

# **BG95&BG77&BG600L Series**

## **NIDD Application Note**

**LPWA Module Series**

Version: 1.0

Date: 2020-10-14

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.**

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](mailto:info@quectel.com)

**Or our local office. 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 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.

## **Disclaimer**

While Quectel has made efforts to ensure that the functions and features under development are free from errors, it is possible that these functions and features could contain errors, inaccuracies and omissions. Unless otherwise provided by valid agreement, Quectel makes no warranties of any kind, implied or express, with respect to the use of features and functions under development. To the maximum extent permitted by law, Quectel excludes all liability for any loss or damage suffered in connection with the use of the functions and features under development, regardless of whether such loss or damage may have been foreseeable.

## **Duty of Confidentiality**

The Receiving Party shall keep confidential all documentation and information provided by Quectel, except when the specific permission has been granted by Quectel. The Receiving Party shall not access or use Quectel's documentation and information for any purpose except as expressly provided herein. Furthermore, the Receiving Party shall not disclose any of the Quectel's documentation and information to any third party without the prior written consent by Quectel. For any noncompliance to the above requirements, unauthorized use, or other illegal or malicious use of the documentation and information, Quectel will reserve the right to take legal action.

## Copyright

The information contained here is proprietary technical information of Quectel wireless solutions co., ltd. Transmitting, reproducing, disseminating and editing this document as well as using the content without permission are forbidden. 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. 2020. All rights reserved.*

# About the Document

## Revision History

Version	Date	Author	Description
-	2020-05-25	Forest WANG	Creation of the document
1.0	2020-10-14	Forest WANG	First official release

## Contents

About the Document .....	3
Contents .....	4
Table Index.....	5
<b>1 Introduction .....</b>	<b>6</b>
<b>2 NIDD AT Commands.....</b>	<b>7</b>
2.1. AT Command Syntax .....	7
2.1.1. Definitions.....	7
2.1.2. AT Command Syntax .....	7
2.2. Description of NIDD Related AT Commands .....	8
2.2.1. AT+QCFGEXT="nipdcfg" Configure NIDD Connection .....	8
2.2.2. AT+QCFGEXT="nipd" Open or Close NIDD Connection .....	8
2.2.3. AT+QCFGEXT="nipds" Send MO Non-IP Data .....	9
2.2.4. AT+QCFGEXT="nipdr" Retrieve MT Non-IP Data .....	10
2.3. Description of NIDD Related URCs .....	11
2.3.1. +QIND: "nipd","rcv" Indicate the Incoming Data .....	11
2.3.2. +QIND: "nipd","close" Indicate the Connection is Closed.....	12
2.4. Example .....	12
<b>3 Summary of &lt;errcode&gt;.....</b>	<b>14</b>
<b>4 Appendix A References.....</b>	<b>15</b>

## Table Index

Table 1: Types of AT Commands and Responses .....	7
Table 2: Summary of <errcode>.....	14
Table 3: Related Documents .....	15
Table 4: Terms and Abbreviations .....	15

# 1 Introduction

The support for NIDD (Non-IP Data Delivery) is introduced from 3GPP Release 13 and later releases. Functions for NIDD may be used to handle MO and MT communication with UE, where the data used for the communication is considered unstructured from the EPS standpoint (which is referred to as Non-IP).

Quectel BG95 series, BG77 and BG600L-M3 modules support NIDD in NB-IoT RAT, and support both tethered and embedded Non-IP data calls. This document introduces how to use the NIDD function of the modules through AT commands.

# 2 NIDD AT Commands

## 2.1. AT Command Syntax

### 2.1.1. 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 omitted, the new value equals to the previous value or the default settings, unless otherwise specified.
- **Underline** Default setting of a parameter.

### 2.1.2. 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>. Throughout this document, only the commands and responses are presented, while carriage return and line feed characters are deliberately omitted.

**Table 1: Types of AT Commands and Responses**

Command Type	Syntax	Description
Test Command	AT+<cmd>=?	Returns the list of parameters and value ranges set by the corresponding Write Command or internal processes.
Read Command	AT+<cmd>?	Returns the currently set value of a parameter or parameters.
Write Command	AT+<cmd>=<p1> [,<p2>[,<p3>[...]]]	Sets parameter values.
Execution Command	AT+<cmd>	Reads non-variable parameters affected by internal processes in the module.



## 2.2. Description of NIDD Related AT Commands

### 2.2.1. AT+QCFGEXT="nipdcfg" Configure NIDD Connection

This command configures an NIDD connection.

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

#### Parameter

<b>&lt;type&gt;</b>	Integer type. Non-IP outgoing data type. 0 MO Non-IP data type 1 MO Exception Non-IP data type
<b>&lt;apn&gt;</b>	String type. Access point name.
<b>&lt;username&gt;</b>	String type. Username of the selected APN.
<b>&lt;password&gt;</b>	String type. Password of the selected APN.

#### NOTES

Before using the selected APN for starting up a Non-IP data call, set the PDP type of the APN into "Non-IP" with **AT+CGDCONT**. See *document [2]* for details of **AT+CGDCONT**.

### 2.2.2. AT+QCFGEXT="nipd" Open or Close NIDD Connection

This command opens or closes an NIDD connection.

## AT+QCFGEXT="nipd" Open or Close NIDD Connection

Write Command <b>AT+QCFGEXT="nipd",&lt;mode&gt;[,&lt;timeout&gt;]</b>	Response If <mode>=0, the command closes the NIDD connection. <b>OK</b>  If <mode>=1, the command opens an NIDD connection. <b>OK</b>  <b>+QIND: "nipd","open",&lt;errcode&gt;</b>  If there is an error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>  If there is any other error: <b>ERROR</b>
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.

### Parameter

<mode>	Integer type. Close or open an NIDD connection. 0 Close an NIDD connection. 1 Open an NIDD connection.
<timeout>	Integer type. The timeout when opening the NIDD connection. This parameter is valid only when <mode>=1. Range: 30–90. Default value: 30. Unit: second.
<errcode>	Integer type. Error code of operation. See <b>Chapter 3</b> for details.

### NOTES

1. NIDD function is disabled by default. **AT+QCFG="nccconf",115** can be used to enable the function.
2. Non-IP data calls are supported for AP embedded and tethered RmNet calls only.
3. Non-IP data calls are not supported for modem embedded calls.

### 2.2.3. AT+QCFGEXT="nips" 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 <b>AT+QCFGEXT="nipds",&lt;mode&gt;,&lt;data&gt;[,&lt;data_length&gt;]</b>	Response <b>OK</b>  If there is an error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>  If there is any other error: <b>ERROR</b>
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.

#### Parameter

<b>&lt;mode&gt;</b>	Integer type. Data format. 0 ASCII format string. 1 HEX format string.
<b>&lt;data&gt;</b>	String type. The data to be sent.
<b>&lt;data_length&gt;</b>	Integer type. The length of the data to be sent. If this parameter is omitted, <b>&lt;data&gt;</b> can be specified at any length within 1358 bytes of ASCII format. Range: 1–1358. <b>&lt;data&gt;</b> can be specified at any length within 679 bytes of HEX format. Range: 1–679. Unit: byte.
<b>&lt;errcode&gt;</b>	String type. Error code of operation. See <b>Chapter 3</b> for details.

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

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

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

Write Command <b>AT+QCFGEXT="nipdr"[,&lt;read_length&gt;[,&lt;read_mode&gt;]]</b>	Response <b>+QCFGEXT: "nipdr",&lt;read_actual_length&gt;,&lt;data&gt;</b>  <b>OK</b>  If there is no data that can be retrieved: <b>+QCFGEXT: "nipdr",0</b>  <b>OK</b>  If there is an error related to ME functionality:
--	---

	<p><b>+CME ERROR: &lt;errcode&gt;</b></p> <p>If there is any other error: <b>ERROR</b></p>
<p>Write Command</p> <p>When &lt;read_length&gt; is 0, query the read status of the retrieved data: <b>AT+QCFGEXT="nipdr",0</b></p>	<p>Response</p> <p>If the connection has existed: <b>+QCFGEXT: "nipdr",&lt;total_receive_length&gt;,&lt;have_read_length&gt;,&lt;unread_length&gt;</b></p> <p><b>OK</b></p> <p>If there is an error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b></p> <p>If there is any other error: <b>ERROR</b></p>
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. Unit: byte.
<read_mode>	Integer type. Data format. This parameter is valid only when <read_length> is not 0. 0 String type 1 Hex type
<read_actual_length>	Integer type. The actual length of retrieved data. Unit: byte.
<data>	String 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. The error code of the operation. See <b>Chapter 3</b> for details.

## 2.3. Description of NIDD Related URCs

### 2.3.1. +QIND: "nipd","recv" Indicate the Incoming 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"**. Be note that

if the buffer is not empty, and the module receives data again, it will 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 Data**

**+QIND: "nipd", "recv"**

The URC notifies the host that there is incoming data from the network. Then the host can retrieve the data via **AT+QCFGEXT="nipdr"**.

### 2.3.2. **+QIND: "nipd", "close" Indicate the Connection is Closed**

#### **+QIND: "nipd", "close" Indicate the Connection is Closed**

**+QIND: "nipd", "close"**

The URC notifies that the connection is accidentally closed. If the connection is closed normally via the **AT+QCFGEXT="nipd",0**, this URC will not be reported.

## 2.4. Example

```

AT+CGDCONT=1,"Non-IP","cmcc" //Set the PDP type of selected APN into "Non-IP".

OK
AT+CEREG?
+CEREG: 0,1

OK
AT+QCFGEXT="nipdcfg",0,"cmcc" //Set the Non-IP data type and APN.

OK
AT+QCFGEXT="nipdcfg"
+QCFGEXT: "nipdcfg",0,"cmcc"

OK
AT+QCFGEXT="nipd",1,30 //Open an NIDD connection.

OK

+QIND: "nipd", "open",0
AT+QCFGEXT="nipds",0,"quectel",7 //Send "quectel" in ASCII format via NIDD connection.
OK
AT+QCFGEXT="nipds",1,"6162636465",10 //Send "abcde" in hex format via NIDD connection.
OK
    
```

//When there is any incoming data from the network, the following URC will be reported.

**+QIND: "nipd","recv"**

**AT+QCFGEXT="nipdr",0**

//Query the retrieved data length.

**+QCFGEXT: "nipdr",10,0,10**

//There are 10 bytes data to be retrieved.

**OK**

**AT+QCFGEXT="nipdr",10**

//Read 10 bytes of the incoming data.

**+QCFGEXT: "nipdr",10,0123456789**

**OK**

**AT+QCFGEXT="nipdr",0**

//Query the retrieved data length.

**+QCFGEXT: "nipdr",10,10,0**

//All incoming data has been retrieved.

**OK**

**AT+QCFGEXT="nipd",0**

//Close the NIDD connection.

**OK**

## 3 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
0	Operation successful
651	Invalid input value
652	Send error
653	Network error
654	NIDD busy
655	Timeout error
656	Connection not open
657	Connection already opened
658	Connection accidentally closed

# 4 Appendix A References

**Table 3: Related Documents**

SN	Document Name	Remark
[1]	Quectel_BG95&BG77&BG600L_Series_QCFGEXT_AT_Commands_Manual	QCFGEXT AT commands manual of BG95 series, BG77 and BG600L-M3 modules
[2]	Quectel_BG95&BG77&BG600L_Series__AT_Commands_Manual	AT commands manual of BG95 series, BG77 and BG600L-M3 modules

**Table 4: Terms and Abbreviations**

Abbreviation	Description
3GPP	3rd Generation Partnership Project
AP	Application Processor
APN	Access Point Name
ASCII	American Standard Code for Information Interchange
EPS	Evolved Packet System
HEX	Hexadecimal
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



---

UE User Equipment

---

URC Unsolicited Result Code

---