

# **BC95-G LwM2M**

## **Application Note**

**NB-IoT Module Series**

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# About the Document

## History

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# 1 Introduction

This document mainly introduces how to use the LwM2M features of BC95-G module.

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# 2 LwM2M AT

This chapter presents the AT commands for operating LwM2M function.

## 2.1. AT Command Syntax

Table1:Types of AT Commands and Responses

<b>Test Command</b>	<b>AT+&lt;x&gt;=?</b>	This command returns the list of parameters and value ranges set by the corresponding Write Command or internal processes.
<b>Read Command</b>	<b>AT+&lt;x&gt;?</b>	This command returns the currently set value of the parameter or parameters.
<b>Write Command</b>	<b>AT+&lt;x&gt;=&lt;...&gt;</b>	This command sets the user-definable parameter values.
<b>Execution Command</b>	<b>AT+&lt;x&gt;</b>	This command reads non-variable parameters affected by internal processes in the UE.

## 2.2. Description of AT Commands

### 2.2.1. AT+NCDP Configure and Query CDP Server Settings

The command is used to set and query the server IP address and port for the LwM2M server. The values assigned are persistent across reboots.

This command is available after the IMEI number has been set.

#### AT+NCDP Configure and Query CDP Server Setting

Write Command <b>AT+NCDP=&lt;ip_addr&gt;[,&lt;port&gt;]</b>	Response Update the CDP server configuration from the supplied Parameters <b>OK</b>  If there is any error, response: <b>+CME ERROR:&lt;err&gt;</b>
Read Command <b>AT+NCDP?</b>	Response Return the current CDP server IP address and port.



	+NCDP:<ip_addr>,<port>
	If CDP server is not set, response: +CME ERROR:<err>
<b>Maximum Response Time</b>	300ms

## Parameter

<b>&lt;ip_addr&gt;</b>	A dot notation IPv4 address. IP addresses can be specified in decimal, octal or hexadecimal notation. Only IPv4 is supported
<b>&lt;port&gt;</b>	Integer type. Unsigned integer. The range is 0-65535. If port 0 is provided, the default port (5683) will be used. If no port is specified, the previously set port will be used. If no port is specified, and no port was previously set, the default port will be used.

## Example

```
AT+NCDP=192.168.5.1,5683
```

```
OK
```

```
AT+NCDP?
```

```
+NCDP: 192.168.5.1,5683
```

```
OK
```

### 2.2.2. AT+QREGSWT Set Registration Mode

The command is used to set registration mode after the module reboot.

- If set <type> to 1, after reboot and attached to network, the module will trigger automatic registration.
- If set <type> to 0, after reboot and attached to network, the module will send REGISTERNOTIFY message to the device, then the device triggers registration by command AT+QLWSREGIND.

It will give an <err> code and description as an intermediate message if the message cannot be sent. Please refer to Chapter 7 for possible <err> values.

#### AT+QREGSWT Set Registration Mode

Write Command  
**AT+QREGSWT=<type>**

Response  
**OK**

If there is any error, response:  
**+CME ERROR:<err>**

Read Command <b>AT+QREGSWT?</b>	Response <b>+QREGSWT:&lt;type&gt;</b>  <b>OK</b>
Maximum Response Time	300ms

### Parameter

<b>&lt;type&gt;</b>	Integer type. Registration mode. 0 Manual mode. 1 Automatic registration mode
---------------------	---

### Example

```
AT+QREGSWT=1
```

```
OK
```

```
AT+QREGSWT?
```

```
+QREGSWT:1
```

```
OK
```

### 2.2.3. AT+QLWSREGIND Register Control

The command is used to control module to launch register, deregister or update to the IoT platform. It will give an <err> code and description as an intermediate message if the message cannot be sent. Please refer to Chapter 7 for possible <err> values

#### AT+QLWSREGIND Register Control

Write Command <b>AT+QLWSREGIND=&lt;type&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+CME ERROR:&lt;err&gt;</b>
Maximum Response Time	300ms

### Parameter

<b>&lt;type&gt;</b>	Integer type. Registration mode. 0 Manual mode. 1 Automatic registration mode
---------------------	---

# 3 Interaction with Leshan server

Leshan Server(<https://leshan.eclipse.org>) is an open source LwM2M server. It provides support for some standard LwM2M objects.

## 3.1. Manually Register to Leshan Server

<b>AT+CGATT?</b>	<i>//Query the PS service attach status.</i>
<b>+CGATT:1</b>	<i>//Attached to the PS service.</i>
OK	
<b>AT+CGSN=1</b>	
<b>+CGSN:867725030029312</b>	<i>//Get the IMEI number, it will be treated as the endpoint name //when we register on the Leshan server</i>
OK	
<b>AT+NCDP= 5.39.83.206,5683</b>	<i>//Set Leshan server IP address and port.</i>
OK	
<b>AT+QREGSWT=0</b>	<i>//Set manual registration mode..</i>
OK	
<b>AT+NRB</b>	
<i>//Rebooting</i>	
REBOOT_CAUSE_APPLICATION_AT	
Neul	
OK	
REGISTERNOTIFY	<i>//Attached to network</i>
<b>AT+QLWSREGIND=0</b>	<i>//Start to register to Leshan server.</i>
OK	<i>//If the registration mode is set to automatic mode, //we do not need to execute this command, but we need to //reboot the module</i>
<b>+QLWEVTIND:0</b>	<i>//Successful registration indication.</i>

### 3.2. Query module information on the Leshan server

1. Open the Leshan server and find your device on the client list interface. We use the IMEI number as the endpoint name. As shown below.

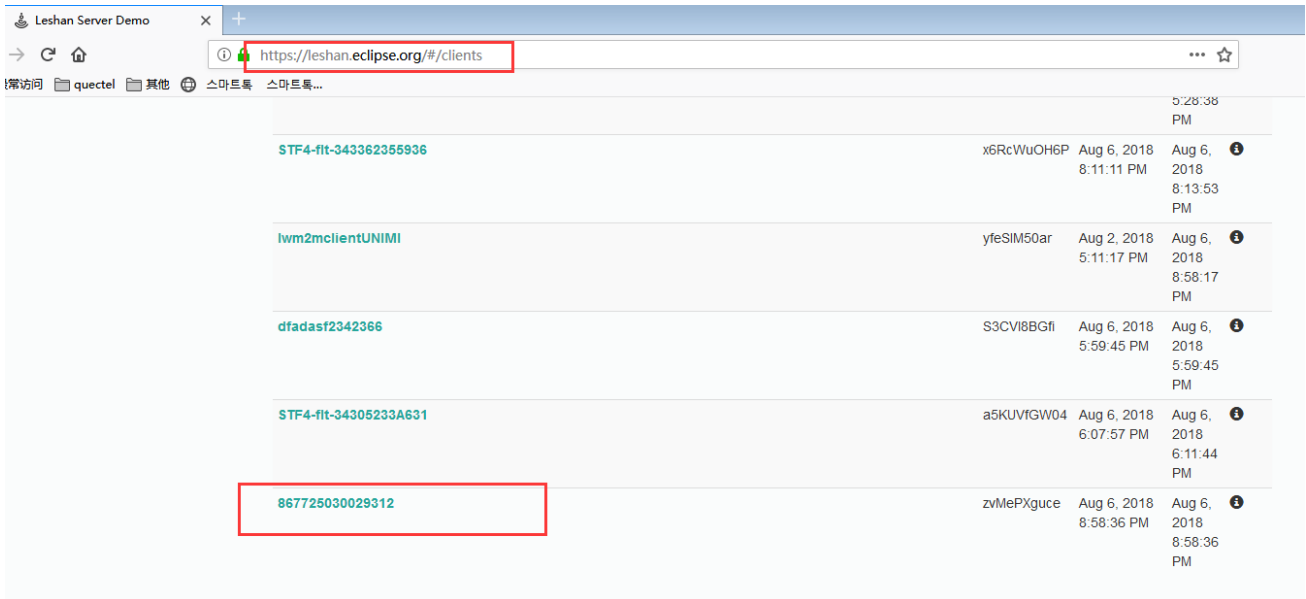


Figure 1:client list

2. Click the “Observe” button of the /1/0 resource to query the LwM2M Server information.

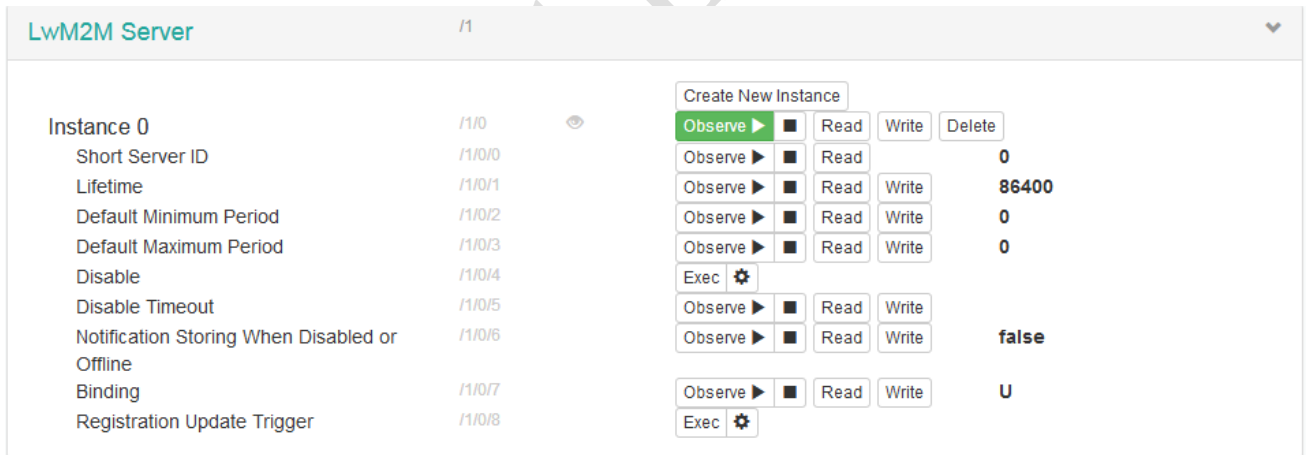


Figure 2:Query LwM2M Server information

3. Click the “Observe” button of the /3/0 resource to query the Device information.

Device		/3	
Instance 0	/3/0		Observe Read Write Delete
Manufacturer	/3/0/0		Observe Read
Model Number	/3/0/1		Observe Read
Serial Number	/3/0/2		Observe Read
Firmware Version	/3/0/3		Observe Read
Reboot	/3/0/4		Exec
Factory Reset	/3/0/5		Exec
Available Power Sources	/3/0/6		Observe Read
Power Source Voltage	/3/0/7	3578	Observe Read
Power Source Current	/3/0/8		Observe Read
Battery Level	/3/0/9	99	Observe Read
Memory Free	/3/0/10		Observe Read
Error Code	/3/0/11		Observe Read
Reset Error Code	/3/0/12		Exec
Current Time	/3/0/13		Observe Read Write
UTC Offset	/3/0/14		Observe Read Write
Timezone	/3/0/15		Observe Read Write
Supported Binding and Modes	/3/0/16		Observe Read
Device Type	/3/0/17		Observe Read
Hardware Version	/3/0/18		Observe Read
Software Version	/3/0/19		Observe Read
Battery Status	/3/0/20		Observe Read
Memory Total	/3/0/21		Observe Read
ExtDevInfo	/3/0/22		Observe Read

Qectel@Hi15RM1-  
HLB\_V1.0@BC35GJBR01A01BET

Figure 3:Query Device information

4. Click the “Observe” button of the /4/0 resource to view the Connectivity Monitoring information.

Connectivity Monitoring		/4	
Instance 0	/4/0		Observe Read Write Delete
Network Bearer	/4/0/0		Observe Read
Available Network Bearer	/4/0/1		Observe Read
Radio Signal Strength	/4/0/2	-808	Observe Read
Link Quality	/4/0/3		Observe Read
IP Addresses	/4/0/4		Observe Read
Router IP Addresses	/4/0/5		Observe Read
Link Utilization	/4/0/6		Observe Read
APN	/4/0/7		Observe Read
Cell ID	/4/0/8	137262770	Observe Read
SMNC	/4/0/9		Observe Read
SMCC	/4/0/10		Observe Read

Figure 4:Query Connectivity Monitoring information

### 3.3. Use Leshan server for FOTA upgrade

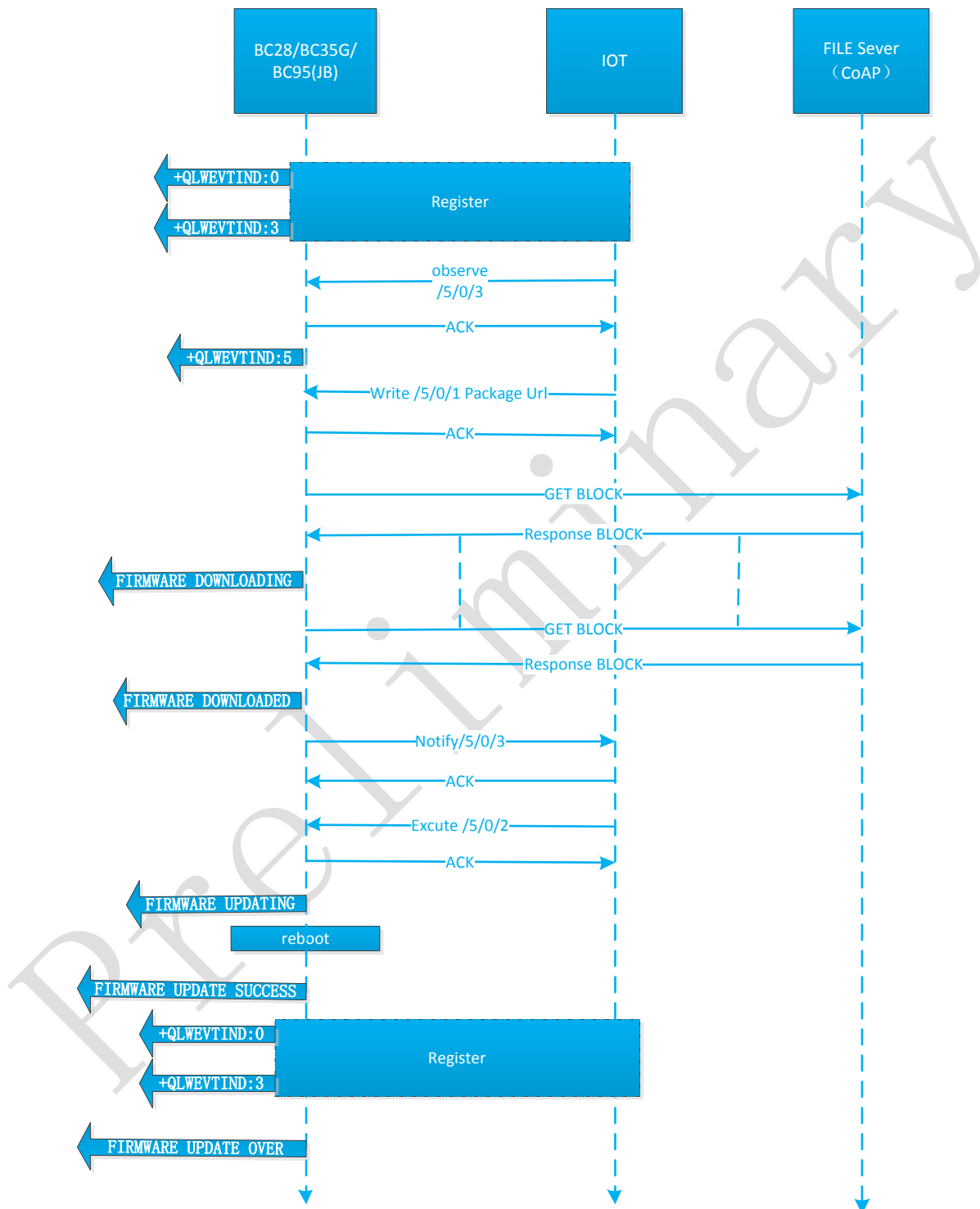


Figure 5:FOTA upgrade flow chart

1. Subscribe to the 5/0/3 and/5/0/5 resources as soon as the module is registered with the platform

Firmware Update		/5			
Instance 0	/5/0			Observe ▶ ■	Read Write Delete
Package	/5/0/0			Write	
Package URI	/5/0/1			Observe ▶ ■	Read Write
Update	/5/0/2			Exec ⚙	
State	/5/0/3	👁		Observe ▶ ■	Read 0
Update Result	/5/0/5	👁		Observe ▶ ■	Read 0
PkgName	/5/0/6			Observe ▶ ■	Read
PkgVersion	/5/0/7			Observe ▶ ■	Read
Firmware Update Protocol Support	/5/0/8			Observe ▶ ■	Read
Firmware Update Delivery Method	/5/0/9			Observe ▶ ■	Read

Figure 6:subscribe /5/0/3 and /5/0/5

- In the case where the /5/0/3 state is 0, the differential package URI can be issued. Click “Write” after /5/0/1, the following dialog box pops up, enter the URI of the differential package in the input box, click the update button, and issue the URI.

### Package URI ✕

---

**Value**

---

Figure 7:Package URI input box

- After the successful delivery, the “Write” button turns green, /5/0/3 value becomes 1

Firmware Update		/5			
Instance 0	/5/0			Observe ▶ ■	Read Write Delete
Package	/5/0/0			Write	
Package URI	/5/0/1			Observe ▶ ■	Read <span style="background-color: #28a745; color: white;">Write</span>
Update	/5/0/2			Exec ⚙	
State	/5/0/3	👁		Observe ▶ ■	Read 1
Update Result	/5/0/5	👁		Observe ▶ ■	Read 0
PkgName	/5/0/6			Observe ▶ ■	Read
PkgVersion	/5/0/7			Observe ▶ ■	Read
Firmware Update Protocol Support	/5/0/8			Observe ▶ ■	Read
Firmware Update Delivery Method	/5/0/9			Observe ▶ ■	Read

Figure 8:Successfully issued the url

4. After the download is successful, the value of /5/0/3 becomes 2

Path	Value	Actions
Instance 0	/5/0	Observe, Read, Write, Delete
Package	/5/0/0	Write
Package URI	/5/0/1	Observe, Read, Write
Update	/5/0/2	Exec
State	/5/0/3	Observe, Read
Update Result	/5/0/5	Observe, Read
PkgName	/5/0/6	Observe, Read
PkgVersion	/5/0/7	Observe, Read
Firmware Update Protocol Support	/5/0/8	Observe, Read
Firmware Update Delivery Method	/5/0/9	Observe, Read

coap://47.100.63.174:5683/firmwarePackage/BETA0808-0808BETA.bin

Figure 9:download successful

5. After the download is successful, click the “Execute” button of /5/0/2 to trigger the module update. If triggered successful, the “Execute” button turns green, and the /5/0/3 value becomes 3.

Path	Value	Actions
Instance 0	/5/0	Observe, Read, Write, Delete
Package	/5/0/0	Write
Package URI	/5/0/1	Observe, Read, Write
Update	/5/0/2	Exec
State	/5/0/3	Observe, Read
Update Result	/5/0/5	Observe, Read
PkgName	/5/0/6	Observe, Read
PkgVersion	/5/0/7	Observe, Read
Firmware Update Protocol Support	/5/0/8	Observe, Read
Firmware Update Delivery Method	/5/0/9	Observe, Read

coap://47.100.63.174:5683/firmwarePackage/BETA0808-0808BETA.bin

Figure 10:Trigger upgrade successfully



# 4 Related URCs

Table2:Related URC

Index	URC	Description
[1]	<b>+QLWEVTIND:0</b>	Module successfully registered to LWM2M server
[2]	<b>+QLWEVTIND:5</b>	The server successfully subscribed to the 5/0/3 resource
[3]	<b>FIRMWARE DOWNLOADING</b>	Module starts downloading differential packet data
[4]	<b>FIRMWARE DOWNLOADED</b>	Module download differential packet data completion
[5]	<b>FIRMWARE DOWNLOAD FAILED</b>	Module failed to download differential packet data
[6]	<b>FIRMWARE UPDATING</b>	Mode starts to upgrade
[7]	<b>FIRMWARE UPDATE SUCCESS</b>	Module upgrade succeeded
[8]	<b>FIRMWARE UPDATE FAILED</b>	Module upgrade failed
[9]	<b>FIRMWARE UPDATE OVER</b>	Module upgrade over