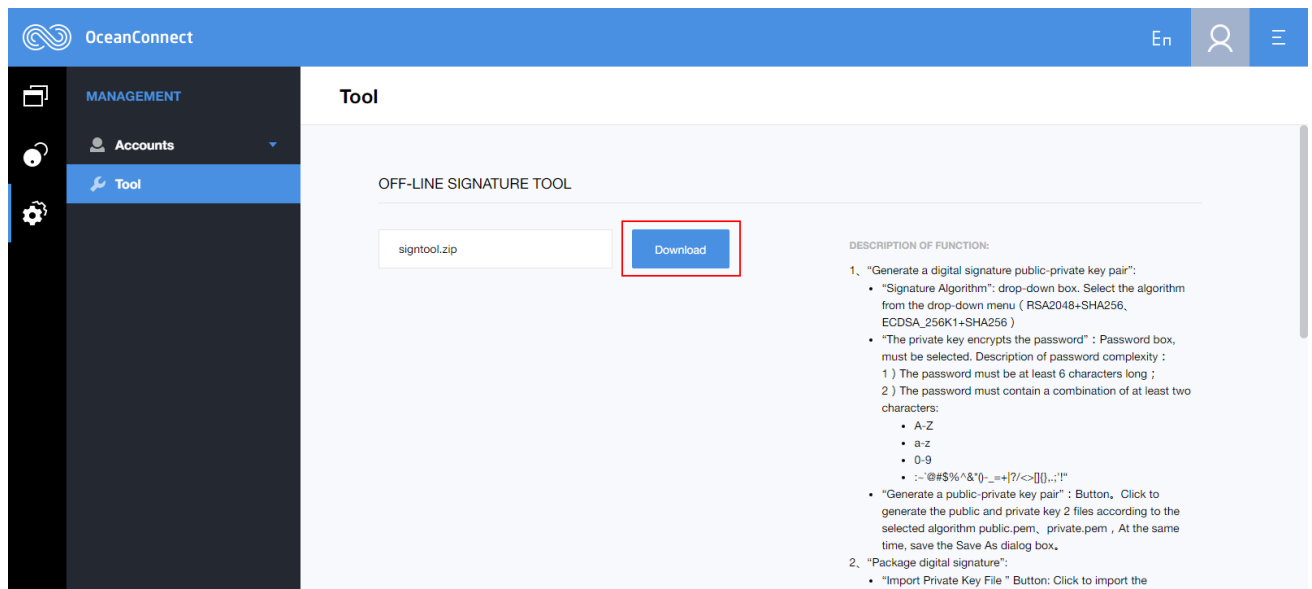


Figure 1: Download Offline Signature Tool

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.



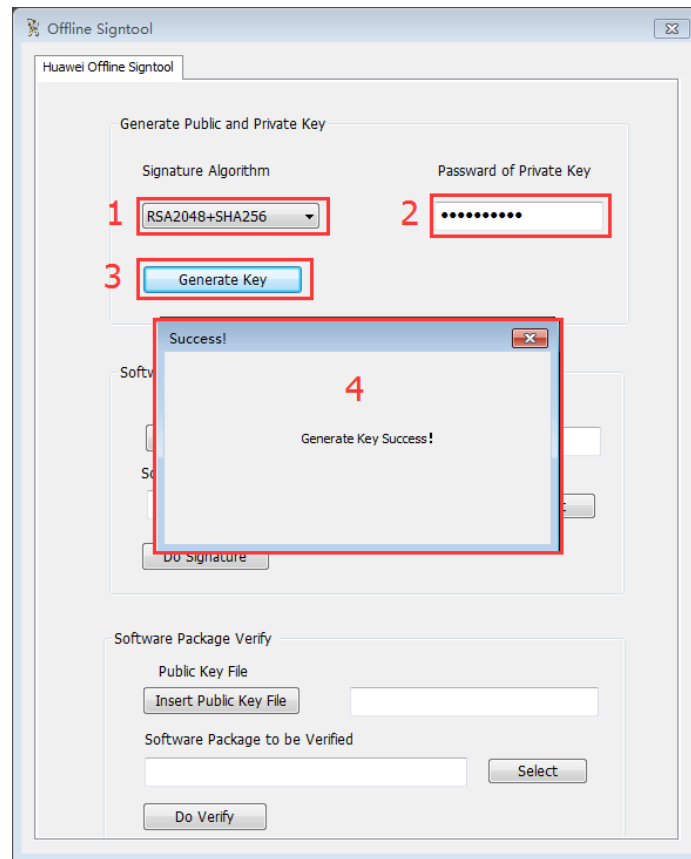


Figure 2: Generate Public and Private Key

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.

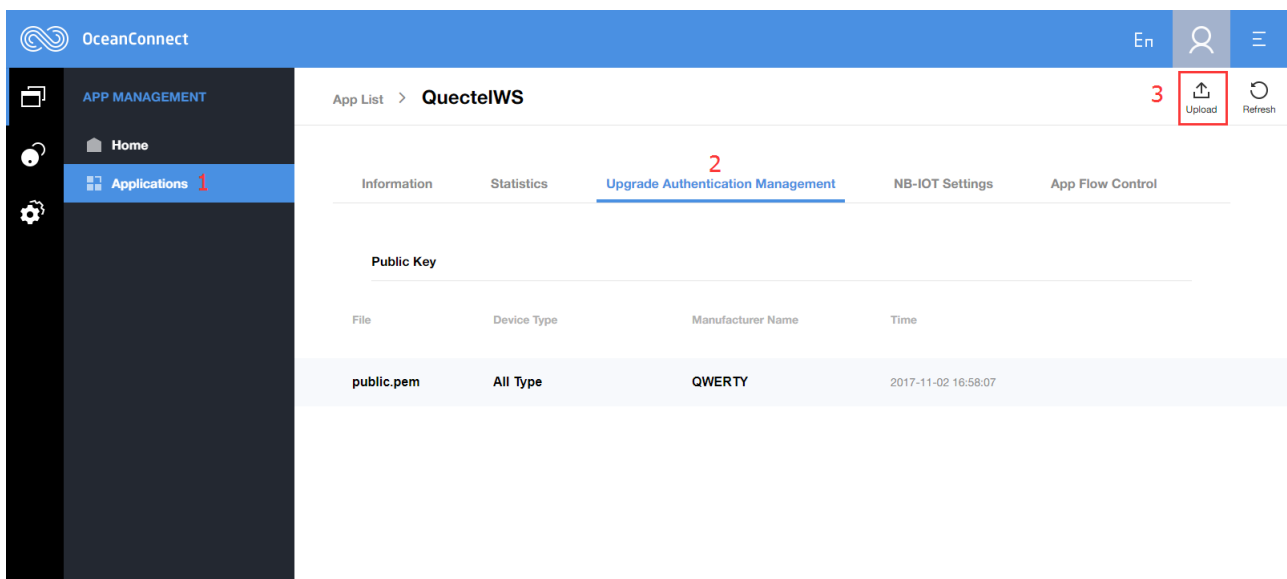


Figure 3: Upload Public Key File (1)

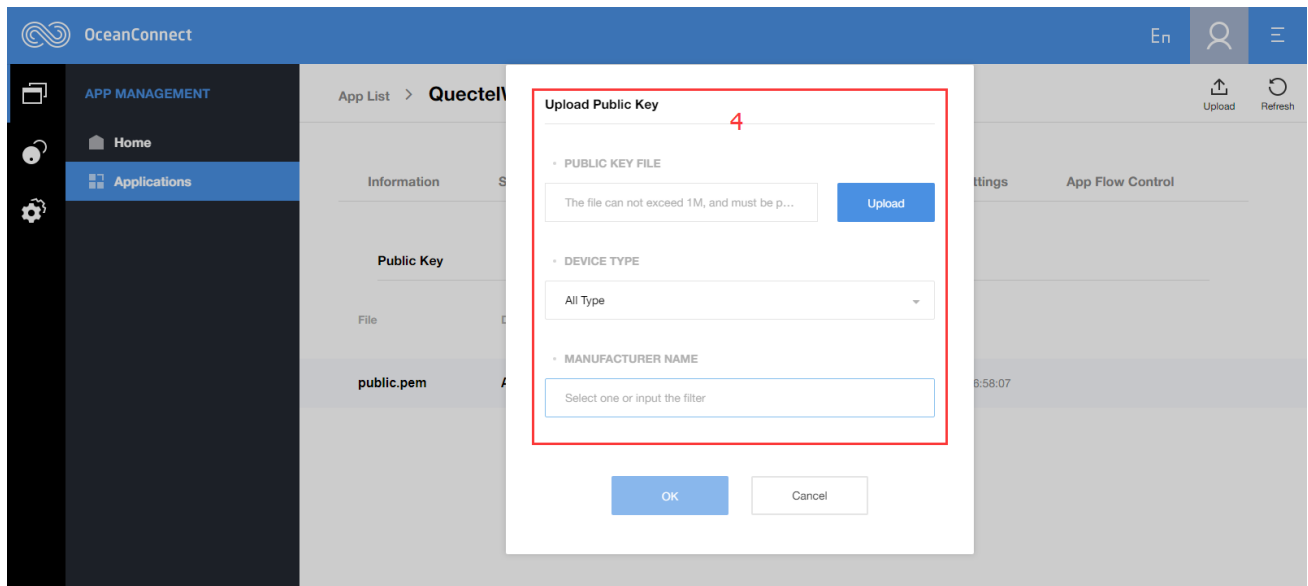


Figure 4: Upload Public Key File (2)

## 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.

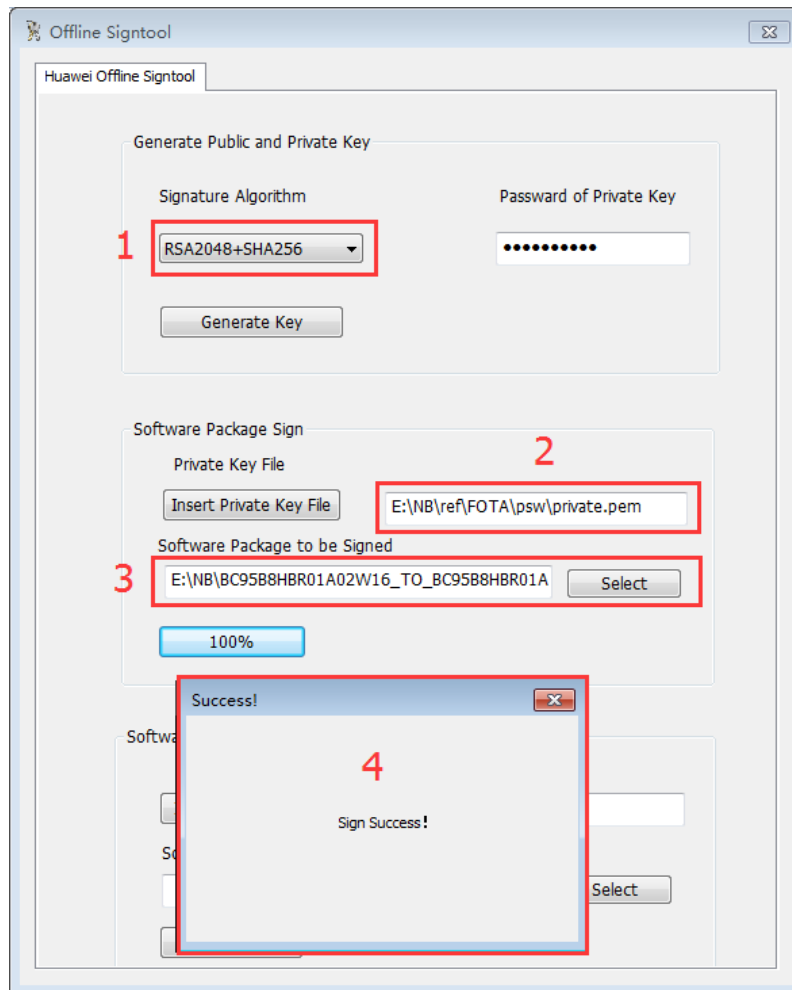
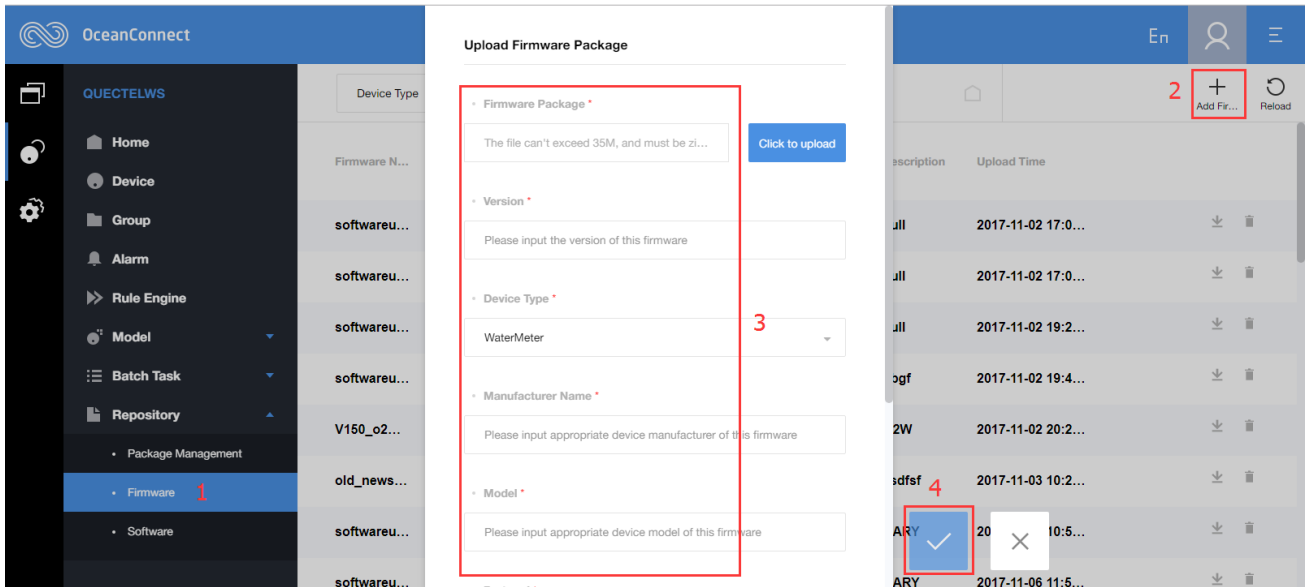


Figure 5: Sign Delta Firmware Package

## 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.



**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.

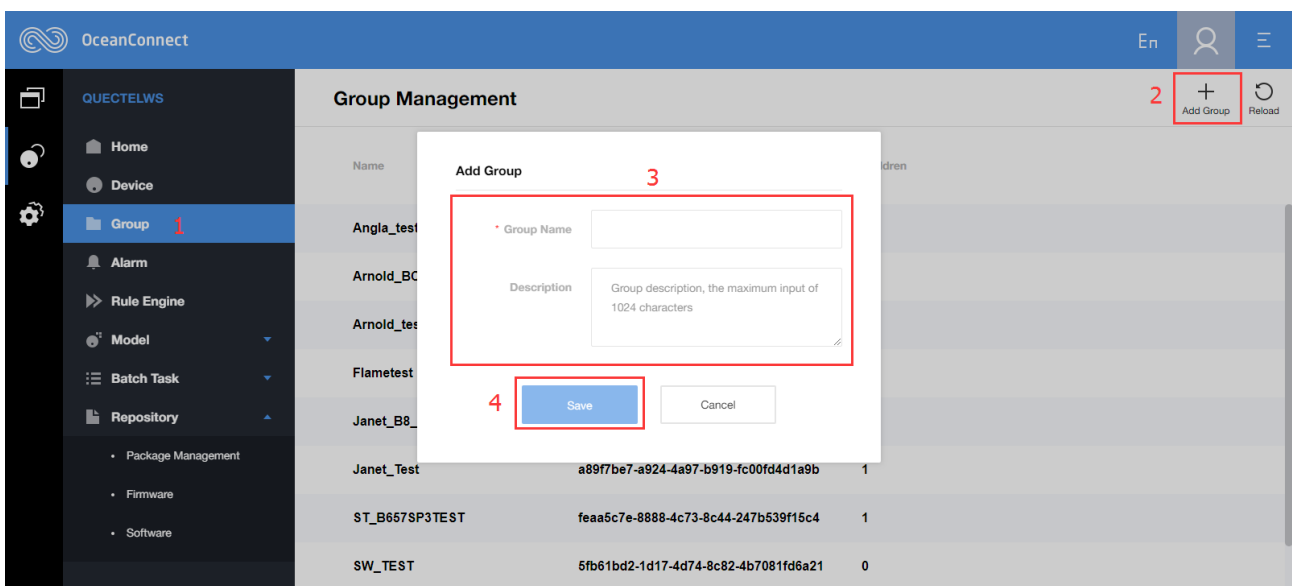


Figure 7: Add a Group

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

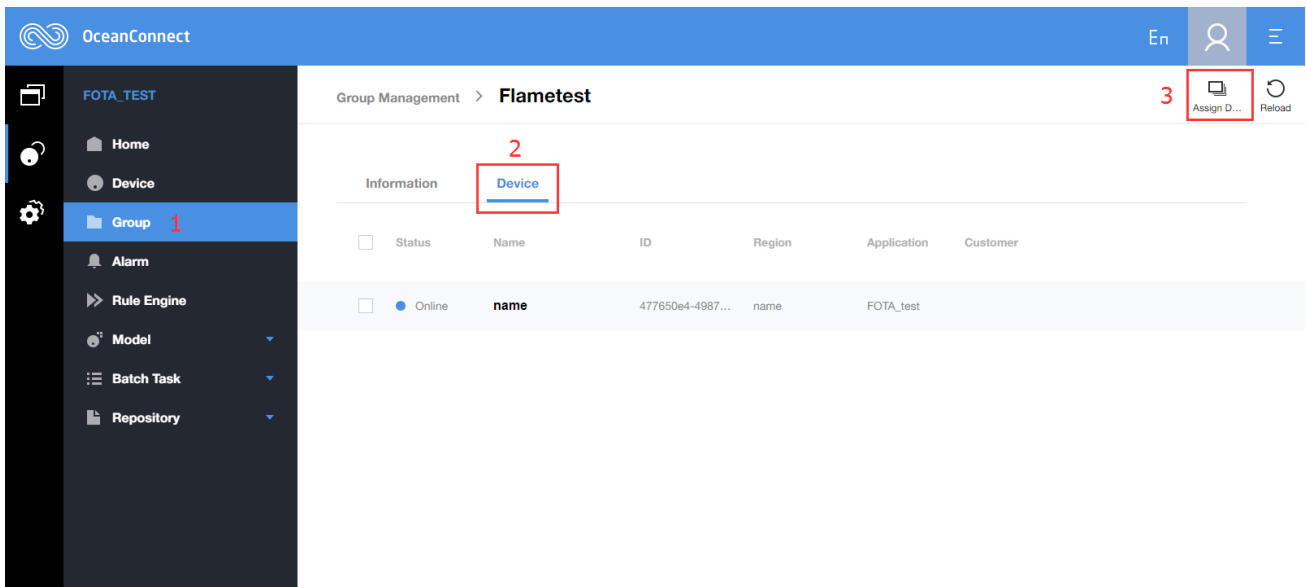


Figure 8: Assign the Device to the Group

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

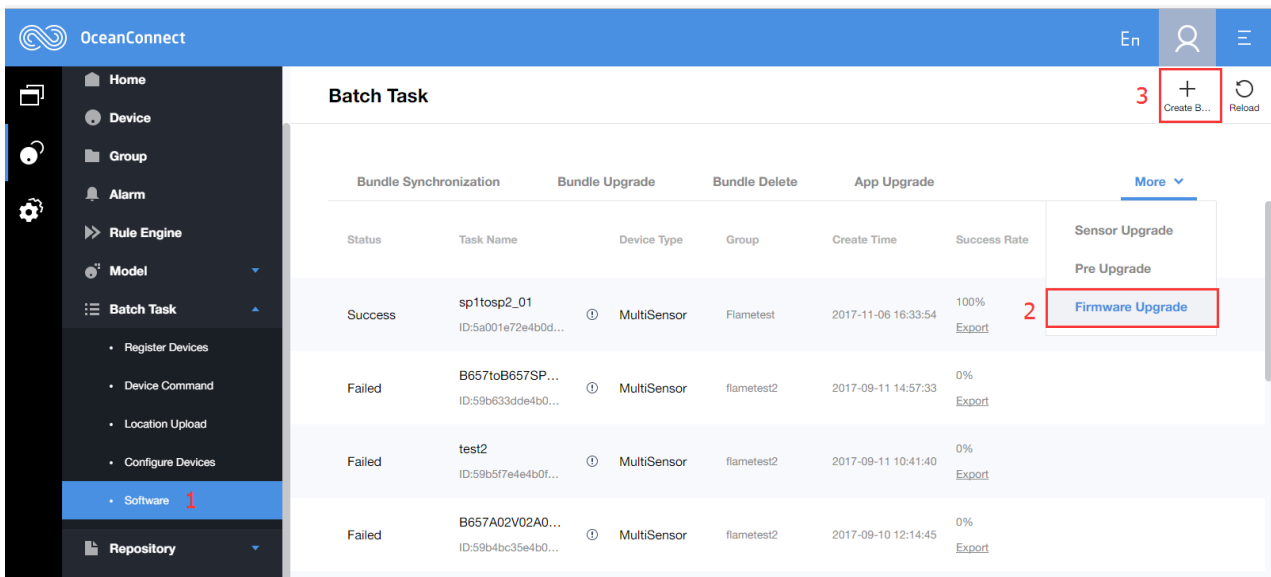


Figure 9: Create a Batch Task

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

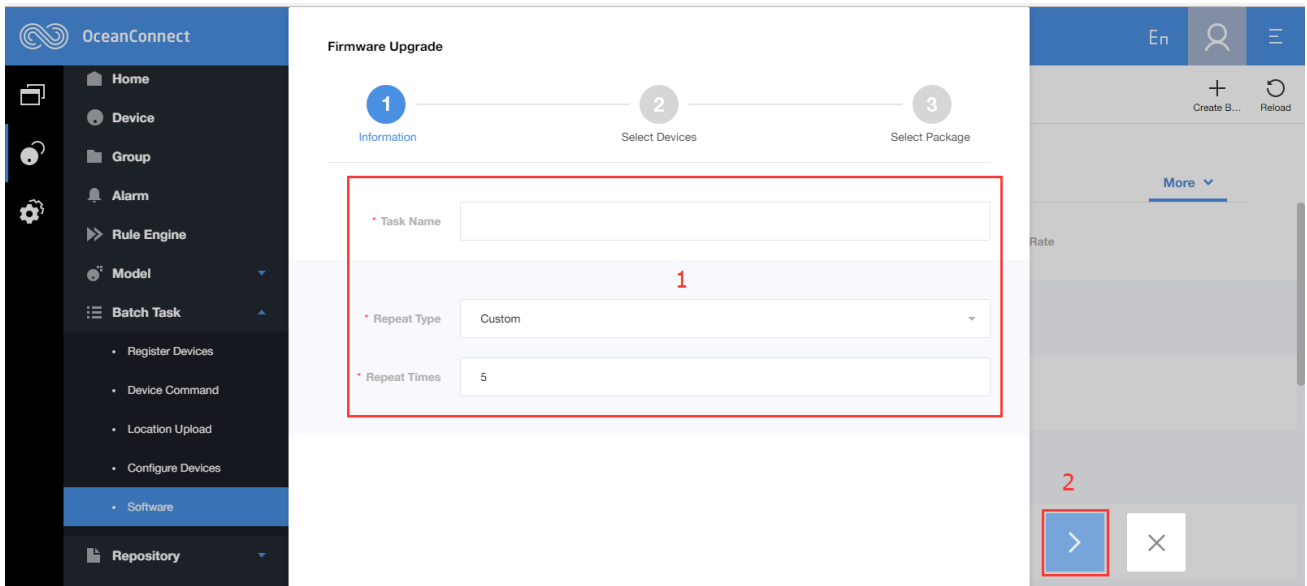


Figure 10: Input Task Name, Repeat Type and Repeat Times

5. Select device group that needs to upgrade.

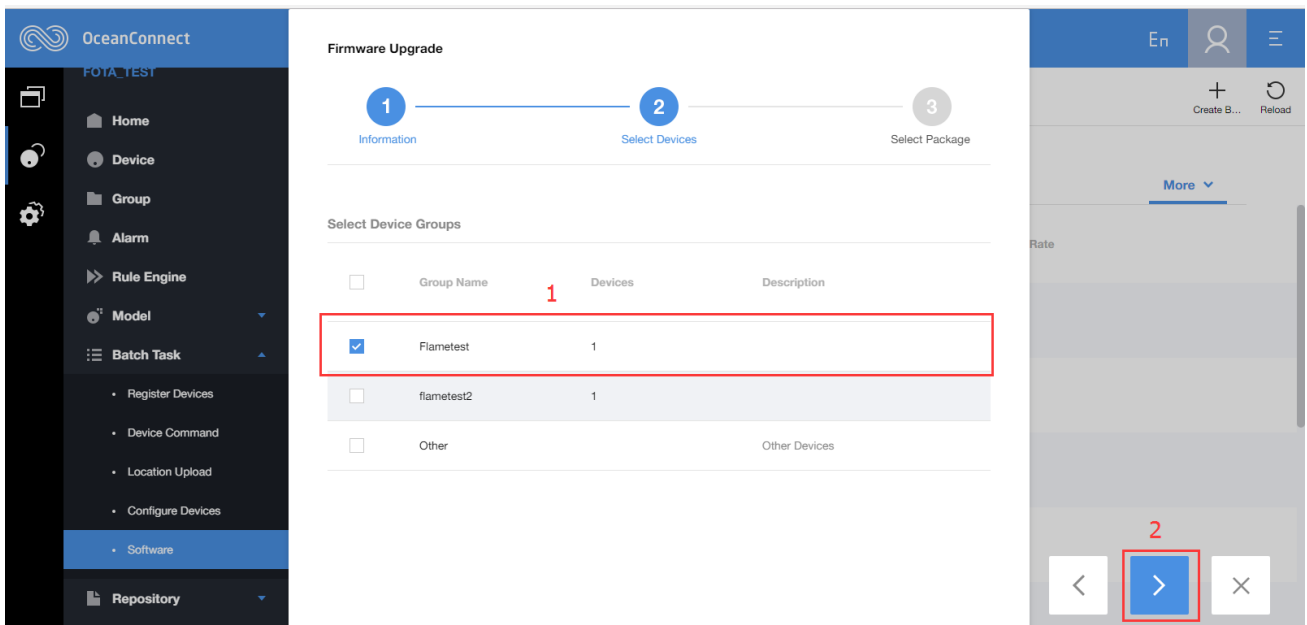


Figure 11: Select Device Group

6. Select the proper delta firmware package, and click the “√” button to create the firmware upgrade task.

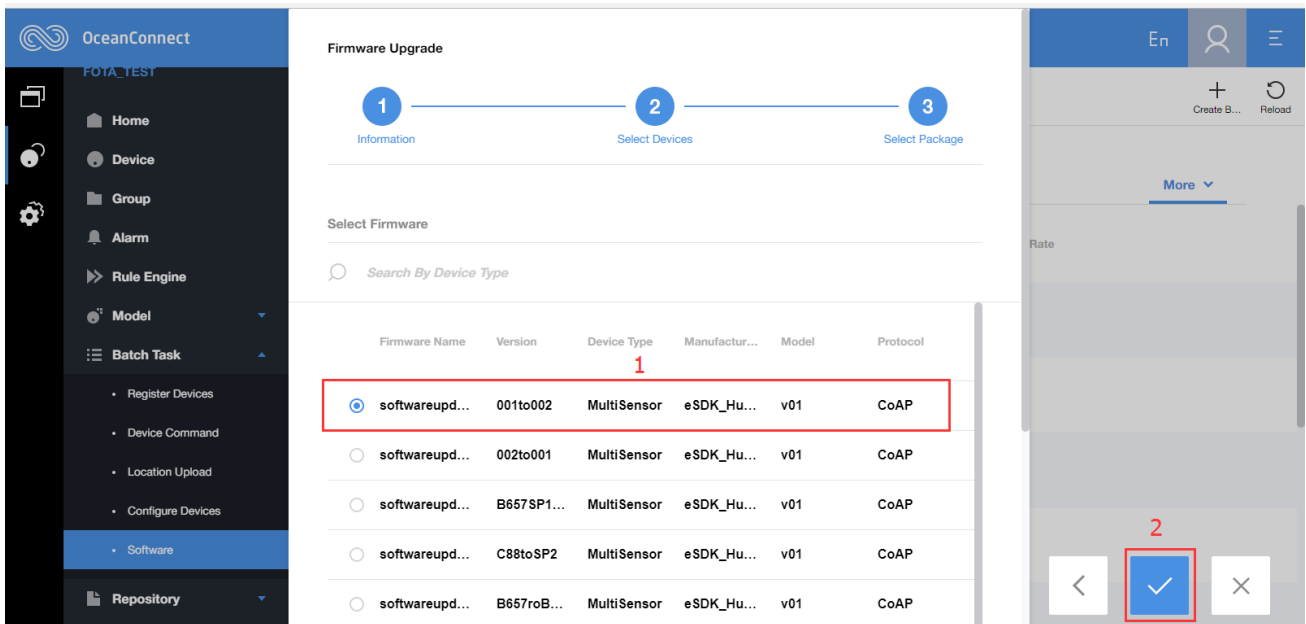


Figure 12: Select Proper Delta Firmware Package

### 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”.

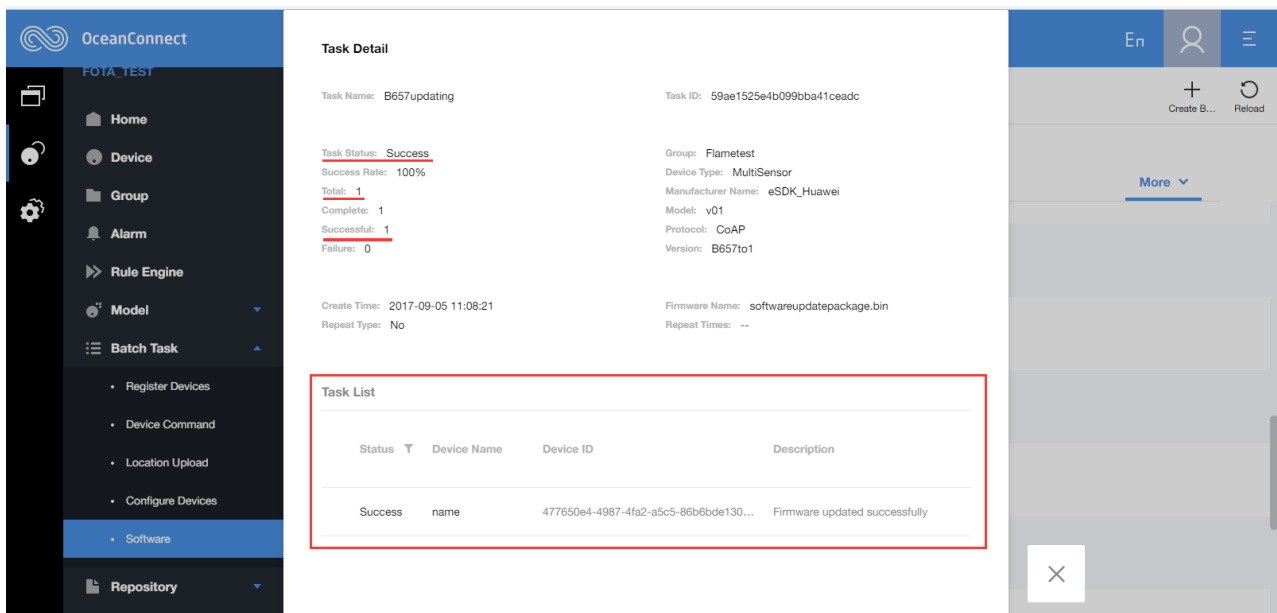


Figure 13: Successful Firmware Upgrade



# 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.

1. 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.