BG95-S5 QCFGEXT
AT Commands Manual

Satellite Communication Module Series

Version: 1.0

Date: 2024-09-23

Status: Released

At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China
Tel: +86 21 5108 6236
Email: info@quectel.com

Or our local offices. For more information, please visit:
http://www.quectel.com/support/sales.htm.

For technical support, or to report documentation errors, please visit:
http://www.quectel.com/support/technical.htm.
Or email us at: support@quectel.com.

Legal Notices

We offer information as a service to you. The provided information is based on your requirements and we make every effort to ensure its quality. You agree that you are responsible for using independent analysis and evaluation in designing intended products, and we provide reference designs for illustrative purposes only. Before using any hardware, software or service guided by this document, please read this notice carefully. Even though we employ commercially reasonable efforts to provide the best possible experience, you hereby acknowledge and agree that this document and related services hereunder are provided to you on an "as available" basis. We may revise or restate this document from time to time at our sole discretion without any prior notice to you.

Use and Disclosure Restrictions

License Agreements

Documents and information provided by us shall be kept confidential, unless specific permission is granted. They shall not be accessed or used for any purpose except as expressly provided herein.

Copyright

Our and third-party products hereunder may contain copyrighted material. Such copyrighted material shall not be copied, reproduced, distributed, merged, published, translated, or modified without prior written consent. We and the third party have exclusive rights over copyrighted material. No license shall be granted or conveyed under any patents, copyrights, trademarks, or service mark rights. To avoid ambiguities, purchasing in any form cannot be deemed as granting a license other than the normal non-exclusive, royalty-free license to use the material. We reserve the right to take legal action for noncompliance with abovementioned requirements, unauthorized use, or other illegal or malicious use of the material.

Trademarks

Except as otherwise set forth herein, nothing in this document shall be construed as conferring any rights to use any trademark, trade name or name, abbreviation, or counterfeit product thereof owned by Quectel or any third party in advertising, publicity, or other aspects.

Third-Party Rights

This document may refer to hardware, software and/or documentation owned by one or more third parties ("third-party materials"). Use of such third-party materials shall be governed by all restrictions and obligations applicable thereto.

We make no warranty or representation, either express or implied, regarding the third-party materials, including but not limited to any implied or statutory, warranties of merchantability or fitness for a particular purpose, quiet enjoyment, system integration, information accuracy, and non-infringement of any third-party intellectual property rights with regard to the licensed technology or use thereof. Nothing herein constitutes a representation or warranty by us to either develop, enhance, modify, distribute, market, sell, offer for sale, or otherwise maintain production of any our products or any other hardware, software, device, tool, information, or product. We moreover disclaim any and all warranties arising from the course of dealing or usage of trade.

Privacy Policy

To implement module functionality, certain device data are uploaded to Quectel's or third-party's servers, including carriers, chipset suppliers or customer-designated servers. Quectel, strictly abiding by the relevant laws and regulations, shall retain, use, disclose or otherwise process relevant data for the purpose of performing the service only or as permitted by applicable laws. Before data interaction with third parties, please be informed of their privacy and data security policy.

Disclaimer

a) We acknowledge no liability for any injury or damage arising from the reliance upon the information.
b) We shall bear no liability resulting from any inaccuracies or omissions, or from the use of the information contained herein.
c) While we have made every effort to ensure that the functions and features under development are free from errors, it is possible that they could contain errors, inaccuracies, and omissions. Unless otherwise provided by valid agreement, we make no warranties of any kind, either implied or express, and exclude all liability for any loss or damage suffered in connection with the use of features and functions under development, to the maximum extent permitted by law, regardless of whether such loss or damage may have been foreseeable.
d) We are not responsible for the accessibility, safety, accuracy, availability, legality, or completeness of information, advertising, commercial offers, products, services, and materials on third-party websites and third-party resources.

About the Document

Revision History

Version	Date	Author	Description
-	2024-07-31	Jude ZHANG	Creation of the document
1.0	2024-09-23	Jude ZHANG	First official release

Contents

Table Index

1 Introduction

This document describes the **AT+QCFGEXT** command supported on BG95-S5 module.

2 AT Command Introduction

2.1. 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 command line. When an optional parameter is not given in a command, the new value equals its previous value or the default settings, unless otherwise specified.
- <u>**Underline**</u>　　Default setting of a parameter.

2.2. 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.

AT+QCFGEXT command implemented by BG95-S5 module is in "Extended" syntax, as illustrated below.

Extended

There are several types of extended commands as shown in the following table.

Table 1: Types of AT Commands

Command Type	Syntax	Description
Test Command	**AT+<cmd>=?**	Test the existence of the corresponding command and return information about the type, value, or range of its parameter.

Read Command	**AT+<cmd>?**	Check the current parameter value of the corresponding 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.

Multiple commands can be placed on a single line using a semi-colon (**;**) between commands. In such cases, only the first command should have **AT** prefix. Commands can be in upper or lower case.

Spaces should be ignored when you enter AT commands, except in the following cases:

● Within quoted strings, where spaces are preserved;
● Within an unquoted string or numeric parameter;
● Within an IP address;
● Within the AT command name up to and including a **=**, **?** or **=?**.

On input, at least a carriage return is required. A newline character is ignored so it is permissible to use carriage return/line feed pairs on the input.

If no command is entered after the **AT** token, **OK** will be returned. If an invalid command is entered, **ERROR** will be returned.

Optional parameters, unless explicitly stated, need to be provided up to the last entered parameter.

2.3. AT Command Responses

When the AT command processor has finished processing a line, it will output **OK**, **ERROR** or **+CME ERROR: <err>** to indicate that it is ready to accept a new command. Solicited information responses are sent before the final **OK**, **ERROR** or **+CME ERROR: <err>**.

Responses will be in the format of:

<CR><LF>+CMD1:<parameters><CR><LF>
<CR><LF>OK<CR><LF>

Or

<CR><LF><parameters><CR><LF>
<CR><LF>OK<CR><LF>

2.4. Declaration of AT Command Examples

The AT command examples in this document are provided to help you learn about the use of the AT commands introduced herein. The examples, however, should not be taken as Quectel's recommendations or suggestions about how to design a program flow or what status to set the module into. Sometimes multiple examples may be provided for one AT command. However, this does not mean that there is a correlation among these examples, or that they should be executed in a given sequence. The URLs, domain names, IP addresses, usernames/accounts, and passwords (if any) in the AT command examples are provided for illustrative and explanatory purposes only, and they should be modified to reflect your actual usage and specific needs.

3 Description of AT+QCFGEXT Commands

3.1. AT+QCFGEXT Extended Configuration Settings

The **AT+QCFGEXT** Write Commands query and configure various extended settings of the module. The following Test Command shows the various extended settings of the module.

AT+QCFGEXT Extended Configuration Settings	
Test Command **AT+QCFGEXT=?**	Response **+QCFGEXT: "addgeo",<geoid>,<mode>,<shape>,<lat1>,<lon1>,<lat2>[,<lon2>[,<lat3>,<lon3>[,<lat4>,<lon4>]]]** **+QCFGEXT: "deletegeo",<geoid>** **+QCFGEXT: "querygeo",<geoid>** **+QCFGEXT: "nipdcfg"[,<type>[,<apn>[,<username>,<password>]]]** **+QCFGEXT: "nipd"[,<mode>[,<timeout>]]** **+QCFGEXT: "nipds"[,<mode>,<data>[,<data_length>[,<rai_flag>]]]** **+QCFGEXT: "nipdr"[,<read_length>[,<read_mode>]]** **+QCFGEXT: "dump"[,(**list of supported **<value>**s**)]** **+QCFGEXT: "quecopen"[,(**list of supported **<value>**s**)]** **+QCFGEXT: "disusb",(**list of supported **<value>**s**)** **+QCFGEXT: "usb/event"** **+QCFGEXT: "fota_apn",<iptype>,<apn>[,<username>,<password>]** **+QCFGEXT: "dnsc_timeout"[,(**range of supported **<timeout>**s**)]** **+QCFGEXT: "pwm",<pin>[,(**list of supported **<state>**s**)[,(**range of supported **<duty_cycle>**s**),(**range of supported **<frequency>**s**)]]** **+QCFGEXT: "usbnet"[,(**range of supported **<mode>**s**)]** **+QCFGEXT: "sni"[,(**list of supported **<SNI>**s**)]** **+QCFGEXT: "fota_http_header",<header_key>,<header_value>** **+QCFGEXT: "fota_wd_gpio",<switch>,<pin_num>,<feed_interval>**

	+QCFGEXT: "ap_os_version" OK

3.1.1. PS Related AT Commands

3.1.1.1. AT+QCFGEXT="nipdcfg" Configure NIDD Connection

This command configures an NIDD connection or queries the current setting.

AT+QCFGEXT="nipdcfg" Configure NIDD Connection	
Write Command **AT+QCFGEXT="nipdcfg"[,<type>[,<apn>[,<username>,<password>]]]**	Response If the optional parameters are omitted, query the current setting: **+QCFGEXT: "nipdcfg",<type>,<apn>** **OK** If any of the optional parameters is specified, configure the NIDD connection: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.

Parameter

<type>	Integer type. Non-IP outgoing data type.
	0 MO non-IP data type.
	1 MO Exception non-IP data type.
<apn>	String type. Access point name.
<username>	String type. Username of the selected APN.
<password>	String type. Password of the selected APN.

3.1.1.2. AT+QCFGEXT="nipd" Open/Close NIDD Connection

This command opens/closes a NIDD connection.

AT+QCFGEXT="nipd" Open/Close NIDD Connection	
Write Command **AT+QCFGEXT="nipd",<mode>[,<time out>]**	Response If **<mode>**=0, close an NIDD connection: **OK** If **<mode>**=1, open an NIDD connection: **OK** **+QIND: "nipd","open",<errcode>** If there is an error related to ME functionality: **+CME ERROR: <errcode>** If there is any other error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.

Parameter

<mode>	Integer type. Close/open a NIDD connection. 0 Close a NIDD connection. 1 Open a NIDD connection.
<timeout>	Integer type. The timeout value when opening an NIDD connection. This parameter is valid only when **<mode>**=1. Range: 30–90. Default value: 30. Unit: s.
<errcode>	Integer type. Error code. See *Chapter 4* for details.

> **NOTE**
>
> NIDD function is disabled by default. **AT+QCFG="nccconf",115** (see *document [1]* for details) can be used to enable the function.

3.1.1.3. AT+QCFGEXT="nipds" Send MO Non-IP Data

This command sends MO non-IP data to a server.

AT+QCFGEXT="nipds" Send MO Non-IP Data	
Write Command **AT+QCFGEXT="nipds",<mode>,<data >[,<data_length>[,<rai_flag>]]**	Response **OK** If there is an error related to ME functionality: **+CME ERROR: <errcode>** If there is any other error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.

Parameter

<mode>	Integer type. Input format for **<data>**. 0 ASCII format string. 1 Hex format string.
<data>	ASCII format string or hex format string. The data to be sent.
<data_length>	Integer type. The length of the data to be sent. Range: 1–1358 for ASCII format; 1–679 for hex format. Unit: byte. If this parameter is omitted, **<data>** can be of any length within 1358 bytes of ASCII format, or within 679 bytes of hex format.
<rai_flag>	Integer type. Whether to enable RAI flag when sending data to the network side. 0 Disable. 1 Enable.
<errcode>	Integer type. Error code. See **Chapter 4** for details.

3.1.1.4. AT+QCFGEXT="nipdr" Retrieve MT Non-IP Data

This command retrieves the MT non-IP data reported by the URC **+QIND: "nipd","recv"**.

AT+QCFGEXT="nipdr" Retrieve MT Non-IP Data	
Write Command **AT+QCFGEXT="nipdr"[,<read_length>[,<read_mode>]]**	Response **+QCFGEXT: "nipdr",<read_actual_length>,<data>** **OK**

	If there is no data that can be retrieved: **+QCFGEXT: "nipdr",0** **OK** If there is an error related to ME functionality: **+CME ERROR: <errcode>** If there is any other error: **ERROR**
Write Command When **<read_length>** is 0, query the read status of the retrieved data: **AT+QCFGEXT="nipdr",0**	Response If the connection has existed: **+QCFGEXT: "nipdr",<total_receive_length>,<have_read_length>,<unread_length>** **OK** If there is an error related to ME functionality: **+CME ERROR: <errcode>** If there is any other error: **ERROR**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<read_length>	Integer type. The length of the data to be retrieved. Retrieve all available data if this parameter is omitted. If **<read_mode>** is 0, the maximum value of **<read_length>** is 990, If **<read_mode>** is 1, the maximum value of **<read_length>** is 495. Unit: byte.
<read_mode>	Integer type. Displayed format for **<data>**. This parameter is valid only when **<read_length>** is not 0.
	<u>0</u> String type.
	1 Hex type.
<read_actual_length>	Integer type. The actual length of retrieved data. Unit: byte.
<data>	String type or hex type. Retrieved data.
<total_receive_length>	Integer type. The total length of received data. Unit: byte.
<have_read_length>	Integer type. The length of retrieved data. Unit: byte.
<unread_length>	Integer type. The length of unread data. Unit: byte.
<errcode>	Integer type. Error code. See *Chapter 4* for details.

3.1.1.5. AT+QCFGEXT="fota_apn" Configure IP Family and APN for DFOTA

This command configures the IP family and APN for DFOTA or queries the current setting.

AT+QCFGEXT="fota_apn" Configure IP Family and APN for DFOTA	
Write Command **AT+QCFGEXT="fota_apn"[,<iptype>,<apn>[,<username>,<password>]]**	Response If the optional parameters are omitted, query the current setting: **+QCFGEXT: "fota_apn",<iptype>,<apn>[,<username>,<password>]** **OK** If any of the optional parameters is specified, set the IP family and APN for DFOTA: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.

Parameter

<iptype>	Integer type. IP family.
	0 IPv4 address family
	1 IPv6 address family
	2 IPv4 and IPv6 address family
<apn>	String type. Access point name.
<username>	String type. Username of the selected APN.
<password>	String type. Password of the selected APN.

3.1.1.6. AT+QCFGEXT="dnsc_timeout" Configure DNS Session Timeout Value

This command configures the DNS session timeout value or queries the current setting.

AT+QCFGEXT="dnsc_timeout" Configure DNS Session Timeout Value	
Write Command **AT+QCFGEXT="dnsc_timeout"[,<timeout>]**	Response If the optional parameter is omitted, query the current setting: **+QCFGEXT: "dnsc_timeout",<timeout>**

	OK If the optional parameter is specified, set the DNS session timeout value: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<timeout>	Integer type. DNS session timeout value. Range: 2–300. Default value: 60. Unit: second.

3.1.1.7. AT+QCFGEXT="sni" Enable/Disable Server Name Indication for DFOTA Downloading over HTTP(S)

This command enables/disables the server name indication for DFOTA downloading over HTTP(S).

AT+QCFGEXT="sni" Enable/Disable Server Name Indication for DFOTA downloading over HTTP(S)	
Write Command **AT+QCFGEXT="sni"[,<SNI>]**	Response If the optional parameter is omitted, query the current setting: **+QCFGEXT: "sni",<SNI>** **OK** If the optional parameter is specified, enable/disable the server name indication for DFOTA downloading over HTTP(S): **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms

Characteristics	The command takes effect immediately.
	The configuration is not saved.

Parameter

<SNI>	Integer type. Enable/disable server name indication.
	<u>0</u> Disable
	1 Enable

3.1.1.8. AT+QCFGEXT="fota_http_header" Configure Application HTTP Header for DFOTA Downloading over HTTP(S)

This command configures the application HTTP header for DFOTA downloading over HTTP(S).

AT+QCFGEXT="fota_http_header" Configure Application HTTP Header for DFOTA Downloading over HTTP(S)	
Write Command **AT+QCFGEXT="fota_http_header"[,<header_key>[,<header_value>]]**	Response If the optional parameters are omitted, query the current setting: **+QCFGEXT: "fota_http_header",<header_key>,<header_value>** **OK** If any of the optional parameters is specified, configure application HTTP header for DFOTA downloading over HTTP(S): **OK** If there is any error related to ME functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.

Parameter

<header_key>	String type. Key of HTTP header.
<header_value>	String type. Value of HTTP header. This value can be null, indicating that delete previously user-defined HTTP header configuration.
<err>	Error codes. Refer to *Chapter 3* for more details.

> **NOTE**
>
> This command can define a maximum of 5 headers.

Example

```
AT+QCFGEXT="fota_http_header","Auth","test"//Set the user-defined HTTP header configuration.
OK
AT+QCFGEXT="fota_http_header"              //Query the user-defined HTTP header configuration.
+QCFGEXT: key:Auth  value:test

OK
AT+QCFGEXT="fota_http_header","Auth",""   //Delete one of the user-defined HTTP header
OK                                            configuration.
```

3.1.1.9. AT+QCFGEXT="fota_wd_gpio" Configure External Watch Dog Pin and Feeding Interval During DFOTA Upgrade

This command configures the external watch dog pin and feeding interval during DFOTA upgrade.

For QuecOpen devices, the QuecOpen application cannot run during DFOTA upgrade of the module, so the external watch dog is unable to be fed by QuecOpen application. This command is used to configure a pin of module to control the external watch dog and perform feeding automatically during DFOTA upgrade.

AT+QCFGEXT="fota_wd_gpio" Configure External Watch Dog Pin and Feeding Interval During DFOTA Upgrade	
Write Command **AT+QCFGEXT="fota_wd_gpio"[,<switch>[,<pin_num>,<feed_interval>]]**	Response If the optional parameters are omitted, query the current setting: **+QCFGEXT: "fota_wd_gpio",<switch>,<pin_num>,<feed_interval>** **OK** If the optional parameters are specified, configure the external watch dog pin and feeding interval during DFOTA upgrade: **OK** If there is any error:

	ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.

Parameter

\<switch\>	Integer type. Enable/disable DFOTA watch dog. 0 Disable. If **\<switch\>** is set to 0, **\<pin_num\>** and **\<feed_interval\>** are omitted 1 Enable
\<pin_num\>	Integer type. GPIO pin number for watch dog. BG95-S5 module supports the pin numbers below: 4–7, 18, 19, 22, 23,25–28, 40, 41, 64–66, 85–88.
\<feed_interval\>	Integer type. The interval to feed the watch dog. Square wave with period of 2 × **\<feed_interval\>**. Range: 100–3600000. Unit: millisecond.
\<err\>	Error codes. See **Chapter 3** for more details.

Example

```
//Set the watch dog configuration.
AT+QCFGEXT="fota_wd_gpio",1,6,3000   //Enable the watch dog, and set pin number to 6 and feed
OK                                     intervals to 3000 milliseconds.
AT+QCFGEXT="fota_wd_gpio",0          //Disable DFOTA watch dog.
OK
AT+QCFGEXT="fota_wd_gpio"            //Query DFOTA watch dog configuration.
+QCFGEXT: "fota_wd_gpio",1,6,3000

OK
```

3.1.2. Platform Related AT Commands

3.1.2.1. AT+QCFGEXT="dump" Enable/Disable Dump Mode

This command configures whether to enable dump mode or queries the current setting.

AT+QCFGEXT="dump" Enable/Disable Dump Mode	
Write Command **AT+QCFGEXT="dump"[,\<value\>]**	Response If the optional parameter is omitted, query the current setting: **+QCFGEXT: "dump",\<value\>**

	OK If the optional parameter is specified, set whether to enable dump mode: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting. The configuration is saved automatically.

Parameter

<value>	Integer type. Enable/disable dump mode. <u>0</u> Disable 1 Enable

3.1.2.2. AT+QCFGEXT="quecopen" Enable/Disable QuecOpen Function

This command enables/disables the QuecOpen function or queries the current setting.

AT+QCFGEXT="quecopen" Enable/Disable QuecOpen Function	
Write Command **AT+QCFGEXT="quecopen"[,<value>]**	Response If the optional parameter is omitted, query the current setting: **+QCFGEXT: "quecopen",<value>** **OK** If the optional parameter is specified, enable/disable QuecOpen function: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting. The configuration is saved automatically.

Parameter

<value>	Integer type. Enable/disable QuecOpen function.
	<u>0</u> Enable
	1 Disable

3.1.2.3. AT+QCFGEXT="disusb" Configure Whether to Disable USB Function

This command configures whether to disable USB function or queries the current setting.

AT+QCFGEXT="disusb" Configure Whether to Disable USB Function	
Write Command **AT+QCFGEXT="disusb"[,<value>]**	Response If the optional parameter is omitted, query the current setting: **+QCFGEXT: "disusb",<value>** **OK** If the optional parameter is specified, configure whether to disable USB function: **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

<value>	Integer type. Configure whether to disable USB function.
	<u>0</u> Do not disable USB function
	1 Disable USB function

NOTE

This command is used to disable USB function, so if **<value>** is 0, it means to enable USB; if **<value>** is 1, it means to disable USB.

3.1.2.4. AT+QCFGEXT="usb/event" Get USB Event

This command gets a USB event.

AT+QCFGEXT="usb/event" Get USB Event	
Write Command **AT+QCFGEXT="usb/event"**	Response **+QCFGEXT: "usb/event",<event>** **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<event>	Integer type. USB event.
	0 USB CONNECT
	1 USB DISCONNECT
	2 USB SUSPEND
	3 USB RESUME
	4 USB RESUME COMPLETED
	5 USB REMOTE WAKEUP
	6 USB CONFIGURED
	7 USB UNCONFIGURED
	8 USB RESET
	9 USB SPEED CHANGE

3.1.2.5. AT+QCFGEXT="pwm" Configure PWM Function

This command configures PWM function or queries the current setting.

AT+QCFGEXT="pwm" Configure PWM Function	
Write Command **AT+QCFGEXT="pwm",<pin>[,<state>[,<duty_cycle>,<frequency>]]**	Response If the optional parameters are omitted, query the current setting: **+QCFGEXT: "pwm",<pin>,<state>,<duty_cycle>,<frequency>**

	OK If any of the optional parameters is specified, configure the PWM function multiplexed from the corresponding GPIO: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.

Parameter

\<pin>	Integer type. Select the PWM function multiplexed from the corresponding GPIO. 0 BG95-S5: Pin 66
\<state>	Integer type. Enable/disable PWM function. <u>0</u> Disable 1 Enable
\<duty_cycle>	Integer type. Set the percentage of PWM duty cycle. Range: 1–99. It is valid only when **\<state>**=1.
\<frequency>	Integer type. Set the frequency of PWM. Range: 293–600000. Unit: Hz. It is valid only when **\<state>**=1.

Example

AT+QCFGEXT="pwm",0,1,10,1000	//Set duty cycle = 10 % and frequency = 1000 Hz.
OK	//PWM turned on successfully.
AT+QCFGEXT="pwm",0	//Query the current setting.
+QCFGEXT: "pwm",0,1,10,1000	
OK	
AT+QCFGEXT="pwm",0,1,10,2000	//Modify the frequency to 2000 Hz. The duty cycle remains unchanged
OK	
AT+QCFGEXT="pwm",0,1,30,2000	//Modify the duty cycle to 30 %. The frequency remains unchanged.
OK	
AT+QCFGEXT="pwm",0,0	//Turn off PWM.
OK	

3.1.2.6. AT+QCFGEXT="usbnet" Configure USB Composition

This command switches different combinations of USB enumerations through configuring USB composition ID.

AT+QCFGEXT="usbnet" Configure USB composition	
Write Command **AT+QCFGEXT="usbnet"[,<mode>]**	Response If the optional parameter is omitted, query the current setting: **+QCFGEXT: "usbnet",<mode>** **OK** If the optional parameter is specified, a corresponding feature will be enabled: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting. The configuration is saved automatically.

Parameter

<mode>	String type.	
	"rmnet"	RmNet interface mode. This interface can accept QMI message. Corresponds to RmNet USB combination: USB DM + NMEA + Modem + RmNet.
	"ecm"	ECM interface mode. The host can connect to the module via USB and use the module as a CDC-Ethernet. Corresponds to ECM USB combination: USB DM + NMEA + Modem + ECM.
	"modem"	Modem interface mode. A second modem port will be additionally enabled for use. Corresponds to Modem USB combination: USB DM + NMEA + Modem + Modem.

3.1.2.7. AT+QCFGEXT="ap_os_version" Query APPS Operation System Version

This command queries APPS operation system version.

AT+QCFGEXT="ap_os_version" Query APPS Operation System Version	
Execution Command **AT+QCFGEXT="ap_os_version"**	Response **<ap_os_version>** **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<ap_os_version>	String type. The version number of module APPS side system.

3.1.3. GNSS Related AT Commands

3.1.3.1. AT+QCFGEXT="addgeo" Add a Geofence

This command adds a geofence or queries the current setting.

AT+QCFGEXT="addgeo" Add a Geofence	
Write Command **AT+QCFGEXT="addgeo"[,<geoid>[,<mode>,<shape>,<lat1>,<lon1>,<lat2>[,<lon2>[,<lat3>,<lon3>[,<lat4>,<lon4>]]]]]**	Response If the optional parameters are omitted, query the current setting of all geofences that have been added: **[+QCFGEXT: "addgeo",<geoid>,<mode>,<shape>,<lat1>,<lon1>,<lat2>[,<lon2>[,<lat3>,<lon3>[,<lat4>,<lon4>]]]** **…** **+QCFGEXT: "addgeo",<geoid>,<mode>,<shape>,<lat1>,<lon1>,<lat2>[,<lon2>[,<lat3>,<lon3>[,<lat4>,<lon4>]]]]** **OK** If all parameters after **<geoid>** are omitted, query the current setting of the specified geofence: **+QCFGEXT: "addgeo",<geoid>,<mode>,<shape>,<lat1>,<lon1>,<lat2>[,<lon2>[,<lat3>,<lon3>[,<lat4>,<lon4>]]]**

	OK
	If **\<shape>**=0, add a circular geofence and the parameters after **\<lat2>** must be omitted: **OK** If **\<shape>**=1, add a circular geofence and the parameters after **\<lon2>** must be omitted: **OK** If **\<shape>**=2, add a triangle geofence and the parameters after **\<lon3>** must be omitted: **OK** If **\<shape>**=3, add a quadrangle geofence and all parameters must be specified: **OK** If there is any error related to ME functionality: **+CME ERROR: \<errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.

Parameter

\<geoid>	Integer type. Geofence ID. Range: 0–9.
\<mode>	Integer type. URC report mode. 0 Disable URC to be reported when the module enters or leaves the geofence. 1 Enable URC to be reported when the module enters the geofence. 2 Enable URC to be reported when the module leaves the geofence. 3 Enable URC to be reported when the module enters or leaves the geofence. For details about the URC, please refer to **Chapter 3.2.1**.
\<shape>	Integer type. Geofence shape. 0 Circle with center and radius. 1 Circle with center and one point on the circle. 2 Triangle. 3 Quadrangle.
\<lat1>	The latitude of a point which is defined as the center of the geofence circular region or the first point. Unit: degree. Format: ±dd.dddddd. Range: -90.000000 to 90.000000.
\<lon1>	The longitude of a point which is defined as the center of the geofence circular region or the first point. Unit: degree. Format: ±ddd.dddddd. Range: -180.000000 to 180.000000.

<lat2>	When **<shape>** is 0, this parameter is a radius. Range: 0–6000000. Unit: meter. When **<shape>** is other values, this parameter is the latitude of the point on the circle or the second point. Unit: degree. Format: ±dd.dddddd. Range: -90.000000 to 90.000000. If **<shape>** is 0, the parameters after **<lat2>** must be omitted.
<lon2>	The longitude of the point on the circle or the second point. Unit: degree. Format: ±ddd.dddddd. Range: -180.000000 to 180.000000. If **<shape>** is 1, the parameters after **<lon2>** must be omitted.
<lat3>	The latitude of the third point. Unit: degree. Format: ±dd.dddddd. Range: -90.000000 to 90.000000.
<lon3>	The longitude of the third point. Unit: degree. Format: ±ddd.dddddd. Range: -180.000000 to 180.000000. If **<shape>** is 2, the parameters after **<lon3>** must be omitted.
<lat4>	The latitude of the fourth point. Unit: degree. Format: ±dd.dddddd. Range: -90.000000 to 90.000000.
<lon4>	The longitude of the fourth point. Unit: degree. Format: ±ddd.dddddd. Range: -180.000000 to 180.000000.
<errcode>	Integer type. Error code. See *Chapter 4* for details.

3.1.3.2. AT+QCFGEXT="deletegeo" Delete a Geofence

This command deletes a geofence.

AT+QCFGEXT="deletegeo" Delete a Geofence	
Write Command **AT+QCFGEXT="deletegeo",<geoid>**	Response **OK** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

<geoid>	Integer type. Geofence ID. Range: 0–10. 10 means deleting all geofences.
<errcode>	Integer type. Error code. See *Chapter 4* for details.

3.1.3.3. AT+QCFGEXT="querygeo" Query Position Relative to Geofence

This command queries the position relative to a geofence.

AT+QCFGEXT="querygeo" Query Position Relative to Geofence	
Write Command **AT+QCFGEXT="querygeo",<geoid>**	Response **+QCFGEXT: "querygeo",<geoid>,<pos_wrt_geofence>** **OK** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<geoid>	Integer type. Geofence ID. Range: 0–9.
<pos_wrt_geofence>	Integer type. Position relative to a geofence.
	0 An unknown position.
	1 A position inside a geofence.
	2 A position outside a geofence.
<errcode>	Integer type. Error code. See *Chapter 4* for details.

3.2. Description of URCs

3.2.1. +QIND: "GEOFENCE" Indicate Entering or Leaving Geofence

+QIND: "GEOFENCE" Indicate Entering or Leaving Geofence	
+QIND: "GEOFENCE",<geoid>,<action>,<time>,<latitude>,<longitude>,<altitude>,<course>,<speed>,<PDOP>,<HDOP>,<VDOP>	The URC indicates entering or leaving a geofence.

Parameter

<geoid>	Integer type. The ID of geofence the module enters or leaves.
<action>	Integer type. The current action of the module.

	1 Entering the geofence.
	2 Leaving the geofence.
<time>	The UTC time when the module enters or leaves the geofence.
	Format: YYYY/MM/DD hh:mm:ss.
<latitude>	The latitude of the module when it enters or leaves the geofence. Unit: degree.
	Format: ±dd.dddddd. Range: -90.000000 to 90.000000.
<longitude>	The longitude of the module when it enters or leaves the geofence. Unit: degree.
	Format: ±ddd.dddddd. Range: -180.000000 to 180.000000.
<altitude>	Float type. Mean sea level altitude. Unit: meter.
<course>	Float type. Course over ground, relative to true north. Unit: degree.
<speed>	Float type. Speed over ground. Unit: m/s.
<PDOP>	Float type. Position dilution of precision.
<HDOP>	Float type. Horizontal dilution of precision.
<VDOP>	Float type. Vertical dilution of precision.

3.2.2. +QIND: "nipd","recv" Indicate the Incoming Non-IP Data

After receiving the non-IP data from the MT, the module reports the URC **+QIND: "nipd","recv"** to notify the host that there is incoming data. Then host can retrieve data via **AT+QCFGEXT="nipdr"**. Please note that if the module receives data again when the buffer is not empty, it does not report a new URC until all the received data has been retrieved via **AT+QCFGEXT="nipdr"** from the buffer. The size of the buffer is 2048 bytes. If the data received exceeds the buffer size, the subsequent data will be discarded.

+QIND: "nipd","recv" Indicate the Incoming Non-IP Data	
+QIND: "nipd","recv"	The URC notifies the host that there is incoming non-IP data from the network. Then the host can retrieve the data via **AT+QCFGEXT="nipdr"**.

3.2.3. +QIND: "nipd","close" Indicate the NIDD Connection is Closed

+QIND: "nipd","close" Indicate the NIDD Connection is Closed	
+QIND: "nipd","close"	The URC notifies that the NIDD connection is closed accidentally. If the connection is closed normally via **AT+QCFGEXT="nipd",0**, this URC will not be reported.

4 Summary of <errcode>

The error code **<errcode>** indicates an error related to mobile equipment or network. The table below describes the details about **<errcode>**.

Table 2: Summary of <errcode>

<errcode>	Meaning
501	Invalid parameter
517	Geofence ID does not exist
651	Invalid parameter for NIPD
652	NIPD sending error
654	NIDD operation in process
656	NIDD connection not opened
657	NIDD connection opened already

5 Appendix References

Table 3: Related Document

Document Name
[1]   Quectel_BG95-S5_QCFG_AT_Commands_Manual

Table 4: Terms and Abbreviations

Abbreviation	Description
APN	Access Point Name
APPS	Application Services
ASCII	American Standard Code for Information Interchange
CDC	Communication Device Class
CME	Command Error
DFOTA	Delta Firmware Update Over-The-Air
DNS	Domain Name Service
ECM	Ethernet Control Model
EGPRS	Enhanced General Packet Radio Service
GNSS	Global Navigation Satellite System
GPIO	General-Purpose Input/Output
ID	Identifier
IP	Internet Protocol
IPv4	Internet Protocol version 4

IPv6	Internet Protocol version 6
ME	Mobile Equipment
MO	Mobile Originated
MT	Mobile Terminated
NIDD	Non-IP Data Delivery
NIPD	Non-IP Data
PPP	Point-to-Point Protocol
PS	Packet Switched
PWM	Pulse Width Modulation
RAI	Release Assistance Indication
TA	Terminal Adapter
URC	Unsolicited Result Code
USB	Universal Serial Bus
UTC	Coordinated Universal Time