

BC95 B650 Version

Application Notes and FAQs

NB-IoT Module Series

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About the Document

History

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1 Introduction

This document mainly describes application notes and some frequently asked questions (FAQs) about Quectel BC95 B650 version.

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2 Application Notes

2.1. Write IMEI

Execute **AT+CGSN=1** command to query whether there is an IMEI number returned, if it is returned, then you do not need to write the IMEI.

If the IMEI has been written on the previous versions, then you still need to re-write the IMEI on B650 version. Please execute **AT+CFUN=0** command first, and then execute **AT+NTSETID=1,.....** command to write the IMEI, and **AT+CGSN=1** command to query whether the IMEI has been successfully written.

Since B650SP8 version, you need to check whether there is a USIM card. If no, execute **AT+NCONFIG?** command to query whether AUTOCONNECT is defaulted as TRUE, if it is TRUE, execute **AT+NCONFIG=AUTOCONNECT, FALSE** command, reboot the module and write IMEI again; If there is a USIM card, execute **AT+CFUN=0** command and then write the IMEI.

NOTES

1. IMEI can only be written once.
2. You can get the IMEI number by two ways: the one written on the label of Quectel modules; or you can apply for it from Quectel. The IMEI will be written into the module during mass production.

2.2. AT+CFUN Command

Since B650SP8 version, you need to check whether there is a USIM card, when there is no card, an error will be reported after executing **AT+CFUN=1**. When the module is searching or accessing the network, you cannot execute **AT+CFUN=0** or **AT+CFUN=1**, or attach/detach network, otherwise an error will be reported.

2.3. Configure CDP Server

You need to write IMEI before configuring CDP server, otherwise it will return an error.

If IMEI has been written, and error is still returned when configuring CDP server, this is because you may have already set CDP server before and the IP address is saved into the NV. When **AT+CFUN=1**, the IP address must be in accordance with the one saved in NV, otherwise it will return an error; when **AT+CFUN=0**, you can be reset and change the CDP server.

Since B650SP8 version, you need to check whether there is a USIM card. If no, execute **AT+NCONFIG?** command to query whether AUTOCONNECT is defaulted as TRUE, if it is TRUE, execute **AT+NCONFIG=AUTOCONNECT, FALSE** command, reboot the module and then configure CDP server.

2.4. Attach Network

You need to make sure the module type corresponds to the frequency band (**AT+NBAND?** command can be used to query the band) before attaching network.

The module's band is defaulted as 900MHz (factory setting), you can configure the band by **AT+NBAND=n** command and the configuration will take effect after restarting the module.

The module types and corresponding frequency bands are shown as follows:

Module Type	BC95-B8 (BC95-CM)	BC95-B5 (BC95-SL)	BC95-B20 (BC95-VF)
Frequency band	900MHz	850MHz	800MHz

The module can automatically attach network by default in B650 version which is controlled by **AT+NCONFIG=AUTOCONN,TRUE** command. You only need to query whether the module has attached network by the following commands:

AT+NBAND?	//Query the band.
AT+CFUN?	//Value is 1.
AT+CIMI	//Query the IMSI.
AT+CSQ	//Query the signal strength.
AT+NUESTATS	//Query the module status.
AT+CGATT?	//+CGATT:1 means attached successfully, sometimes you need to wait for 30s.
AT+CEREG?	//Query the network registration status, 1 means registered on network, 2 means searching the network.
AT+CSCON?	//Query the network connection mode, 1 means CONNECT, 0 means IDLE.

If you want to manually attach the network, please execute **AT+NCONFIG=AUTOCONNECT, FALSE** to disable automatic network attachment. This value will be saved to the NV and take effect after restarting the module.

The following shows two ways of manual network attachment process:

1. Do not specify PLMN.

```
AT+CFUN=1
AT+CIMI           //Wait for 4s before querying the IMSI. If IMSI is returned, it means the card has
                  //been identified; if not returned, you need to check whether it is a USIM card and
                  //whether the card is well inserted.

AT+NBAND?         //Query the band.
AT+CEREG=1        //Set to automatically report network registration status, when the module is
                  //registered on network, URC will be reported.

AT+CGDCONT=1,"IP","APN" //APN is a local access point, you need to configure accordingly or not
                  //to configure it.

AT+CGATT=1
AT+CSQ           //Query the signal strength.
AT+NUESTATS      //Query the module status.

AT+CGATT?        //+CGATT:1 means attached successfully, sometimes you need to wait for 30s.
AT+CEREG?        //Query the network registration status, 1 means registered on network, 2
                  //means searching the network.

AT+CSCON?        //Query the network connection mode, 1 means CONNECT, 0 means IDLE.
```

2. Specify PLMN.

```
AT+CFUN=1
AT+CIMI           //Wait for 4s before querying the IMSI. If IMSI is returned, it means the
                  //card has been identified; if not returned, you need to check whether it is
                  //a USIM card and whether the card is well inserted.

AT+NBAND?         //Query the band.
AT+CEREG=1        //Set to automatically report network registration status, when the
                  //module is registered on the network, URC will be reported.

AT+CGDCONT=1,"IP","APN" //APN is a local access point, you need to configure accordingly or not
                  //to configure it.

AT+COPS=1,2,"46000" (or AT+COPS=0) //Specify the PLMN searching or automatic searching,
                  //PLMN needs to be configured by yourself.

AT+CSQ           //Query the signal strength.
AT+NUESTATS      //Query the module status.
AT+CGATT?        //+CGATT:1 means attached successfully, sometimes you need to wait
                  //for 30s.
```


AT+CEREG?	//Query the network registration status, 1 means registered on network, 2 means searching the network.
AT+CSCON?	//Query the network connection mode, 1 means CONNECT, 0 means IDLE.

2.5. Send UDP Messages

You need to establish a socket by **AT+NSOCR** before sending UDP messages via **AT+NSOST**.

Execute **AT+NSOCR=<type>,<protocol>,<listen port>[,<receive control>]** to create socket:

<type>	Supported value is DGRAM
<protocol>	Supported value is 17
<listen port>	A number in the range 0-65535, the local port that will be included in sent messages and the port on which messages will be received
<receive control>	Set to 1 if incoming messages need to be received, 0 if incoming messages need to be ignored. Default is 1

Execute **AT+NSOST=<socket>,<remote_addr>,<remote_port>,<length>,<data>** to send UDP messages:

<socket>	Socket number returned by AT+NSOCR
<remote_addr>	IPv4, a dot notation IP address
<remote_port>	A number in the range 0-65535. This is the remote port on which messages will be received
<length>	Decimal length of data to be sent
<data>	Data received in hex string format, or quoted string format

2.6. Send CoAP Messages

You do not need to establish a connection, after configuring CDP server, CoAP messages can be sent.

Execute **AT+NCDP=<ip_addr>,<port>** to configure CDP server. **<ip_addr>** is the network address (the network must be able to connect to the server), **<port>** is the monitoring port set by the server, and the default port is 5683.

2.7. Receive Paging Messages

The module can receive the paging messages under the IDLE mode. If you want to test it, you need to confirm whether the base station supports receiving the paging messages.

2.8. About Command Echoing

Command echoing is not supported currently.

2.9. About Baud Rate

The main UART port is used for AT command communication and baud rate is 9600bps; the debug port is used to output log and baud rate is 921600bps.

2.10. About Firmware Upgrade and Log Catching

Each firmware version has a corresponding firmware upgrade tool (currently via main UART port) and log catching tool (currently via debug port), and the corresponding tools will be attached when providing the firmware.

3 FAQs

1) Q: How can network connection modes be switched on the module?

A: The module has three kinds of network connection modes:

- a) CONNECT (+CSCON:0,1, when the module has attached network, it will be in this mode)
- b) IDLE (+CSCON:0,0)
- c) PSM (can be identified by power consumption, maximum power consumption is 5uA under PSM mode)

The following figure shows the transition among the network connection modes:

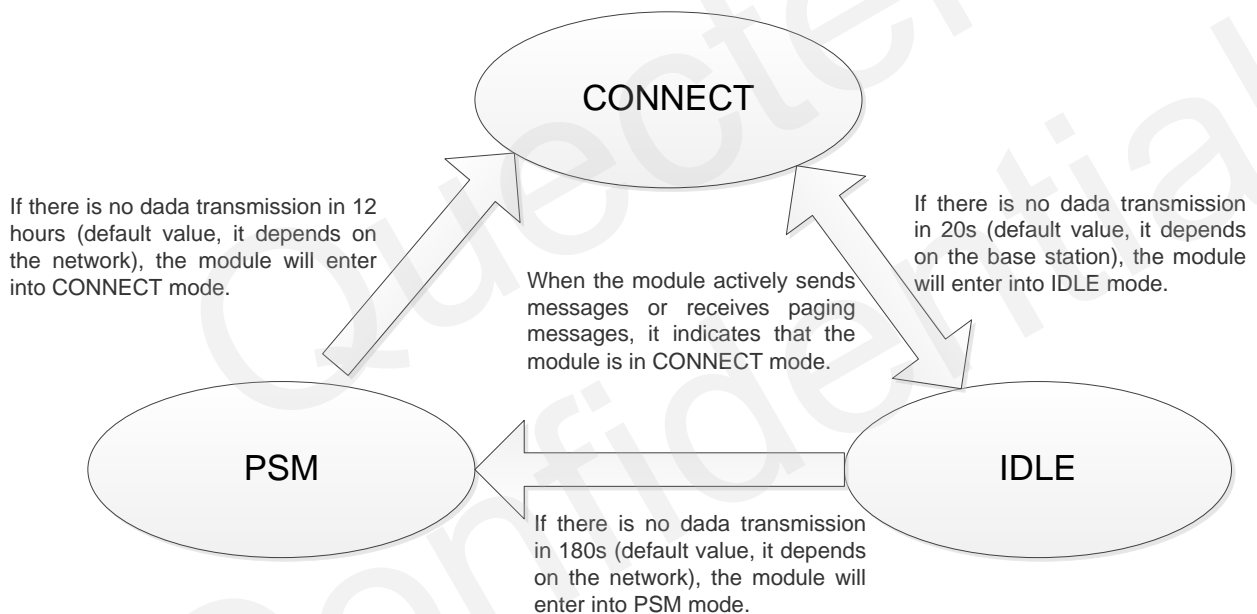


Figure 1: Transition among Network Connection Modes

NOTES

1. UDP/CoAP messages can be sent under these three modes; sending messages under IDLE mode or PSM mode will make the module enter into CONNECT mode; when TAU time expires, the module will be woken and enter into CONNECT mode.
2. When messages are received under IDLE mode, the module enters into CONNECT mode, and messages cannot be received under PSM mode.
3. TAU time refers to the duration from the moment that the IDLE mode starts to the moment the PSM mode ends.

- 2) Q: When sending CoAP messages, the IP address of CDP server needs to be configured and the server depends on network operators or test environment providers, then how about sending UDP packet?
A: CDP server is provided by test environment providers, and UDP server can be built by your own.
- 3) Q: There are three kinds of network connection modes on BC95, which are active (CONNECT) mode, standby (IDLE) mode and deep-sleep (PSM) mode, whether the transition among them is controlled by BC95 or by connected devices?
A: The transition is controlled by BC95 through a timer in it, and the timer value depends on the network; connected devices can activate communication function no matter the module is in standby mode or in deep sleep mode.
- 4) Q: When BC95 is in low power consumption mode, whether it is always connected with the server? Whether the messages sent by the server can always be received?
A: When BC95 is in a deep sleep mode, it will be disconnected with the server; the network side cannot page to the device until the module is connected to the server.
- 5) Q: When sending CoAP messages, CDP server must be configured, then how to configure on CDP or Huawei IoT platform?
A: The server depends on network operators or test environment providers, such as IoT platform adopted by China Unicom is Jasper, China Mobile uses Onenet, and for the module, only the IP address of the server is configured.
- 6) Q: Whether the module supports TCP protocol and whether it supports writing SIM card number?
A: Neither of them is supported. Currently only CoAP and UDP protocols are supported.
- 7) Q: For CoAP messages and UDP messages, can I choose one of them or they must be chosen simultaneously?
A: Both of them can be chosen. CoAP is an application layer protocol based on UDP.
- 8) Q: Whether “+NSONMI:0,4” URC is automatically outputted by the module to notify the MCU, or it is sent by MCU?
A: This URC is outputted by the module when it receives UDP messages. The first parameter is the socket, and the second parameter is length of the received data. Whether or not to report the URC is determined by **<receive control>** in **AT+NSOCR** command. **<receive control>**: Set to 1 if incoming messages need to be received, 0 if incoming messages need to be ignored. Default value is 1 (messages will be received). Please refer to *Quectel_BC95_AT_Commands_Manual* for details.
- 9) Q: Whether operators (such as China Mobile/Unicom/Telecom) can be supported simultaneously or only one can be supported at one time? If only one can be supported at one time, is there a way to identify?
A: The module supports China Mobile, Chins Unicom and China Telecom. Currently it only supports single frequency, listed as below:

BC95-VF/ BC95-B20	800MHz
BC95-SL/ BC95-B5	850MHz
BC95-CM/ BC95-B8	900MHz

10) Q: Which bands does the module support for different operators currently?

A: The module supports 800MHz for China Telecom (**actually this band is within the range of BC95-850MHz**), 900MHz for China Mobile and 1800MHz for China Unicom.

11) Q: Whether cell switch and re-election are supported?

A: Temporarily they are not supported.

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