

BC660K-GL

AT Commands Manual

NB-IoT Module Series

Version: 1.1

Date: 2021-11-05

Status: Released



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About the Document

Revision History

Version	Date	Author	Description
-	2020-01-12	Jacobi RAO	Creation of the document
1.0	2021-01-27	Jacobi RAO	First official release
1.1	2021-11-05	Jacobi RAO	<ol style="list-style-type: none"> Updated the following commands: AT+QENG (Chapter 4.8); AT+CGDCONT (Chapter 5.4); AT+QBAND (Chapter 7.5); AT+QCFG="statisr" (Chapter 11.1.7). Added the following commands: AT+QESMC (Chapter 4.9); AT+QEMMS (Chapter 4.10); AT+QOOSAIND (Chapter 4.11); AT+CGAUTH (Chapter 5.3); AT+CIPCA (Chapter 5.5); AT+CRTDCP (Chapter 7.3); AT+CSODCP (Chapter 7.4); AT+QLAPI (Chapter 7.9); AT+QLEDMOD (Chapter 7.10); AT+QIPERF (Chapter 7.11); AT+QSIMSLEEP (Chapter 8.13); AT+QDRX (Chapter 9.5); AT+QPSMS (Chapter 9.9); AT+QPSC (Chapter 9.11); AT+QCFG="NcellMeas" (Chapter 11.1.14); AT+QCFG="SimBip" (Chapter 11.1.15). Added the URC +RECVNONIP (Chapter 7.12). Added MQTT related commands (Chapter 13.2). Updated error codes (Chapter 14).

Contents

About the Document	3
Contents	4
Table Index	7
1 Introduction	8
1.1. Definitions	8
1.2. AT Command Syntax	8
1.3. AT Command Responses	10
1.4. Description of Data Mode	10
1.5. Declaration of AT Command Examples	11
2 Product Information Query Commands	12
2.1. ATI Display Product Identification Information	12
2.2. AT+CGMI Request Manufacturer Identification	13
2.3. AT+CGMM Request Model Identification	13
2.4. AT+CGMR Request Manufacturer Revision	14
2.5. AT+CGSN Request Product Serial Number	15
3 UART Function Commands	17
3.1. ATE Set Command Echo Mode	17
3.2. AT+IPR Set TE-TA Local Rate	18
4 Network Status Related Commands	20
4.1. AT+CEREG EPS Network Registration Status	20
4.2. AT+CESQ Extended Signal Quality	23
4.3. AT+CGATT PS Attach or Detach	26
4.4. AT+CGPADDR Show PDP Addresses	27
4.5. AT+CREG Network Registration	29
4.6. AT+CSCON Signaling Connection Status	31
4.7. AT+CSQ Signal Quality Report	33
4.8. AT+QENG Engineering Mode	34
4.9. AT+QESMC Query Cause to the Rejection of a Session Request	37
4.10. AT+QEMMS Query EMM State of UE	38
4.11. AT+QOOSAIND Enable or Disable OOSA URC	40
5 PDN and APN Commands	42
5.1. AT+CGACT PDP Context Activate/Deactivate	42
5.2. AT+CGAPNRC APN Rate Control	44
5.3. AT+CGAUTH Define PDP Context Authentication Parameters	45
5.4. AT+CGDCONT Define PDP Context	47
5.5. AT+CIPCA Initial PDP Context Activation	51
5.6. AT+QCGDEFCONT Set Default PSD Connection Settings	52
6 3GPP R14 Protocol Commands	55

6.1.	AT+CNMPSD	Trigger R14 RAI	55
6.2.	AT+QR14FEATURE	Query Status of R14 Features	56
6.3.	AT+QCFG	Configure System	57
7	Other Network Commands		59
7.1.	AT+CCIOTOPT	CloT Optimization Configuration	59
7.2.	AT+COPS	Operator Selection	60
7.3.	AT+CRTDCP	Reporting of Terminating Data via the Control Plane	63
7.4.	AT+CSODCP	Sending of Originating Data via Control Plane	64
7.5.	AT+QBAND	Get and Set Mobile Operation Band	65
7.6.	AT+QCSEARFCN	Clear Stored NB-IoT EARFCN List	67
7.7.	AT+QLOCKF	Lock NB-IoT Frequency and PCI	68
7.8.	AT+QPLMNS	Search PLMN	69
7.9.	AT+QLAPI	Enable or Disable the NAS Low Access Priority Indicator	70
7.10.	AT+QLEDMODE	Set NETLIGHT Mode	71
7.11.	AT+QIPERF	Throughput Test	73
7.12.	+RECVNONIP	Incoming Downlink Non-IP Data	75
8	USIM Related Commands		76
8.1.	AT+CCHO	Open Logical Channel	76
8.2.	AT+CCHC	Close Logical Channel	77
8.3.	AT+CGLA	Generic UICC Logical Channel Access	78
8.4.	AT+CIMI	Request International Mobile Subscriber Identity	79
8.5.	AT+CLCK	Facility Lock	79
8.6.	AT+CPIN	Enter PIN	81
8.7.	AT+CPINR	Remaining PIN Retries	82
8.8.	AT+CPWD	Change Password	84
8.9.	AT+CRSM	Restricted USIM Access	85
8.10.	AT+CSIM	Generic USIM Access	87
8.11.	AT+QCCID	USIM Card Identification	88
8.12.	AT+QSIMPOLL	USIM Card Polling	88
8.13.	AT+QSIMSLEEP	USIM Sleep Control	90
9	Power Consumption Commands		92
9.1.	AT+CEDRXS	eDRX Setting	92
9.2.	AT+CEDRXRDP	eDRX Read Dynamic Parameters	95
9.3.	AT+CFUN	Set UE Functionality	97
9.4.	AT+CPSMS	Power Saving Mode Setting	98
9.5.	AT+QDRX	Query DRX Status	100
9.6.	AT+QEDRXCFCG	Configure eDRX and PTW	103
9.7.	AT+QNBIOTRAI	NB-IoT Release Assistance Indication	106
9.8.	AT+QNBIOTEVENT	Enable/Disable NB-IoT Related Event Report	106
9.9.	AT+QPSMS	Power Saving Mode Setting	107
9.10.	AT+QSCLK	Configure Sleep Mode	109
9.11.	AT+QPSC	Power Saving Control	110

10 Platform Related Commands	112
10.1. AT+CBC Query Power Supply Voltage.....	112
10.2. AT+CMEE Report Mobile Termination Error.....	113
10.3. AT+QADC Query the Input Voltage of Dedicated ADC Channel.....	114
10.4. AT+QRST Module Reset	115
10.5. AT+QRFSTAT Query RF Status	116
11 General Configuration Commands	117
11.1. AT+QCFG System Configuration.....	117
11.1.1. AT+QCFG="EPCO" Enable/Disable EPCO.....	118
11.1.2. AT+QCFG="DataInactTimer" Configure Inactivity Timer.....	119
11.1.3. AT+QCFG="OOScheme" Configure Network Searching Mechanism in OOS	120
11.1.4. AT+QCFG="logbaudrate" Configure Baud Rate.....	121
11.1.5. AT+QCFG="slplocktimes" Configure Countdown to Entering Sleep Mode.....	121
11.1.6. AT+QCFG="dsevent" Control the Reporting of URC Indicating Deep Sleep.....	122
11.1.7. AT+QCFG="statisr" Configure Report Interval of Statistics URC.....	123
11.1.8. AT+QCFG="MacRAI" Enable/Disable RAI in MAC Layer	124
11.1.9. AT+QCFG="relversion" Configure Protocol Release Version	125
11.1.10. AT+QCFG="NBcategory" Configure UE Category	126
11.1.11. AT+QCFG="wakeupRXD" Enable/Disable RXD to Wake Up UE	127
11.1.12. AT+QCFG="faultaction" Configure UE Reaction to System Crash.....	128
11.1.13. AT+QCFG="GPIO" Configure GPIO Status	128
11.1.14. AT+QCFG="NcellMeas" Enable or Disable Neighbor Cell Measurement.....	130
11.1.15. AT+QCFG="SimBip" Enable or Disable SIMBIP	131
12 Time Related Commands	132
12.1. AT+CCLK Set and Get Current Date and Time.....	132
12.2. AT+CTZR Time Zone Reporting	133
13 Other Related Commands	136
13.1. TCP/IP Related Commands	136
13.2. MQTT Related Commands.....	137
13.3. DFOTA Related Commands	137
14 Summary of Error Codes	138
15 Appendix References	143

Table Index

Table 1: Types of AT Commands	9
Table 2: List of TCP/IP Related AT Commands	136
Table 3: List of MQTT Related AT Commands.....	137
Table 4: List of DFOTA Related AT Commands	137
Table 5: Summary of General <err>.....	138
Table 6: Related Documents	143
Table 7: Terms and Abbreviations	143

1 Introduction

This document gives details of the AT Command set supported by the Quectel NB-IoT module BC660K-GL.

1.1. Definitions

- **<CR>** Carriage return character.
- **<LF>** Line feed character.
- **<...>** Parameter name. Angle brackets do not appear on command line.
- **[..]** Optional parameter of a command or an optional part of TA information response. Square brackets do not appear on command line. When an optional parameter is not given, the new value equals to its previous value or its default setting, unless otherwise specified.
- **Underline** Default setting of a parameter.

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>**. In tables presenting commands and responses throughout this document, only the commands and responses are presented, and **<CR>** and **<LF>** are deliberately omitted.

The AT commands applicable to BC660K-GL fall into two categories syntactically: **Basic** and **Extended**. They are listed as follows:

- **Basic Syntax**

These AT commands have the format of **AT<x><n>**, or **AT&<x><n>**, where **<x>** is the command, and **<n>** is/are the argument(s) for that command. An example of this is **ATE<value>**, which tells the DCE whether received characters should be echoed back to the DTE according to the value of **<value>**. **<n>** is optional and a default will be used if it is omitted.

- **Extended Syntax**

These AT commands have four types as explained in the following table:

Table 1: Types of AT Commands

Command Type	Syntax	Description
Test Command	AT+<cmd>=?	Test the existence of corresponding Write Command and return information about the type, value, or range of its parameter.
Read Command	AT+<cmd>?	Check the current parameter value of a corresponding Write 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 in a single line using a semi-colon (;) between commands. In such cases, only the first command should have the **AT** prefix. Commands can be in upper or lower cases.

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 parameter being entered.

NOTE

Every AT command must be inputted separately. Execute a new AT command only when the previous one is finished.

1.3. 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 receive a new command. Solicited informational responses are displayed before the final **OK**, **ERROR** or **+CME ERROR: <err>**.

Responses are in these formats:

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

Or

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

1.4. Description of Data Mode

BC660K-GL supports two working modes of the COM port: AT command mode and data mode. In the AT command mode, the data inputted via a COM port is treated as AT commands; while in the data mode, it is treated as data.

In the AT command mode (the default mode), the BC660K-GL module enters the data mode in 500 ms after the > response, after which if "Ctrl" + "Z" is entered, the module will exit data mode and send the data to a COM port; if "Esc" is entered, the module will exit data mode and cancel the sending.

NOTE

1. After the > response, it is recommended for the MCU to wait for 500 ms before sending the data.
2. In the data mode, URCs will be lost. To avoid this, please enter the data to be sent immediately 500 ms after the > response and then exit the data mode as soon as possible.

1.5. Declaration of AT Command Examples

The AT command examples in this document are provided to help you learn about how to use the AT commands introduced herein. The examples, however, should not be taken as Quectel's recommendation or suggestions about how you should design a program flow or what status you should set the module into. Sometimes multiple examples may be provided for one AT command. However, this does not mean that there exists a correlation among these examples or that they should be executed in a given sequence.

2 Product Information Query Commands

2.1. ATI Display Product Identification Information

This Execution Command returns product identification information including the identifier of device type and the revision of software.

ATI Display Product Identification Information	
Execution Command ATI	Response Quectel_Ltd <objectID> Revision: <revision> OK
Maximum Response Time	5 s
Characteristics	/

Parameter

<objectID>	String type. Identifier of device type.
<revision>	String type. Revision of software release.

Example

```

ATI
Quectel_Ltd
Quectel_BC660K-GL
Revision: BC660KGLAAR01A01

OK
    
```

2.2. AT+CGMI Request Manufacturer Identification

This Execution Command returns manufacturer information.

AT+CGMI Request Manufacturer Identification	
Test Command AT+CGMI=?	Response OK
Execution Command AT+CGMI	Response Quectel_Ltd <objectID> Revision: QCX212 OK
Maximum Response Time	5 s
Characteristics	/

Parameter

<objectID> String type. Identifier of device type.

Example

```

AT+CGMI
Quectel_Ltd
Quectel_BC660K-GL
Revision: QCX212

OK
    
```

2.3. AT+CGMM Request Model Identification

This Execution Command returns the model information of the product.

AT+CGMM Request Model Identification	
Test Command AT+CGMM=?	Response OK
Execution Command AT+CGMM	Response <objectID>

	OK
Maximum Response Time	5 s
Characteristics	/

Parameter

<objectID> String type. Identifier of device type.

Example

```
AT+CGMM
Quectel_BC660K-GL

OK
```

2.4. AT+CGMR Request Manufacturer Revision

This Execution Command returns the manufacturer revision.

AT+CGMR Request Manufacturer Revision	
Test Command AT+CGMR=?	Response OK
Execution Command AT+CGMR	Response Revision: <revision> OK
Maximum Response Time	5 s
Characteristics	/

Parameter

<revision> String type. Manufacturer revision (Revision of software release).

Example

```
AT+CGMR
```

Revision: BC660KGLAAR01A03

OK

2.5. AT+CGSN Request Product Serial Number

This Execution Command returns the IMEI (International Mobile Equipment Identity) number and related information. For a TA which does not support <snt>, only **OK** is returned.

AT+CGSN Request Product Serial Number	
Test Command AT+CGSN=?	Response When TE supports <snt> and the command is executed successfully: +CGSN: (range of supported <snt>s) OK
Write Command AT+CGSN=<snt>	Response When <snt>=0: <SN> OK When <snt>=1: +CGSN: <IMEI> OK When <snt>=2: +CGSN: <IMEISV> OK When <snt>=3: +CGSN: <SVN> OK If there is any error: ERROR Or +CME ERROR: <err>

Execution Command AT+CGSN	Response <SN> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<snt>	Integer type. The serial number type requested. <u>0</u> Returns <SN> 1 Returns the IMEI number 2 Returns the IMEISV (International Mobile Equipment Identity and Software Version) number 3 Returns the SVN (Software Version Number)
<SN>	String type. One or more lines of information text determined by the MT manufacturer.
<IMEI>	String type. The IMEI number in decimal format.
<IMEISV>	String type. The IMEISV in decimal format.
<SVN>	String type. The current SVN in decimal format, and it is a part of IMEISV.
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CGSN=1 //Request the IMEI number
+CGSN: 866818039921444

OK
```

3 UART Function Commands

3.1. ATE Set Command Echo Mode

This Execution Command determines whether or not the UE echoes characters received from external MCU in the AT command mode.

ATE Set Command Echo Mode	
Execution Command ATE<value>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type. Whether to echo commands. 0 OFF <u>1</u> ON
<err>	Error code. See Chapter 14 for details.

Example

```
ATE0
OK

Quectel_Ltd
Quectel_BC660K-GL
Revision: BC660KGLAAR01A01
```

```

OK
ATE1
OK
ATI
Quectel_Ltd
Quectel_BC660K-GL
Revision: BC660KGLAAR01A01

OK
    
```

3.2. AT+IPR Set TE-TA Local Rate

This command sets the TE-TA local rate.

AT+IPR Set TE-TA Local Rate	
Test Command AT+IPR=?	Response +IPR: (list of supported <rate>s) OK
Read Command AT+IPR?	Response +IPR: <rate> OK
Write Command AT+IPR=<rate>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<rate>	Integer type. Baud rate per second. Unit: bps. 2400 4800
---------------------	--

9600
 19200
 38400
 57600
115200
 230400
 460800

<err> Error code. See **Chapter 14** for details.

Example

```

AT+IPR=115200 //Set the baud rate to 115200 bps.
OK
AT+IPR? //Query the current configuration.
+IPR: 115200
OK
AT+IPR=? //Query the baud rates supported.
+IPR: (2400,4800,9600,19200,38400,57600,115200,230400,460800)
OK
    
```

4 Network Status Related Commands

4.1. AT+CEREG EPS Network Registration Status

This Write Command configures the presentation of unsolicited result codes for EPS Network Registration Status.

- When **<n>=1** and there is a change in the MT's EPS network registration status in E-UTRAN, an unsolicited result code (URC) **+CEREG: <stat>** is presented.
- When **<n>=2** and there is a change of the network cell in E-UTRAN, URC **+CEREG: <stat>[, <tac>],[<ci>],[<AcT>]]** is presented. **<AcT>**, **<tac>** and **<ci>** are provided only if available.
- When the value of **<stat>** changes, **<n>=3** further extends **+CEREG: <stat>[, <tac>],[<ci>],[<AcT>]]** with **[,<cause_type>,<reject_cause>]** if available.

If the UE applies for entering PSM to reduce power consumption, the Write Command controls the presentation of the following URC:

+CEREG: <stat>[, <tac>],[<ci>],[<AcT>][, <cause_type>],[<reject_cause>][, <Active-Time>],[<Periodic-TAU>]]].

- When **<n>=4**, the URC provides the UE with additional information including the active time value **<Active-Time>** and the periodic TAU value **<Periodic-TAU>** if there is a change to the network cell in E-UTRAN.
- **<n>=5** further enhances the URC with **<cause_type>** and **<reject_cause>** when the value of **<stat>** changes. The parameters **<tac>**, **<ci>**, **<AcT>**, **<cause_type>**, **<reject_cause>**, **<Active-Time>** and **<Periodic-TAU>** are provided only if available.

This Read Command returns the status of result code presentation and an integer **<stat>** which shows whether the network has currently indicated the registration of the MT. Location information elements **<tac>**, **<ci>** and **<AcT>**, if available, are returned only when **<n>=2** and MT is registered in the network. The parameters **[,<cause_type>,<reject_cause>]**, if available, are returned when **<n>=3**.

This Test Command returns supported parameter values.

AT+CEREG EPS Network Registration Status	
Test Command AT+CEREG=?	Response +CEREG: (range of supported <n>s)

	<p>OK</p>
<p>Read Command AT+CEREG?</p>	<p>Response</p> <p>When <n>=0, 1, 2 or 3 and the command is executed successfully: +CEREG: <n>,<stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]]]</p> <p>When <n>=4 or 5 and the command is executed successfully: +CEREG: <n>,<stat>[,<tac>],[<ci>],[<AcT>][,<cause_type>],[<reject_cause>][,<Active-Time>],[<Periodic-TAU>]]]</p> <p>OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
<p>Write Command AT+CEREG=<n></p>	<p>Response</p> <p>OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
<p>Maximum Response Time</p>	<p>5 s</p>
<p>Characteristics</p>	<p>The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.</p>

Parameter

<p><n></p>	<p>Integer type. Disable or enable network registration URC.</p> <p><u>0</u> Disable network registration URC</p> <p>1 Enable network registration URC: +CEREG: <stat></p> <p>2 Enable network registration and location information URC: +CEREG: <stat>[,<tac>],[<ci>],[<AcT>]]</p> <p>3 Enable network registration, location information and EMM cause value information URC: +CEREG: <stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]]</p> <p>4 For a UE that requests PSM, enable network registration and location information URC:</p>
------------------	---

- 5 For a UE that requests PSM, enable network registration, location information and EMM cause value information URC:

+CEREG: <stat>[,<tac>],[<ci>],[<AcT>][,],[<Active-Time>],[<Periodic-TAU>]]]]

+CEREG: <stat>[,<tac>],[<ci>],[<AcT>][,],[<cause_type>],[<reject_cause>][,],[<Active-Time>],[<Periodic-TAU>]]]]

- <stat>** Integer type. EPS registration status.
- 0 Not registered, MT is not currently searching an operator to register to
 - 1 Registered, home network
 - 2 Not registered, but MT is currently trying to attach or searching an operator to register to
 - 3 Registration denied
 - 4 Unknown (e.g. out of E-UTRAN coverage)
 - 5 Registered, roaming
- <tac>** String type. Two-byte tracking area code in hexadecimal format (e.g., 00C3 equals 195 in decimal).
- <ci>** String type. Four-byte E-UTRAN cell ID in hexadecimal format.
- <AcT>** Integer type. Access technology of the serving cell.
- 7 E-UTRAN
 - 9 E-UTRAN (NB-S1 mode)
- <cause_type>** Integer type. Type of **<reject_cause>**.
- 0 **<reject_cause>** contains an EMM cause value (see *3GPP TS 24.008 Annex G*).
 - 1 **<reject_cause>** contains a manufacturer-specific cause value.
- <reject_cause>** Integer type. Contains the cause of the registration failure. The value is of type as defined by **<cause_type>**.
- <Active-Time>** String type. One byte in an 8-bit format. Active time value (T3324) allocated to the UE in E-UTRAN. The active time value is coded as one byte (octet 3) of the GPRS Timer 2 information element coded as bit format (e.g. "00100100" equals 4 minutes). For the coding and the value range, see the *GPRS Timer 2 IE in 3GPP TS 24.008 Table 10.5.163/3Gpp TS 24.008, 3GPP TS 23.682 and 3GPP TS 23.401*.
- Bits 5 to 1 represents the binary coded timer value.
- Bits 8 to 6 defines the timer value unit for the GPRS timer as follows:
- Bits
- 8 7 6
- 0 0 0 value is incremented in multiples of 2 seconds
 - 0 0 1 value is incremented in multiples of 1 minute
 - 0 1 0 value is incremented in multiples of 6 minutes
 - 1 1 1 value indicates that the timer is deactivated
- <Periodic-TAU>** String type. One byte in an 8-bit format. Indicates the extended periodic TAU value (T3412) allocated to the UE in E-UTRAN. The extended periodic TAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours). For the coding and the value range, see *GPRS Timers 3 IE in 3GPP TS 24.008 Table 10.5.163a/3GPP TS 24.008, 3GPP TS 23.682 and 3GPP TS 23.401*.
- Bits 5 to 1 represents the binary coded timer value.

Bits 8 to 6 defines the timer value increment as follows:

Bits

8 7 6

0 0 0 value is incremented in multiples of 10 minutes

0 0 1 value is incremented in multiples of 1 hour

0 1 0 value is incremented in multiples of 10 hours

0 1 1 value is incremented in multiples of 2 seconds

1 0 0 value is incremented in multiples of 30 seconds

1 0 1 value is incremented in multiples of 1 minute

1 1 0 value is incremented in multiples of 320 hours

1 1 1 value indicates that the timer is deactivated

<err>

Error code. See **Chapter 14** for details.

Example

```
AT+CEREG=1
```

```
OK
```

```
AT+CEREG?
```

```
+CEREG: 1,1
```

```
OK
```

```
AT+CEREG=?
```

```
+CEREG: (0-5)
```

```
OK
```

4.2. AT+CESQ Extended Signal Quality

This Execution Command makes the module returns a numeral from 0 to 99 to indicate the strength of the signal it has just received, and the larger the number is, the better the quality of the signal.

This Test Command returns supported values as compound values.

AT+CESQ Extended Signal Quality

Test Command

```
AT+CESQ=?
```

Response

```
+CESQ: (list of supported <rxlev>s),(list of supported <ber>s),(list of supported <rscp>s),(list of supported <ecno>s),(list of supported <rsrq>s),(list of supported <rsrp>s)
```

```
OK
```


Execution Command AT+CESQ	Response +CESQ: <rxlev>,<ber>,<rscp>,<ecno>,<rsrq>,<rsrp> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<rxlev>	Integer type. Received signal strength level. 0 <rssi> < -110 dBm 1 -110 dBm ≤ <rssi> < -109 dBm 2 -109 dBm ≤ <rssi> < -108 dBm ... 61 -50 dBm ≤ <rssi> < -49 dBm 62 -49 dBm ≤ <rssi> < -48 dBm 63 -48 dBm ≤ <rssi> 99 Not known or not detectable
<ber>	Integer type. Channel bit error rate (in percent). 0–7 RxQual values RXQUAL_0–RXQUAL_7 as defined in <i>3GPP TS 45.008</i> 99 Not known or not detectable
<rscp>	Integer type. Received signal code power (See <i>3GPP 25.133</i> and <i>3GPP 25.123</i>). 0 <rscp> < -120 dBm 1 -120 dBm ≤ <rscp> < -119 dBm 2 -119 dBm ≤ <rscp> < -118 dBm ... 94 -27 dBm ≤ <rscp> < -26 dBm 95 -26 dBm ≤ <rscp> < -25 dBm 96 -25 dBm ≤ <rscp> 255 Not known or not detectable
<ecno>	Integer type. Ratio of the received energy per PN chip to the total received power spectral density (Ec/No) (See <i>3GPP 25.133</i>). 0 <ecno> < -24 dBm 1 -24 dBm ≤ <ecno> < -23.5 dBm 2 -23.5 dBm ≤ <ecno> < -23 dBm ... 47 -1 dBm ≤ <ecno> < -0.5 dBm

	48	-0.5 dBm ≤ <ecno> < 0 dBm
	49	0 dBm ≤ <ecno>
	255	Not known or not detectable
<rsrq>		Integer type. Reference signal received quality (RSRQ, see 3GPP 36.133). When sending data is needed, RSRQ is recommended to be greater than -10 dB.
	0	<rsrq> < -19.5 dB
	1	-19.5 dB ≤ <rsrq> < -19 dB
	2	-19 dB ≤ <rsrq> < -18.5 dB
	...	
	32	-4 dB ≤ <rsrq> < -3.5 dB
	33	-3.5 dB ≤ <rsrq> < -3 dB
	34	-3 dB ≤ <rsrq>
	255	Not known or not detectable
<rsrp>		Integer type. Reference signal received power (RSRP, see 3GPP 36.133). When sending data is needed, RSRP is recommended to be greater than -115 dbm.
	0	<rsrp> < -140 dBm
	1	-140 dBm ≤ <rsrp> < -139 dBm
	2	-139 dBm ≤ <rsrp> < -138 dBm
	...	
	95	-46 dBm ≤ <rsrp> < -45 dBm
	96	-45 dBm ≤ <rsrp> < -44 dBm
	97	-44 dBm ≤ <rsrp>
	255	Not known or not detectable
<err>		Error code. See Chapter 14 for details.

NOTE

1. For details of **<rssi>**, see **AT+CSQ**.
2. **<releval>** and **<ber>** are not applicable to NB-IoT network and should be set to "not known or not detectable" (99) for the module.
3. **<rscpl>** and **<ecno>** are not applicable to NB-IoT network and should be set to "not known or not detectable" (255) for the module.

Example

```

AT+CESQ
+CESQ: 99,99,255,255,25,61

OK
    
```

4.3. AT+CGATT PS Attach or Detach

This Write Command attaches the MT to, or detach the MT from, the packet domain service. After the command has completed, the MT remains in V.250 command state. If the MT is already in the requested state, the command ignores and the **OK** response is still returned. If the requested state cannot be achieved, an **ERROR** or **+CME ERROR** response is returned. Refer to **Chapter 14** for possible **<err>** values. Any active PDP contexts are automatically deactivated when the attachment state changes to detached.

This Read Command returns the current packet domain service state.

This Test Command requests information on the supported packet domain service states.

AT+CGATT PS Attach or Detach	
Test Command AT+CGATT=?	Response +CGATT: (list of supported <state>s) OK
Read Command AT+CGATT?	Response +CGATT: <state> OK
Write Command AT+CGATT=<state>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	70 s, determined by network.
Characteristics	/

Parameter

<state>	Integer type. Indicates the state of PS attachment. 0 Detached 1 Attached
<err>	Error code. See Chapter 14 for details.

NOTE

The initial PDP context with **<cid>=0** is automatically defined at startup.

Example

```

AT+CGATT?
+CGATT: 1

OK
AT+CGATT=1
OK
AT+CGATT=?
+CGATT: (0,1)

OK
    
```

4.4. AT+CGPADDR Show PDP Addresses

This command returns the IP address of the device.

This Execution Command returns a list of PDP addresses for the specified context identifiers. If no **<cid>** is specified, the addresses for all defined contexts are returned.

This Test Command returns a list of defined **<cid>**s. These are **<cid>**s that have been activated and may or may not have an IP address associated with them.

AT+CGPADDR Show PDP Addresses	
Test Command AT+CGPADDR=?	Response [+CGPADDR: (list of defined <cid>s)] OK
Read Command AT+CGPADDR?	Response [+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]] [+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]] [...] OK
Write Command AT+CGPADDR=<cid>	Response +CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]

	OK
Execution Command AT+CGPADDR	Response [+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]] [+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]] [...] OK
Maximum Response Time	5 s
Characteristics	/

Parameter

<cid> Integer type. A numeric parameter which specifies a particular PDP context definition (see **AT+CGDCONT**). If no **<cid>** is specified, the addresses for all defined contexts are returned.

<PDP_addr_1> and **<PDP_addr_2>**

String type. Identify the MT in the address space applicable to the PDP. The address may be static or dynamic.

For a static address, it will be the one set by **AT+CGDCONT** when the context was defined.

For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by **<cid>**. **<PDP_address>** is omitted if none is available.

Both **<PDP_addr_1>** and **<PDP_addr_2>** are included when both IPv4 and IPv6 addresses are assigned, with **<PDP_addr_1>** containing the IPv4 address and **<PDP_addr_2>** containing the IPv6 address. **<PDP_addr_1>** is preferred for containing address information when there is only one address.

The string is given as a dot-separated numeric (0–255) parameter in this form:

a1.a2.a3.a4 for IPv4 and a1:a2:a3:a4:a5:a6:a7:a8 for IPv6.

NOTE

1. In dual-stack terminals (**<PDP_type>**="IPV4V6"), the IPv6 address is provided in **<PDP_addr_2>**.
2. For terminals with a single IPv6 stack (**<PDP_type>**="IPV6") or due to backwards compatibility, the IPv6 address can be provided in **<PDP_addr_1>**.

Example

```
AT+CGPADDR=0
+CGPADDR: 0,"100.68.114.220"
```

```
OK
AT+CGPADDR=?
+CGPADDR: (0)

OK
```

4.5. AT+CREG Network Registration

This Write Command controls the presentation of an unsolicited result code **+CREG: <stat>**

- When **<n>=1** and there is a change in the circuit mode network registration status of the MT in GERAN/UTRAN/E-UTRAN, or unsolicited result code **+CREG: <stat>[,<lac>],[<ci>],[<AcT>]]**
- When **<n>=2** and there is a change of the network cell in GERAN/UTRAN/E-UTRAN. The parameters **<AcT>**, **<lac>** and **<ci>** are sent only if available.
- When the value of **<stat>** changes, the value **<n>=3** further extends the unsolicited result code with **[,<cause_type>,<reject_cause>]**, when available.

This Read Command returns the status of result code presentation and an integer **<stat>** which shows whether the network has currently indicated the registration of the MT. Location information elements **<lac>**, **<ci>** and **<AcT>**, if available, are returned only when **<n>=2** and MT is registered in the network. The parameters **[,<cause_type>,<reject_cause>]**, if available, are returned when **<n>=3**.

This Test Command returns values supported as a compound value.

AT+CREG Network Registration	
Test Command AT+CREG=?	Response +CREG: (list of supported <n>s) OK
Read Command AT+CREG?	Response +CREG: <n>,<stat>[,<lac>],[<ci>],[<AcT>][,<cause_type>,<reject_cause>]] OK If there is any error: ERROR Or +CME ERROR: <err>

Write Command AT+CREG=<n>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<n>	Integer type. <ul style="list-style-type: none"> 0 Disable network registration unsolicited result code. 1 Enable network registration unsolicited result code +CREG: <stat> 2 Enable network registration and location information unsolicited result code +CREG: <stat>[,<lac>],[<ci>],[<AcT>] 3 Enable network registration, location information and cause value information unsolicited result code +CREG: <stat>[,<lac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]
<stat>	Integer type. <ul style="list-style-type: none"> 0 Not registered, MT is not currently searching a new operator to register to 1 Registered, home network 2 Not registered, but MT is searching a new operator to register to 3 Registration denied 4 Unknown. (for example, out GERAN/UTRAN/E-UTRAN coverage) 5 Registered, roaming 6 Registered for "SMS only", home network (applicable only when <AcT> indicates E-UTRAN) 7 Registered for "SMS only", roaming (applicable only when <AcT> indicates E-UTRAN)
<lac>	String type. Location area code in hexadecimal format, two bytes.(e.g."00C3" equals 195 in decimal).
<ci>	String type. Four-byte E-UTRAN Cell ID in hexadecimal format.
<AcT>	Integer type. Access technology of the serving cell. <ul style="list-style-type: none"> 9 E-UTRAN (NB-S1 mode)
<cause_type>	Integer type. Indicates the type of <reject_cause> . <ul style="list-style-type: none"> 0 <reject_cause> contains an EMM cause value (see <i>3GPP TS 24.008 Annex G</i>) 1 <reject_cause> packet contains a manufacturer specific cause.
<reject_cause>	Integer type. Contains the cause of the failed registration. The value is of type as defined by <cause_type> . (see <i>3GPP TS 24.301</i>)

<err> Error code. See **Chapter 14** for details.

Example

```
AT+CREG?
+CREG: 0,6
OK
```

4.6. AT+CSCON Signaling Connection Status

This command gives details of the TA's perceived radio connection status (i.e. with a base station). It returns an indication of the current state. Please note that this state is only updated when radio events, such as sending and receiving, take place. This means that the current state may be out of date. The terminal may think it is "Connected" yet cannot currently use the base station due to a change in the link quality.

This Write Command controls the presentation of an URC. If <n>=1, **+CSCON: <mode>** is sent from the MT when the connection mode of the MT is changed. When the MT is in E-UTRAN, the mode of the MT refers to idle when no PS signaling connection and to connected mode when a PS signaling connection between MT and network is setup. The <state> value indicates the state of the MT when the MT is in E-UTRAN.

This Read Command returns the status of result code presentation and an integer <mode> which shows whether the MT is currently in idle mode or connected mode.

This Test Command returns supported values as a compound value.

AT+CSCON Signaling Connection Status	
Test Command AT+CSCON=?	Response +CSCON: (list of supported <n>s) OK
Read Command AT+CSCON?	Response +CSCON: <n>,<mode> OK If there is any error: ERROR Or

	+CME ERROR: <err>
Write Command AT+CSCON=<n>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<n>	Integer type. Enable/disable the URC. 0 Disable the URC 1 Enable URC +CSCON: <mode>
<mode>	Integer type. Signaling connection status. 0 Idle 1 Connected
<err>	Error code. See Chapter 14 for details.

Example

```

AT+CSCON=0
OK
AT+CSCON?
+CSCON: 0,0

OK
AT+CSCON=?
+CSCON: (0,1)

OK
    
```

4.7. AT+CSQ Signal Quality Report

This Execution Command returns the received signal strength level **<rssi>** and the channel bit error rate **<ber>** from the MT.

This Test Command returns supported values as a compound value.

AT+CSQ Signal Quality Report	
Test Command AT+CSQ=?	Response +CSQ: (list of supported <rssi>s),(list of supported <ber>s) OK
Execution Command AT+CSQ	Response +CSQ: <rssi>,<ber> OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<rssi>	Integer type. Received signal strength level. 0 -113 dBm or less 1 -111 dBm 2–30 -109 to -53 dBm 31 -51 dBm or greater 99 Not known or not detectable
<ber>	Integer type. Channel bit error rate (in percent). 0–7 RxQual values RXQUAL_0–RXQUAL_7 as defined in <i>3GPP TS 45.008</i> 99 Not known or not detectable
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CSQ
+CSQ: 22,0
```

OK

4.8. AT+QENG Engineering Mode

This command queries current modem status information of serving cell and current network status in Engineering Mode.

AT+QENG Engineering Mode	
Test Command AT+QENG=?	Response +QENG: (range of supported <mode>s) OK
Write Command AT+QENG=<mode>	Response When <mode>=0: +QENG: 0,<sc_EARFCN>,<sc_EARFCN_offset>,<sc_pci>,<sc_cellID>,<sc_RSRP>,<sc_RSRQ>,<sc_RSSI>,<sc_SINR>,<sc_band>,<sc_TAC>,<sc_ECL>,<sc_Tx_pwr>,<operation_mode> [+QENG: 1,<nc_EARFCN>,<nc_pci>,<nc_RSRP>,<nc_RSRQ>[...]] OK When <mode>=2: +QENG: 3,<sleep_duration>,<Rx_time>,<Tx_time> When <mode>=3: +QENG: 4,<EMM_state>,<EMM_mode>,<PLMN_state>,<PLMN_type>,<selectPLMN> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	15 s
Characteristics	/

Parameter

<mode>	Integer type. Requested engineering information. 0 Display radio information of serving and neighbor cells 1 Display data transfer information only if modem in RRC-CONNECTED state (not supported currently) 2 Display Tx/Rx total working duration (time) 3 Display PLMN Status
<sc_EARFCN>	Integer type. The EARFCN of the serving cell. Range: 0–262143.
<sc_EARFCN_offset>	Integer type. The EARFCN offset for the serving cell: 0 Offset of invalid 1 Offset of -10 2 Offset of -9 3 Offset of -8 4 Offset of -7 5 Offset of -6 6 Offset of -5 7 Offset of -4 8 Offset of -3 9 Offset of -2 10 Offset of -1 11 Offset of -0.5 12 Offset of 0 13 Offset of 1 14 Offset of 2 15 Offset of 3 16 Offset of 4 17 Offset of 5 18 Offset of 6 19 Offset of 7 20 Offset of 8 21 Offset of 9
<sc_pci>	Integer type. Physical cell ID of the serving cell. Range: 0–503.
<sc_cellID>	String type. Four-byte (28-bit) cell ID in hexadecimal for the serving cell.
<sc_RSRP>	Signed integer. RSRP value in dBm for the serving cell. (can be negative).
<sc_RSRQ>	Signed integer. RSRQ value in dB for the serving cell. (can be negative).
<sc_RSSI>	Signed integer. RSSI value in dBm for the serving cell. (can be negative).
<sc_SINR>	Signed integer. Last SINR value in dB for the serving cell. (can be negative).
<sc_band>	Integer type. Current serving cell band.
<sc_TAC>	String type. Two-byte tracking area code (TAC) in hexadecimal format (e.g. "00C3" equals 195 in decimal).
<sc_ECL>	Integer type. The last Enhanced Coverage Level (ECL) value for the serving cell. Range: 0–2. Only available in RRC connected state.
<sc_Tx_pwr>	Signed integer. The current transmission power of UE. Unit: dBm. Range:

	-45–23,128 means an invalid value. (0 dBm = 1 mW, and this parameter can be a negative value)
<operation_mode>	Integer type. Operation mode of the serving cell: 0 In-band same PCI 1 In-band different PCI 2 Guard band 3 Stand alone
<nc_EARFCN>	Integer type. The EARFCN of neighbor cell(s). Range: 0–262143.
<nc_pci>	Integer type. Physical cell ID of the neighbor cell(s). Range: 0–503.
<nc_RSRP>	Signed integer. RSRP value in dBm for neighbor cell(s) (can be negative).
<nc_RSRQ>	Signed integer. RSRQ value in dB for neighbor cell(s) (can be negative).
<sleep_duration>	Integer type. The total sleep duration from the latest boot-up or deep sleep. Unit: 0.1 s.
<Rx_time>	Integer type. The total Rx time since the latest boot-up or deep sleep. Unit: 0.1 s.
<Tx_time>	Integer type. The total Tx time since the latest boot-up or deep sleep. Unit: 0.1 s.
<EMM_state>	String type. EMM state. "NULL" "DEREG" "REG INIT" "REG" "DEREG INIT" "TAU INI" "SR INIT" "UNKNOWN"
<EMM_mode>	String type. Modem state. "UNKNOWN" "IDLE" "PSM" "CONNECTED"
<PLMN_state>	String type. PLMN state. "NO PLMN" "SEARCHING" "SELECTED" "UNKNOWN" (deregistering or other unknown states)
<PLMN_type>	String type. PLMN type. "HPLMN" "EHPLMN" "VPLMN" "UPLMN" "OPLMN" "OTHERS" "UNKNOWN"

<selectPLMN>	String type. Current PLMN in numeric form.
<err>	Error code. See Chapter 14 for details.

NOTE

1. If the response of **AT+QENG=0** is not in the range defined above, it is invalid.
2. For a better understanding of the Internet environment, the following criteria can be used to assess the network quality:
 Strong: RSRP ≥ -100 dBm, SNR ≥ 3 dB, RSRQ > -7;
 Medium: -100 dBm ≥ RSRP ≥ -110 dBm, 3 dB > SNR > -3 dB, -7 > RSRQ > -11;
 Weak: RSRP < -110 dBm or SNR < -3 dB or RSRQ < -11.

Example

```

AT+QENG=0
+QENG: 0,3688,11,121,"05C4EF33",-72,-8,-64,14,8,"4C10",0,-128,3

OK
AT+QENG=3
+QENG: 4,"REG","PSM","SELECTED","EHPLMN","0x460,0xf000"

OK
    
```

4.9. AT+QESMC Query Cause to the Rejection of a Session Request

This command queries the cause to the rejection of a session establishment request, as is the use of **AT+CEREG**.

AT+QESMC Query Cause to the Rejection of a Session Request	
Test Command AT+QESMC=?	Response OK
Read Command AT+QESMC?	Response +QESMC: <rejCausePresent>,<causeType>,<rejCauseValue> OK If there is any error: ERROR Or +CME ERROR: <err>

Maximum Response Time	5 s
Characteristics	/

Parameter

<rejCausePresent>	Integer type. 1 rejcause present.
<CauseType>	Integer type. The type of <reject_cause> . 0 Indicates that <reject_cause> contains an ESM related cause value 1 Indicates that <reject_cause> contains a manufacturer specific cause value
<rejCauseValue>	Integer type. Contains the cause of the failed registration. The value is of the type defined by <CauseType> . For details about the cause value, see <i>3GPP TS 24.301</i> .
<err>	Error code. See Chapter 14 for details.

Example

```
AT+QESMC?
+QESMC: 1,0,26
OK
```

4.10. AT+QEMMS Query EMM State of UE

This command queries the EMM main state/sub-state.

AT+QEMMS Query EMM State of UE	
Test Command AT+QEMMS=?	Response OK
Read Command AT+QEMMS?	Response +QEMMS: <Mainstate>[,<Substate>] OK If there is any error: ERROR Or +CME ERROR: <err>

Maximum Response Time	5 s
Characteristics	/

Parameter

<MainState>	String type. Indicates the main state in EMM sublayer. See <i>3GP TS 24.301 5.3.1.3.2.2</i> . "NULL" "EMM_REGISTERED_INITIATED" "EMM_DEREGISTERED_INITIATED" "EMM_TRACKING_AREA_UPDATING_INITIATED" "EMM_SERVICE_REQUEST_INITIATED" "EMM_DEREGISTERED" "EMM_REGISTERED" "UNKNOWN"
<Substate>	String type. Indicates the substate in EMM sublayer. When the main state is "EMM_DEREGISTERED", the substate can be as follows: "NORMAL_SERVICE" "LIMITED_SERVICE" "ATTEMPTING_TO_ATTACH" "PLMN_SEARCH" "NO_IMSI" "ATTACH_NEEDED" "NO_CELL_AVAILABLE" When the main state is "EMM_REGISTERED", the substate can be as follows: "NORMAL_SERVICE" "ATTEMPTING_TO_UPDATE" "LIMITED_SERVICE" "PLMN_SEARCH" "UPDATE_NEEDED" "NO_CELL_AVAILABLE" "ATTEMPTING_TO_UPDATE_MM" "IMSI_DETACH_INITIATED"
<err>	Error code. See Chapter 14 for details.

Example

```
AT+QEMMS?
+QEMMS: "EMM_REGISTERED,NORMAL_SERVICE"
OK
```


4.11. AT+QOOSAIN D Enable or Disable OOSA URC

This Write Command enables or disables OOSA URC **+QOOSAIN D: [<state>,<remaining_time>]**.

AT+QOOSAIN D Enable or Disable OOSA URC	
Test Command AT+QOOSAIN D=?	Response +QOOSAIN D: (list of supported <OOSAIN D>s)
Read Command AT+QOOSAIN D?	Response +QOOSAIN D: <OOSAIN D> OK If there is any error: ERROR Or +CME ERROR: <err>
Write Command AT+QOOSAIN D=<QOOSAIN D>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<QOOSAIN D>	Integer type. 0 Disable the OOSA URC indicator 1 Enable the OOSA URC indicator
<state>	Integer type. PLMN state in NAS. 0 PLMN searching is inactivated. PLMN is not searched 1 PLMN is being searched 2 PLMN is selected 3 UE is in OOS status. The PLMN search timer is started
<remaining_time>	Integer type. Remaining time of PLMN search timer. Unit: second. Only valid when <state>=3 .
<err>	Error code. See Chapter 14 for details.

Example

```
AT+QOOSAIND=1
```

```
OK
```

5 PDN and APN Commands

5.1. AT+CGACT PDP Context Activate/Deactivate

This Write Command activates or deactivates the specified PDP context(s). After the command has completed, the MT remains in V.250 command state. The state of a PDP context already in the requested state remains unchanged. If the requested state for any specified context cannot be achieved, an **ERROR** or **+CME ERROR** response is returned. Extended error responses are enabled by **AT+CMEE**.

If the UE is not PS attached when the activation form of the command is executed, the UE first performs a PS attachment and then attempts to activate the specified contexts. If the attachment fails then the MT responds with an error or, if extended error responses are enabled, with the appropriate failure-to-attach error message.

In the 3GPP TS 27.007 specification are the following statements:

For EPS, if an attempt is made to disconnect the last PDN connection, then the UE responds with **ERROR** or if extended error responses are enabled, a **+CME ERROR**.

For EPS, the activation request for an EPS bearer resource will be answered by the network by either an EPS dedicated bearer activation or EPS bearer modification request. The request must be accepted by the UE before the PDP context can be set into established state.

If no **<cid>**s are specified, the activation form of the command activates all defined non-emergency contexts, and the deactivation form of the command deactivates all active contexts.

This Read Command returns the current activation states for all the defined PDP contexts.

This Test Command is used for requesting information on the supported PDP context activation states.

AT+CGACT PDP Context Activate/Deactivate	
Test Command AT+CGACT=?	Response +CGACT: (list of supported <state>s) OK
Read Command AT+CGACT?	Response [+CGACT: <cid>,<state>]

	[+CGACT: <cid>,<state>] [...] OK
Write Command AT+CGACT=<state>,<cid>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	70 s, determined by network.
Characteristics	/

Parameter

<state>	Integer type. The state of PDP context activation. 0 Deactivated 1 Activated
<cid>	Integer type. A numeric parameter which specifies a particular PDP context definition (see AT+CGDCONT).
<err>	Error code. See Chapter 14 for details.

NOTE

1. The initial PDP context with **<cid>=0** is automatically defined at startup.
2. This Write Command must and only specify one **<cid>**.
3. The maximum number of PDN connections that can be activated simultaneously is 11 and an established PDN connection is not allowed to be re-established.

Example

```

AT+CGACT=0,1
OK
AT+CGACT?
+CGACT: 1,0

OK
AT+CGACT=?
+CGACT: (0,1)

OK
    
```

5.2. AT+CGAPNRC APN Rate Control

This Write Command returns the APN rate control parameters (see *3GPP TS 24.008*) associated with the provided context identifier **<cid>**.

This Test Command returns a list of **<cid>**s associated with secondary and non-secondary active PDP contexts.

AT+CGAPNRC APN Rate Control	
Test Command AT+CGAPNRC=?	Response +CGAPNRC: (list of <cid> s associated with active contexts) OK
Write Command AT+CGAPNRC=<cid>	Response +CGAPNRC: <cid> [, <additional_exception_reports> [, <uplink_time_unit> [, <maximum_uplink_rate>]]] OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<cid>	Integer type. A particular PDP context definition (see AT+CGDCONT).
<additional_exception_reports>	Integer type. Whether additional exception reports are allowed to be sent or not when the maximum uplink rate is reached. This refers to bit-4 of octet-1 of the APN rate control parameters IE as specified in <i>3GPP TS 24.008 subclause 10.5.6.3.2</i> . 0 Additional exception reports at maximum rate reached are not allowed to be sent. 1 Additional exception reports at maximum rate reached are allowed to be sent.
<uplink_time_unit>	Integer type. The time unit to be used for the maximum uplink rate. This refers to bits 1 to 3 of octet-1 of the APN rate control parameters IE as specified in <i>3GPP TS 24.008 subclause</i>

	10.5.6.3.2.
	0 Unrestricted
	1 Minute
	2 Hour
	3 Day
	4 Week
<maximum_uplink_rate>	Integer type. The maximum number of messages the UE is restricted to send per uplink time unit. This refers to octets 2 to 4 of the APN rate control parameters IE as specified in <i>3GPP TS 24.008 subclause 10.5.6.3.2</i> .
<err>	Error code. See Chapter 14 for details.

5.3. AT+CGAUTH Define PDP Context Authentication Parameters

The Write Command allows the TE to specify authentication parameters for a PDP context identified by the (local) context identification parameter **<cid>** used during the PDP context activation and the PDP context modification procedures. Since the **<cid>** is the same parameter as that used in **AT+CGDCONT** and **AT+QCGDEFCONT** commands, **AT+CGAUTH** is effectively as an extension to these commands.

The Test Command returns values supported as compound values. The Read Command returns the current settings for each defined context.

AT+CGAUTH Define PDP Context Authentication Parameters	
Test Command AT+CGAUTH=?	Response +CGAUTH: (range of supported <cid> s),(list of supported <auth_proto> s),(max length of <userid>),(max length of <password>) OK
Read Command AT+CGAUTH?	Response [+CGAUTH: <cid>,<auth_proto>[,<userid>,<password>]] [+CGAUTH: <cid>,<auth_proto>[,<userid>,<password>]] [...] OK
Write Command AT+CGAUTH=<cid>[,<auth_proto>[,<userid>[,<password>]]]	Response OK If there is any error:

	<p>ERROR Or +CME ERROR: <err></p>
Maximum Response Time	5 s
Characteristics	<p>The command takes effect immediately. The configurations will not be saved to NVRAM and will be deleted after deep-sleep wakeup.</p>

Parameter

<cid>	Integer type. A numeric parameter that specifies a particular PDP context definition (see AT+CGDCONT for details).
<auth_proto>	Integer type. Authentication protocol used for this PDP context. 0 None. Used to indicate that no authentication protocol is used for this PAP 1 PAP
<userid>	String type. User ID string, the max length is 20 characters with 1 line end mark.
<password>	String type. Password string, the max length is 20 characters with 1 line end mark.
<err>	Error code. See Chapter 14 for details.

Example

```

AT+CGAUTH=?
+CGAUTH: (0-10),(0-1),(20),(20)

OK
AT+CGAUTH?
+CGAUTH: 0,0,"",""

OK
AT+CGDCONT=1,IP
OK
AT+CGAUTH=1,1,"userid","psw"
OK
    
```

5.4. AT+CGDCONT Define PDP Context

This Write Command specifies PDP context parameters for a PDP context identified by the (local) context identification parameter **<cid>**. It also allows the TE to specify whether security protected transmission of ESM information is requested, because the PCO can include information that requires ciphering. There can be other reasons for the UE to use security protected transmission of ESM information, e.g. if the UE needs to transfer an APN. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the Test Command.

For EPS the PDN connection and its associated EPS default bearer is identified herewith. For EPS the **<PDP_addr>** shall be omitted.

A special form of the Write Command, **AT+CGDCONT=<cid>** causes the values for context number **<cid>** to become undefined.

This Read Command returns the current settings for each defined context.

This Test Command returns values supported as a compound value. If the UE supports several PDP types, **<PDP_type>**, the parameter value ranges for each **<PDP_type>** are returned on a separate line.

By default, the initial PDP context with **<cid>=0** is defined upon startup and cannot to be defined with the **AT+CGDCONT** command. Please configure the initial PDP context (**<cid>=0**) with **AT+QCGDEFCONT**. When in E-UTRAN, the initial PDP context is automatically activated by the MT following a successful registration to the network depending on the setting of **AT+CIPCA**. If all active contexts are deactivated, the initial PDP context can be (re)established.

AT+CGDCONT Define PDP Context	
Test Command AT+CGDCONT=?	Response +CGDCONT: (range of supported <cid> s),(list of supported <PDP_type> s),,,,,(list of supported <IPv4_addr_alloc> s),(range of supported <request_type> s),(range of supported <P-CSCF_discovery> s),(list of supported <IM_CN_signaling_flag_ind> s),(list of supported <NSLPI> s),(list of supported <securePCO> s),(list of supported <IPv4_MTU_discovery> s),(list of supported <local_addr_ind> s),(list of supported <Non-IP_MTU_discovery> s),(list of supported <Reliable_Data_Service> s) OK
Read Command AT+CGDCONT?	Response [+CGDCONT: <cid> , <PDP_type> , <APN> , <PDP_a

	<pre> ddr>,<d_comp>,<h_comp>[,<IPv4_addr_alloc>[<request_type>[,<P-CSCF_discovery>[,<IM_CN_ signaling_flag_ind>[,<NSLPI>[,<securePCO>[,<I Pv4_MTU_discovery>[,<local_addr_ind>[,<Non-I P_MTU_discovery>]]]]]]]]]] [+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_a ddr>,<d_comp>,<h_comp>[,<IPv4_addr_alloc>[<request_type>[,<P-CSCF_discovery>[,<IM_CN_ signaling_flag_ind>[,<NSLPI>[,<securePCO>[,<I Pv4_MTU_discovery>[,<local_addr_ind>[,<Non-I P_MTU_discovery>]]]]]]]]]] [...]</pre>
Write Command	Response
<pre> AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,< PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4_ad dr_alloc>[,<request_type>[,<P-CSCF_discover y>[,<IM_CN_signaling_flag_ind>[,<NSLPI>[,< securePCO>[,<IPv4_MTU_discovery>[,<local _addr_ind>[,<Non-IP_MTU_discovery>]]]]]]]]]]]]]]</pre>	<p>OK</p> <p>If there is any error:</p> <p>ERROR</p> <p>Or</p> <p>+CME ERROR: <err></p>
Maximum Response Time	5 s
Characteristics	<p>The command takes effect immediately.</p> <p>Besides the initial PDP context (<cid>=0), the configurations of the first two defined PDP contexts will be saved to NVRAM automatically. The configurations of other PDP contexts will not be saved to NVRAM.</p> <p>If the defined <cid> is activated, the configuration will be valid after deep-sleep wakeup. Otherwise, it will be deleted after deep-sleep wakeup.</p>

Parameter

<cid>	Integer type. A numeric parameter that specifies a particular PDP context definition. The parameter is local to the UE-TE interface and is used in other PDP context-related commands. Range: 0–10. 0 only appears in the response of Read Command.
<PDP_type>	String type. A string parameter which specifies the type of packet data protocol. <ul style="list-style-type: none"> "IP" Internet Protocol (<i>IETF STD 5</i>) "IPV6" Internet Protocol version 6 "IPV4V6" Virtual <PDP_type> introduced to handle dual-IP-stack UE capability "Non-IP" None IP

<APN>	String type. A logical name that is used to select the GGSN or the external packet data network. The maximum configurable APN length is 99 bytes. If the value is null or omitted, then the subscription value will be requested.
<PDP_addr>	String type. A string parameter that identifies the UE in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. The read form of the command continues to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read by AT+CGPADDR .
<d_comp>	Integer type. Controls PDP data compression. 0 Off 1 On (manufacturer preferred compression) 2 V.42bis 3 V.44
<h_comp>	Integer type. Controls PDP header compression. 0 Off 1 On 2 RFC 1144 (applicable for SMDCP only) 3 RFC 2507 4 RFC 3095[ROHC] (applicable for PDCP only)
<IPv4_addr_alloc>	Integer type. Controls how the MT/TA requests to get the IPv4 address information. 0 IPv4 address allocation through NAS signaling 1 IPv4 address allocated through DHCP
<request_type>	Integer type. The type of PDP context activation request for the PDP context. See <i>3GPP TS 24.301 (subclause 6.5.1.2)</i> and <i>3GPP TS 24.008 (subclause 10.5.6.17)</i> . It is not allowed to set <cid> to 0 for emergency bearer services. According to <i>3GPP TS 24.008 (subclause 4.2.4.2.2 and subclause 4.2.5.1.4)</i> and <i>3GPP TS 24.301 (subclause 5.2.2.3.3 and subclause 5.2.3.2.2)</i> , a separate PDP context must be established for emergency bearer services. If the PDP context for emergency bearer services is the only activated context, then only emergency calls are allowed (see <i>3GPP TS 23.401 subclause 4.3.12.9</i>). 0 PDP context is for new PDP context establishment or for handover from a non-3GPP access network (how the MT decides whether the PDP context is for new PDP context establishment or for handover is implementation specific). 1 PDP context is for emergency bearer services 2 PDP context is for new PDP context establishment 3 PDP context is for handover from a non-3GPP access network
<P-CSCF_discovery>	Integer type. Influences how the MT/TA requests to get the P-CSCF address (refer to <i>3GPP TS 24.229 Annex B</i> and <i>Annex L</i>). 0 Preference of P-CSCF address discovery not influenced by

	AT+CGDCONT
	<ul style="list-style-type: none"> 1 Preference of P-CSCF address discovery through NAS signaling 2 Preference of P-CSCF address discovery through DHCP
<IM_CN_signaling_flag_ind>	<p>Integer type. Indicates to the network whether the PDP context is for IM CN subsystem related signaling only or not.</p> <ul style="list-style-type: none"> 0 UE indicates that the PDP context is not for IM CN subsystem-related signaling only 1 UE indicates that the PDP context is for IM CN subsystem-related signaling only
<NSLPI>	<p>Integer type. The NAS signaling priority requested for this PDP context. MT utilizes the provided NSLPI information as specified in <i>3GPP TS 24.301</i> and <i>3GPP TS 24.008</i>.</p> <ul style="list-style-type: none"> 0 Indicates that this PDP context is to be activated with the value for the low priority indicator configured in the MT. 1 Indicates that this PDP context is to be activated with the value for the low priority indicator set to "MS is not configured for NAS signaling low priority".
<securePCO>	<p>Integer type. Specifies whether security protected transmission of PCO is requested or not (applicable for EPS only).</p> <ul style="list-style-type: none"> 0 Security protected transmission of PCO is not requested 1 Security protected transmission of PCO is requested
<IPv4_MTU_discovery>	<p>Integer type. Influences how the MT/TA requests to get the IPv4 MTU size, see <i>3GPP TS 24.008 subclause 10.5.6.3</i>.</p> <ul style="list-style-type: none"> 0 Preference of IPv4 MTU size discovery not influenced by
	AT+CGDCONT
<local_addr_ind>	<ul style="list-style-type: none"> 1 Preference of IPv4 MTU size discovery through NAS signaling <p>Integer type. Indicates whether MS supports local IP address in TFTs</p> <ul style="list-style-type: none"> 0 Indicates that the MS does not support local IP address in TFTs 1 Indicates that the MS supports local IP address in TFTs
<Non-IP_MTU_discovery>	<p>Integer type. Influences how the MT/TA requests to get the Non-IP MTU size (see <i>3GPP TS 24.008 subclause 10.5.6.3</i>).</p> <ul style="list-style-type: none"> 0 Preference of Non-IP MTU size discovery not influenced by
	AT+CGDCONT
<Reliable_Data_Service>	<ul style="list-style-type: none"> 1 Preference of Non-IP MTU size discovery through NAS signaling <p>Integer type. Whether UE supports reliable transmission.</p> <ul style="list-style-type: none"> 0 Not support 1 Support (currently not support)
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CGDCONT=?
+CGDCONT: (0-10),("IP","IPV6","IPV4V6","Non-IP"),,,,,(0,1),(0-3),(0-2),(0,1),(0,1),(0,1),(0,1),(0,1),(0,1),(0,1),(0,1),(0,1)
```

```

OK
AT+CGDCONT=1,"IP","CMNET"
OK
AT+CGDCONT?
+CGDCONT: 0,"IP","CMNBIOT","100.81.144.240"
+CGDCONT: 1,"IP","CMNET"

OK
    
```

NOTE

1. The value of **<APN>** is case-insensitive, and the reads are converted to uppercase regardless of whether the input is uppercase or lowercase.
2. **<cid>=0** can be configured by **AT+QCGDEFCONT**.

5.5. AT+CIPCA Initial PDP Context Activation

This Write Command controls whether the UE is attached to E-UTRAN with or without a PDN connection. The setting of **<n>=3** applies to E-UTRAN RATs.

For **<attach_without_PDN>=1**, the EPS attachment is performed without a PDN connection.

This Read Command returns the current settings of the command.

This Test Command returns values supported as a compound value.

AT+CIPCA Initial PDP Context Activation

Test Command AT+CIPCA=?	Response +CIPCA: (list of supported <n>s),(list of supported <attach_without_PDN>s) OK
Read Command AT+CIPCA?	Response +CIPCA: <n> , <attach_without_PDN> OK If there is any error: ERROR Or

	+CME ERROR: <err>
Write Command AT+CIPCA=<n>,<attach_without_PDN>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM.

Parameter

<n>	Integer type. Activation of PDP context upon attaching. 3 This is the current setting and does not need to be changed
<attach_without_PDN>	Integer type. Whether EPS attachment is performed with or without PDN connection. 0 EPS attachment is performed with a PDN connection 1 EPS attachment is performed without a PDN connection
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CIPCA=?
+CIPCA: (3),(0,1)

OK
```

5.6. AT+QCGDEFCONT Set Default PSD Connection Settings

This Write Command sets the PSD connection settings for PDN connection on power-up. When MT attaches to the NB-IoT network on power-up, a PDN connection is established. Therefore, PDN connection settings are stored in NVRAM so that they can be used by the modem during the attachment.

AT+QCGDEFCONT Set Default PSD Connection Settings	
Test Command AT+QCGDEFCONT=?	Response +QCGDEFCONT: (list of supported <PDP_type>s)

	OK
Read Command AT+QCGDEFCONT?	Response +QCGDEFCONT: <PDP_type>,[[[[<APN>],<user_name>],<password>],<auth_type>]
	OK
Write Command AT+QCGDEFCONT=<PDP_type>[,<APN>[,<user_name>,<password>[,<auth_type>]]]	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configurations are saved to NVRAM automatically.

Parameter

<PDP_type>	String type. Specify the type of packet data protocol: "IP" Internet Protocol (<i>IETF STD 5</i>) "IPV6" Internet Protocol version 6 (<i>IETF RFC 2460</i>) "IPV4V6" Dual IP stack (see <i>3GPP TS 24.301</i>) "Non-IP" Transfer of Non-IP data to external packet network (see <i>3GPP TS 24.301</i>)
<APN>	String type. A logical name that is used to select the GGSN or the external packet data network. The maximum configurable APN length is 99 bytes. If the value is null or omitted, then the subscription value will be requested.
<user_name>	String type. The user name for accessing the IP network. The maximum configurable APN length is 19 bytes.
<password>	String type. The password for accessing the IP network. The maximum configurable APN length is 19 bytes.
<auth_type>	Integer type. The authentication type of the APN. Range: 0–2. 0 None. If <user_name> and <password> are omitted, the <auth_type> is None by default. It should not be set by AT commands. 1 PAP. If this parameter is omitted, but <user_name> and <password> exist. The default value of <auth_type> is "PAP" 2 CHAP. Not support currently. Please do not set <auth_type> to this value lest the <PDP_type> and <APN> be changed correspondingly.
<err>	Error code. See Chapter 14 for details.

Example

```
AT+QCGDEFCONT=?
```

```
+QCGDEFCONT: ("IP","IPV6","IPV4V6","Non-IP")
```

```
OK
```

6 3GPP R14 Protocol Commands

The 3GPP R14 protocol extends the capabilities of the UE. That means switching between R13 and R14 protocol versions with AT commands may change some default configurations or make some configuration items automatically adapts to the configurations supported by the R13 protocol. Therefore, it is recommended to check and confirm the configuration items after configuring all items with the Write Commands in this Chapter.

6.1. AT+CNMPD Trigger R14 RAI

This command notifies the network that no application is expected to exchange data. If RAI in AS is enabled, this command triggers the RAI in the AS to release RRC connection quickly.

AT+CNMPD Trigger R14 RAI	
Test Command AT+CNMPD=?	Response OK
Execution Command AT+CNMPD	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<err> Error code. See **Chapter 14** for details.

6.2. AT+QR14FEATURE Query Status of R14 Features

This command queries whether the current network supports R14 protocol and what features are supported. If the module stays in idle status, some of the features that can only be queried in connected status are unable to be checked. Thus, it is recommended to execute the command in connected status.

AT+QR14FEATURE Query Status of R14 Features	
Test Command AT+QR14FEATURE=?	Response OK
Execution Command AT+QR14FEATURE	Response +QR14FEATURE: <UE_rel>,<UE_MAC_RAI> +QR14FEATURE: <net_feature> +QR14FEATURE: <2-harq>,<net_MAC_RAI>,<N_NPRACH>,<N_paging>,<cp_reest> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<UE_rel>	Integer type. Protocol supported by UE. 14 UE supports R14 protocol and enables the features by default 13 UE supports R13 protocol only
<UE_MAC_RAI>	Integer type. Whether MAC RAI is enabled. MAC RAI can only be used when the module is working in R14 mode. 0 RAI in AS is disabled 1 RAI in AS is enabled. If RAI is enabled by both network and UE, you can trigger a quick release of RRC connection with AT+CNMPSD
<net_feature>	Integer type. Whether the R14 features listed below are enabled by the network. The value is 1 if any one of the features is enabled. 0 None of the features listed below is enabled by the network 1 At least one of the features is enabled
<net_MAC_RAI>	Integer type. MAC RAI status of UE returned by network. 0 RAI in AS is disabled by RAU

	1	RAI in AS is enabled. If RAI is enabled by both network and UE, you can trigger a quick release of RRC connection with AT+CNMPSD
<2-harq>		Integer type. Whether 2-HARQ is enabled by the network.
	0	2-HARQ is not enabled
	1	2-HARQ is enabled
<N_NPRACH>		Integer type. Whether the network supports random access on non-anchor carrier.
	0	Not support
	1	Support
<N_paging>		Integer type. Whether the network supports paging on non-anchor carrier.
	0	Not support
	1	Support
<cp_reest>		Integer type. Whether the network supports re-establishing with CP-CIOT.
	0	Not support
	1	Support
<err>		Error code. See Chapter 14 for details.

Example

```

AT+QR14FEATURE //Query the current status of R14 features.
+QR14FEATURE: 13,0
+QR14FEATURE: 0
+QR14FEATURE: 0,0,0,0,0

OK
    
```

6.3. AT+QCFG Configure System

This command configures the system parameters of UE.

AT+QCFG Configure System	
Test Command AT+QCFG=?	Response List of +QCFG: <function>,(list of supported <value>s) ... OK
Write Command AT+QCFG=<function>[,<value>]	Response If the optional parameter is omitted, query the current configurations: +QCFG: <function>,<value>

	<p>OK</p> <p>If the optional parameter is specified, configure the corresponding feature:</p> <p>OK</p> <p>If there is any error:</p> <p>ERROR</p> <p>Or</p> <p>+CME ERROR: <err></p>
<p>Read Command AT+QCFG?</p>	<p>Response</p> <p>List of</p> <p>+QCFG: <function>, <value></p> <p>...</p> <p>OK</p> <p>If there is any error:</p> <p>ERROR</p> <p>Or</p> <p>+CME ERROR: <err></p>
<p>Maximum Response Time</p>	<p>5 s</p>
<p>Characteristics</p>	<p>The command takes effect after the module is rebooted.</p> <p>Remain valid after deep-sleep wakeup.</p> <p>The configurations will be saved to NVRAM automatically.</p>

Parameter

<function>	String type. Features to be configured.		
	"MacRAI"	RAI mechanism in AS	
	"relversion"	Protocol version supported by UE	
	"NBcategory"	UE-Category	
<value>	Integer.		
	<function>	<value>	Description
	"MacRAI"	<u>0</u>	Disable RAI in AS
		1	Enable RAI in AS
	"relversion"	<u>13</u>	R13 protocol
		14	R14 protocol
	"NBcategory"	<u>1</u>	Cat NB1 with R13 default configurations
		2	Cat NB2 with R14 default configurations
<err>	Error code. See Chapter 14 for details.		

7 Other Network Commands

7.1. AT+CCIOTOPT CloT Optimization Configuration

This Write Command controls which CloT EPS optimizations the UE indicates as supported and preferred in the ATTACH REQUEST and TRACKING AREA UPDATE REQUEST messages. The command also allows reporting of the CloT EPS optimizations that are supported by the network. UE supporting CloT functionality supports control plane CloT EPS optimization or user plane CloT EPS optimization or both (see 3GPP TS 24.301 subclause 9.9.3.34). Based on the application characteristics the UE may prefer to be registered for control plane CloT EPS optimization or for user plane CloT EPS optimization (see 3GPP TS 24.301 subclause 9.9.3.0B).

Further, the network may support control plane CloT EPS optimization or user plane CloT EPS optimization or both (see 3GPP TS 24.301 subclause 9.9.3.12A).

This Write Command controls the URC **+CCIOTOPTI**. The URC **+CCIOTOPTI: <supported_network_opt>** indicates the supported CloT EPS optimization by the network.

This Read Command returns the current settings for supported and preferred CloT EPS optimization and the current status of unsolicited result code **+CCIOTOPTI**.

AT+CCIOTOPT CloT Optimization Configuration	
Test Command AT+CCIOTOPT=?	Response +CCIOTOPT: (range of supported <n>s),(list of supported <supported_UE_opt>s),(range of supported <preferred_UE_opt>s) OK
Read Command AT+CCIOTOPT?	Response +CCIOTOPT: <n>,<supported_UE_opt>,<preferred_UE_opt> OK
Write Command AT+CCIOTOPT=<n>[,<supported_UE_opt>[,<preferred_UE_opt>]]	Response OK

	If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<n>	Integer type. Enable/disable reporting of URC +CCIOTOPTI . 0 Disable reporting 1 Enable reporting, +CCIOTOPTI: <supported_network_opt> 3 Disable reporting and reset the parameters for CloT EPS optimization to the default values
<supported_UE_opt>	Integer type. Indicates the UE's support for CloT EPS optimizations. 1 Support control plane CloT EPS optimization 3 Support both control plane and user plane CloT EPS optimizations
<preferred_UE_opt>	Integer type. Indicates the UE's preference for CloT EPS optimizations. 0 No preference 1 Preference for control plane CloT EPS optimization 2 Preference for user plane CloT EPS optimization
<supported_network_opt>	Integer type. Indicates the network's support for CloT EPS optimizations. 0 Not support 1 Support control plane CloT EPS optimization 2 Support user plane CloT EPS optimization 3 Support both control plane and user plane CloT EPS optimizations
<err>	Error code. See Chapter 14 for details.

7.2. AT+COPS Operator Selection

This Write Command forces an attempt to select and register the EPS network operator using the USIM card installed in the currently selected card slot. **<mode>** is used to select whether the selection is done automatically by the MT or is forced by this command to operator **<oper>** (it shall be given in format **<format>**) to a certain access technology, indicated in **<Act>**. If the selected operator is not available, no other operator shall be selected (except **<mode>**=4). If the selected access technology is not available, then the same operator shall be selected in other access technologies. The selected operator name format shall also apply to the read command (**AT+COPS?**). **<mode>**=2 forces an attempt to deregister

from the network. The selected mode affects all further network registration (e.g. after **<mode>=2**, MT shall be unregistered until **<mode>=0** or **1** is selected). This command should be abortable when a registration/deregistration attempt is made.

This Read Command returns the current mode, the currently selected operator and the current access technology. If no operator is selected, **<format>**, **<oper>** and **<AcT>** are omitted.

This Test Command returns a set of five parameters, each representing an operator present in the network. A set consists of an integer indicating the availability of the operator **<stat>**, long and short alphanumeric format of the operator's name, numeric format representation of the operator and access technology. Any of the formats may be unavailable and should then be an empty field. The list of operators shall be in the order of: home network, networks referenced in USIM or active application in the UICC (USIM) in the following order: HPLMN selector, user controlled PLMN selector, operator controlled PLMN selector and PLMN selector (in the USIM), and other networks.

The **<AcT>** access technology selected parameters should only be used in terminals capable to register to more than one access technology. Selection of **<AcT>** does not limit the capability to cell reselections, even though an attempt is made to select an access technology, the phone may still re-select a cell in another access technology.

AT+COPS Operator Selection	
Test Command AT+COPS=?	Response +COPS: list of supported (<stat> ,long alphanumeric <oper> ,short alphanumeric <oper> ,numeric <oper> [, <AcT>]) s [[,(range of supported <mode>s),(range of supported <format>s) OK If there is any error: ERROR Or +CME ERROR: <err>
Read Command AT+COPS?	Response +COPS: <mode> [, <format> , <oper>][, <AcT>] OK If there is any error: ERROR Or +CME ERROR: <err>
Write Command AT+COPS=<mode> [, <format>][, <oper	Response OK

>[,<AcT>]]	If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	305 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. Only when <mode> =0/1/4, the configuration will be saved to NVRAM automatically.

Parameter

<mode>	Integer type. 0 Automatic mode (<oper> field is ignored) 1 Manual operator selection (<oper> field shall be present) 2 Manually deregister from network 3 Set <format> not shown in read command response 4 Manual/automatic selected. If manual selection fails, automatic mode (<mode> =0) is entered
<format>	Integer type. 0 Long format alphanumeric <oper> 1 Short format alphanumeric <oper> 2 Numeric <oper> . Only valid when <mode> =1 or <mode> =4
<oper>	String type. <format> indicates if the form at is numeric. Numeric format is the NB-IoT network location area identification number which consists of a three BCD digit ITU-T country code, plus a two or three BCD digit network code, which is administration specific. <oper> field could not be present when <mode> =0.
<stat>	Integer type. 0 Unknown 1 Operator available 2 Operator currently selected 3 Operator forbidden to be selected
<AcT>	Integer type. Access technology selected. 9 E-UTRAN (NB-S1 mode)
<err>	Error code. See Chapter 14 for details.

NOTE

1. This Test Command interrupts the data sending if the data transmitting is ongoing.
2. This Write Command can be executed only when the module is in the idle state or de-registered state with an USIM card inserted, otherwise an error is returned.

Example

```

AT+COPS=0
OK
AT+COPS?
+COPS: 0,2,"46000",9

OK
AT+COPS=?
+COPS: (2,"CHINA MOBILE","CMCC","46000",9),(3,"CHINA UNICOMM","CUCC","46001",9),(1,"",
"", "21405",9),(1,"CHINA TELECOM","CTCC","46011",9),,(0-4),(0-2)

OK
    
```

7.3. AT+CRTDCP Reporting of Terminating Data via the Control Plane

The Write Command enables or disables reporting of data from the network to the MT that is transmitted via the control plane in downlink direction. If the reporting is enabled, the MT returns the unsolicited result code **+CRTDCP: <cid>,<cpdata_length>,<cpdata>** when data is received from the network.

AT+CRTDCP Reporting of Terminating Data via the Control Plane	
Test Command AT+CRTDCP=?	Response +CRTDCP: (list of supported <reporting>s),(range of supported <cid>s),(maximum number of octets of user data indicated by <cpdata_length>) OK
Read Command AT+CRTDCP?	Response +CRTDCP: <reporting> OK
Write Command AT+CRTDCP=<reporting>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<cid>	Integer type. A numeric parameter which specifies a particular PDP context or EPS bearer context definition. The <cid> parameter is local to the TE-MT interface and identifies the PDP or EPS bearer contexts configured via AT+CGDCONT . Range: 0–10.
<cpdata_length>	Integer type. The number of octets of the <cpdata> information element. Range: 0–1600. Unit: byte. When there is no data to transmit, the value will be set to 0.
<cpdata>	String of octets. Contains the user data container contents (refer <i>3GPP TS 24.301 subclause 9.9.4.24</i>). When there is no data to transmit, the <cpdata> shall be an empty string (""). It supports "HEX" character format.
<reporting>	Integer type. Controls reporting of mobile terminated control plane data events. <u>0</u> Disable reporting of MT control plane data <u>1</u> Enable reporting of MT control plane data by the unsolicited result code +CRTDCP: <cid>,<cpdata_length>,<cpdata>
<err>	Error code. See Chapter 14 for details.

7.4. AT+CSODCP Sending of Originating Data via Control Plane

The Write Command is used by the TE to transmit data over control plane to network via MT. Context identifier **<cid>** is used to link the data to particular context.

This command optionally indicates that the application on the MT expects that the exchange of data:

- will be completed with this uplink data transfer; or
- will be completed with the next received downlink data.

This command also optionally indicates whether or not the data to be transmitted is exception data. This command causes transmission of an ESM DATA TRANSPORT message, as defined in *3GPP TS 24.301*.

AT+CSODCP Send Originating Data via Control Plane	
Test Command AT+CSODCP=?	Response +CSODCP: (range of supported <cid>s),(maximum number of octets of user data indicated by <cpdata_length>),(range of supported <RAI>s),(list of supported <type_of_user_data>s) OK
Write Command AT+CSODCP=<cid>,<cpdata_length>,<cpdata>,[<RAI>],[<type_of_user_data>]	Response OK If there is any error: ERROR

	Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<cid>	Integer type. Specifies a particular PDP context definition. Range: 0–10.
<cpdata_length>	Integer type. The number of octets of the <cpdata> information element. Range: 0–950. Unit: byte.
<cpdata>	String type. The data to be sent. Contains the user data container contents (refer <i>3GPP TS 24.301 subclause 9.9.4.24</i>). When there is no data to transmit, the <cpdata> shall be an empty string (""). The maximum length of <cpdata> are implementation specific.
<RAI>	Integer type. Indicates the value of the release assistance indication. <u>0</u> No information available 1 The MT expects that exchange of data will be completed with the transmission of the ESM DATA TRANSPORT message 2 The MT expects that exchange of data will be completed with the receipt of an ESM DATA TRANSPORT message
<type_of_user_data>	Integer type. Indicates whether the user data that is transmitted is regular or exceptional. <u>0</u> Regular data 1 Exception data
<err>	Error code. See Chapter 14 for details.

7.5. AT+QBAND Get and Set Mobile Operation Band

This command gets the currently registered band or sets the bands to be locked.

AT+QBAND Get and Set Mobile Operation Band	
Test Command AT+QBAND=?	Response +QBAND: (range of supported <band_number>s),(list of supported <operating_band>s) OK
Read Command AT+QBAND?	Response +QBAND: <operating_band> OK

	<p>If there is any error: ERROR Or +CME ERROR: <err></p>
<p>Write Command AT+QBAND=<band_number>[,<band>[,<band>[,...]]]</p>	<p>Response OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
Maximum Response Time	900 s
Characteristics	<p>The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.</p>

Parameter

<band_number>	<p>Integer type. Preferred band number to be searched for. 0 All bands 1–17 Number of bands</p>
<band>	<p>Integer type. Currently preferred NB-IoT bands to be searched for. Valid values: 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 28, 66, 70, 85</p>
<operating_band>	<p>Integer type. The band(s) that has been set earlier. Valid values: 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 28, 66, 70, 85.</p>
<err>	<p>Error code. See Chapter 14 for details.</p>

Example

```

AT+QBAND=? //Query the list of supported bands.
+QBAND: (0-17),(1,2,3,4,5,8,12,13,17,18,19,20,25,28,66,70,85)

OK
AT+QBAND=1,4 //Set the band to be used.
OK
AT+QBAND? //Query the band that has been set earlier.
+QBAND: 4

OK
    
```

NOTE

The Write Command will trigger a detachment and re-attachment procedure.

7.6. AT+QCSEARFCN Clear Stored NB-IoT EARFCN List

This command clears the stored EARFCN list for the UE.

AT+QCSEARFCN Clear Stored NB-IoT EARFCN List	
Execution Command AT+QCSEARFCN	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	Only can be executed when AT+CFUN=0 , and takes effect after switching to AT+CFUN=1 . For details on AT+CFUN , see Chapter 9.3 . Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<err>	Error code. See Chapter 14 for details.
--------------------	--

Example

```
AT+QCSEARFCN //Clear stored EARFCN list for the UE.
OK
```

7.7. AT+QLOCKF Lock NB-IoT Frequency and PCI

This command locks the UE to a specific frequency and an optional cell ID. The value of **<pci>** greater than 503 causes error returned; and if **<pci>** is smaller than 0, or a non-integer value, it is ignored.

AT+QLOCKF Lock NB-IoT Frequency and PCI	
Test Command AT+QLOCKF=?	Response +QLOCKF: (list of supported <mode> s) OK
Read Command AT+QLOCKF?	Response [+QLOCKF: [1,<EARFCN>[,<pci>]]] [+QLOCKF: [2,<EARFCN1>[,<EARFCN2>,...]]] OK
Write Command Unlock NB-IoT Frequency(<mode>=0) AT+QLOCKF=<mode>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Write Command Lock NB-IoT Frequency (<mode>=1) AT+QLOCKF=<mode>,<EARFCN>[,,<pci>]]	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Write Command Set priority frequency (<mode>=2) AT+QLCOKF=<mode>,<numofEARFCN>,<EARFCN1>[,<EARFCN2>]....	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	Only can be executed when AT+CFUN=0 , and takes effect after switching to AT+CFUN=1 . For details on AT+CFUN , see Chapter 9.3 . Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<mode>	Integer type. Activate/remove the lock. 0 Remove lock 1 Activate lock 2 Set the preferred frequency
<EARFCNx>	Integer type. The requested EARFCN on which to lock. Range: 0–262143. Value 0 indicates to remove any lock of EARFCN and cell. The maximum number of EARFCNs that can be prioritized is 8.
<pci>	Integer type. The physical cell ID. Range: 0–503.
<numofEARFCN>	Integer type. The number of EARFCNs prioritized. Range: 1–8.
<err>	Error code. See Chapter 14 for details.

NOTE

1. This Write Command should be conducted after you execute **AT+CFUN=0**.
2. **<mode>=2** is only applicable to valid downlink carrier frequency setting.

Example

```
AT+QLOCKF=1,2508
OK
```

7.8. AT+QPLMNS Search PLMN

The Write Command starts searching PLMN when UE is out of service. If UE is in service status, the command returns **+CME ERROR: <err>**.

The Read Command returns the current PLMN search status and the remaining time of PLMN search timer.

AT+QPLMNS Search PLMN	
Test Command AT+QPLMNS=?	Response OK
Read Command AT+QPLMNS?	Response +QPLMNS: <state>[,<OOS_time_step>] OK If there is any error: ERROR

	Or +CME ERROR: <err>
Execution Command AT+QPLMNS	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<state>	Integer type. PLMN status in NAS. 0 PLMN searching is inactivated. PLMN is not searched 1 PLMN is being searched 2 PLMN is selected 3 UE is in OOS status. The PLMN search timer is started
<OOS_time_step>	Integer type. Remaining time of PLMN search timer. Unit: second. Only valid when <state> =3.
<err>	Error code. See Chapter 14 for details.

7.9. AT+QLAPI Enable or Disable the NAS Low Access Priority Indicator

This command configures or queries the low access priority indicator in device properties. Only when there is no EF_{NASCONFIG} on the USIM card will the command take effect.

AT+QLAPI Enable or Disable the NAS Low Access Priority Indicator

Test Command AT+QLAPI=?	Response +QLAPI: (list of supported <Lapi>s) OK
Read Command AT+QLAPI?	Response +QLAPI: <Lapi> OK If there is any error:

	<p>ERROR Or +CME ERROR: <err></p>
<p>Write Command AT+QLAPI=<Lapi></p>	<p>Response OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
Maximum Response Time	5 s
Characteristics	<p>The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.</p>

Parameter

<Lapi>	Integer type.
	0 Disable
	1 Enable

Example

```
AT+QLAPI=0
OK
```

NOTE

This command can only be used when the inserted USIM card belongs to KT carrier.

7.10. AT+QLEDMODE Set NETLIGHT Mode

This command configures or queries NETLIGHT LED mode.

AT+QLEDMODE Set NETLIGHT Mode	
<p>Test Command AT+QLEDMODE=?</p>	<p>Response +QLEDMODE: (list of supported <LED_mode>s)</p> <p>OK</p>

	<p>If there is any error: ERROR Or +CME ERROR: <err></p>
<p>Read Command AT+QLEDMODE?</p>	<p>Response +QLEDMODE: <LED_mode></p> <p>OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
<p>Write Command AT+QLEDMODE=<LED_mode></p>	<p>Response OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
<p>Maximum Response Time</p>	<p>5 s</p>
<p>Characteristics</p>	<p>This command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.</p>

Parameter

<LED_mode>	<p>Integer type. NETLIGHT LED indicator mode.</p> <p><u>0</u> Disable NETLIGHT LED function. NETLIGHT pin outputs low level</p> <p>1 Enable NETLIGHT LED function. NETLIGHT pin outputs PWM signals. The different duration of low level and high level indicates different network status</p> <table border="1"> <thead> <tr> <th>Network Status</th> <th>High Level Duration</th> <th>Low Level Duration</th> </tr> </thead> <tbody> <tr> <td>Network Searching</td> <td>64 ms</td> <td>800 ms</td> </tr> <tr> <td>Connecting</td> <td>64 ms</td> <td>2000 ms</td> </tr> </tbody> </table>	Network Status	High Level Duration	Low Level Duration	Network Searching	64 ms	800 ms	Connecting	64 ms	2000 ms
Network Status	High Level Duration	Low Level Duration								
Network Searching	64 ms	800 ms								
Connecting	64 ms	2000 ms								
<err>	<p>Error code. See Chapter 14 for details.</p>									

NOTE

If the NETLIGHT level is always low (LED OFF), then the module is not working or in Idle/PSM state.

Example

```

AT+QLEDMODE=1
OK
AT+QLEDMODE?
+QLEDMODE: 1

OK
AT+QLEDMODE=?
+QLEDMODE: (0,1)

OK
    
```

7.11. AT+QIPERF Throughput Test

This command is used for throughput test.

AT+QIPERF Throughput Test	
Test Command AT+QIPERF=?	Response +QIPERF: (range of supported <action>s),(list of supported <protocol>s),(range of supported <port>s),<ipaddr>,(range of supported <tpt>s),(range of supported <payload_size>s),(range of supported <pkg_num>s),(range of supported <duration>s),(range of supported <report_interval>s) OK
Write Command AT+QIPERF=<action>[,<protocol>[,<port>[,<ipaddr>[,<tpt>[,payload_size[,<packet_number>[,<duration>[,<report_interval>]]]]]]]]]	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<action> Integer type. IPERF command.

	0 Terminate all IPERF services
	1 Start IPERF client
	2 Stop IPERF client
	3 Start IPERF server
	4 Start IPERF UDP NAT server. In this mode, UE sends a UDP packet to the remote server to set a UDP connection. Then the UE waits to receive DL UDP packets and starts the DL UDP IPERF server
	5 Stop IPERF server
<protocol>	Integer type. Protocol type.
	0 UDP
	1 TCP
<port>	Integer type. UDP/TCP port number. Range: 1–65535. Default value: 5001. If <action> =1/4, <port> represents target server port number If <action> =3, <port> represents local IPERF server port number
<ipaddr>	Integer type. IP address. If <action> =1/4, <ipaddr> is mandatory and indicates the target server address. If <action> =3 and the test domain is IPv6, <ipaddr> is mandatory, and it shall be the local IPv6 address of UE.
<tpt>	Integer type. Throughput. Range: 1–1200000. Default value: 20000. Unit: bps.
<payload_size>	Integer type. The payload size of UL UDP/TCP IPERF packets, used in client mode. Range: 36–1472. Default value: 1350. Unit: byte.
<packet_number>	Integer type. In client mode, it indicates the number of packets sent by UE. Range: 1–65000. Default value: 100.
<duration>	Integer type. IPERF service duration. If it is not specified, IPERF will not end until error occurs or the termination command is received. Range: 1–65000. Unit: second.
<report_interval>	Integer type. IPERF's internal service results report. Unit: second. Default value: 10. The following URCs will be provided periodically within the interval. Range: 1–65000. If <action> =1, UE sends URC +QIPERF: Client SUCC, pkg sent bytes:<bytes>, UL through put: <tpt> bps If <action> =3/4, UE sends URC +QIPERF: Server SUCC, pkg sent bytes:<bytes>, UL through put: <tpt> bps
<err>	Error code. See Chapter 14 for details.

NOTE

1. When the service from IPERF client completes (terminate/expires), UE sends this URC:
+QIPERF: Client END, pkg sent total bytes: <bytes>, average UL through put: <tpt> bps.
2. When the service from IPERF server completes (terminate/expires), UE sends this URC:
+QIPERF: Server END, pkg rcv total bytes: <bytes>, average DL through put: <tpt> bps.
3. If an error disrupts the IPERF service, UE sends the following URC:
+QIPERF: Client FAIL, <err>; or +QIPERF: Server FAIL, <err>.

Example

```

AT+QIPERF=1,0,5001,"180.101.147.115",10000
OK

+QIPERF: Client SUCC, pkg sent bytes: 15158, UL through put: 12126 bps

+QIPERF: Client SUCC, pkg sent bytes: 12402, UL through put: 9921 bps

+QIPERF: Client SUCC, pkg sent bytes: 12402, UL through put: 9921 bps

+QIPERF: Client SUCC, pkg sent bytes: 13780, UL through put: 11024 bps

+QIPERF: Client SUCC, pkg sent bytes: 12402, UL through put: 9921 bps
AT+QIPERF=0
OK

+QIPERF: Client END, pkg sent total bytes: 74412, average UL through put: 10263 bps
AT+QIPERF=?
+QIPERF: (0-5),(0,1),(1-65535),<ipaddr>,(1-1200000),(36-1472),(1-65000),(1-65000),(1-65000)

OK
    
```

7.12. +RECVNONIP Incoming Downlink Non-IP Data

This is an unsolicited code message which indicates incoming downlink non-IP data.

+RECVNONIP: Incoming Downlink Non-IP Data

+RECVNONIP: <cid>,<data_length>,<data> Notify the incoming of downlink non-IP data.

Parameter

<cid>	Integer type. Specifies a particular PDP context. Range: 0–10.
<data_length>	Integer type. Indicates the number of octets of the <cpdata> information element.
<data>	String octets. Data received.
<err>	Error code. See Chapter 14 for details.

8 USIM Related Commands

8.1. AT+CCHO Open Logical Channel

This command causes the MT to return **<sessionid>** to allow the TE to identify a channel that is being allocated by the currently selected UICC, which is attached to ME. The currently selected UICC opens a new logical channel; select the application identified by the **<dfname>** received with this command and return a session Id as the response. The ME restricts the communication between the TE and the UICC to this logical channel.

This **<sessionid>** is to be used when sending commands with Restricted UICC Logical Channel access **AT+CRLA** or Generic UICC Logical Channel access **AT+CGLA**.

AT+CCHO Open Logical Channel	
Test Command AT+CCHO=?	Response OK
Write Command AT+CCHO=<dfname>	Response <sessionid> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<dfname>	String type. DF name. All selectable applications in the UICC are referenced by a DF name coded on 1 to 16 bytes.
<sessionid>	Integer type. Session ID to be used in order to target a specific application on the smart card (e.g. USIM) using logical channels mechanism.
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CCHO="A00000004374506173732E496F54"
1
OK
```

8.2. AT+CCHC Close Logical Channel

This command asks the ME to close a communication session with the active UICC. The ME shall close the previously opened logical channel. The TE no longer be able to send commands on this logical channel.

AT+CCHC Close Logical Channel	
Test Command AT+CCHC=?	Response OK
Write Command AT+CCHC=<sessionid>	Response +CCHC OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<sessionid>	Integer type. Session ID to be used in order to target a specific application on the smart card (e.g. USIM) using logical channels mechanism.
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CCHC=1
+CCHC
OK
```

8.3. AT+CGLA Generic UICC Logical Channel Access

This Write Command transmits to the MT the **<command>** it then shall send as it is to the selected UICC. In the same manner the UICC **<response>** shall be sent back by the MT to the TA as it is.

This command allows a direct control of the currently selected UICC by a distant application on the TE. The TE then shall take care of processing UICC information within the frame specified by GSM/UMTS.

Although the command allows TE to take control over the UICC-MT interface, there are some functions of the UICC-MT interface that logically do not need to be accessed from outside the TA/MT.

AT+CGLA Generic UICC Logical Channel Access	
Test Command AT+CGLA=?	Response OK
Write Command AT+CGLA=<sessionid>,<length>,<command>	Response +CGLA: <length>,<response> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<sessionid>	Integer type. The identifier of the session to be used in order to send the APDU commands to the UICC. It is mandatory to send commands to the UICC when targeting applications on the smart card using a logical channel other than the default channel (channel "0").
<length>	Integer type. Length of the characters that are sent to TE in <command> or <response> (two times the actual length of the command or response).
<command>	String type in hex format. Command passed on by the MT to the UICC. For details, see <i>3GPP TS 31.101</i> .
<response>	String type in hex format. Response to the command passed on by the UICC to the MT. For details, see <i>3GPP TS 31.101</i> .
<err>	Error code. See Chapter 14 for details.

8.4. AT+CIMI Request International Mobile Subscriber Identity

This command returns International Mobile Subscriber Identity (a string without double quotes).

This Execution Command causes the TA to return **<IMSI>**, which is intended to permit the TE to identify the USIM which is attached to MT.

AT+CIMI Request International Mobile Subscriber Identity	
Test Command AT+CIMI=?	Response OK
Execution Command AT+CIMI	Response <IMSI> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<IMSI>	String type without double quotes. International Mobile Subscriber Identity.
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CIMI
460001357924680

OK
```

8.5. AT+CLCK Facility Lock

This command locks/unlocks or interrogates a MT or a network facility **<fac>**. A password is normally needed to do such actions. When querying the status of a network service (**<mode>=2**) the response line for 'not active' case (**<status>=0**) should be returned only if the service is not active for any **<class>**. This

command should be abortable when network facilities are set or interrogated.

This Test Command returns facility values supported as a compound value.

AT+CLCK Facility Lock	
Test Command AT+CLCK=?	Response +CLCK: (list of supported <fac>s) OK
Write Command AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]]	Response when <mode>=0 or 1 and the command is executed successfully: OK when <mode>=2 and the command is executed successfully: +CLCK: <status>[,<class>] [+CLCK: <status>,<class> [...]] OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<fac>	String type. Network facility. "SC" SIM (lock USIM card installed in the currently selected card slot) (USIM asks password in MT power-up and when this lock command is issued)
<mode>	Integer type. Lock operation. 0 Unlock 1 Lock 2 Query status
<passwd>	String type. It shall be the same as the password specified for the facility from the MT user interface or as the password set with AT+CPWD .
<class>	Integer type. Sum of integers each representing a class of information. 1 Voice (telephony)

2	Data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)
4	Fax (facsimile services)
8	Short message service
16	Data circuit sync
32	Data circuit async
64	Dedicated packet access
128	Dedicated PAD access
<status>	Integer type. Status of facility.
0	Not active
1	Active
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CLCK="SC",2
+CLCK: 0

OK
```

8.6. AT+CPIN Enter PIN

This Write Command sends to the MT a password which is necessary before it can be operated (SIM PIN, SIM PUK, PH SIM PIN, etc.). If the PIN is to be entered twice, the TA shall automatically repeat the PIN. If no PIN request is pending, no action is taken towards MT and an error message, **+CME ERROR**, is returned to TE. If the PIN required is SIM PUK, the second pin is required. This second pin, **<newpin>**, is used to replace the old pin in the SIM.

AT+CPIN Enter PIN	
Test Command AT+CPIN=?	Response OK
Read Command AT+CPIN?	Response +CPIN: <code> OK If there is any error: ERROR Or +CME ERROR: <err>
Write Command	Response

AT+CPIN=<pin>[,<newpin>][,<newpin>]	<p>OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Whether the configurations are saved to the USIM card depends on the USIM card in use. The configurations will not be saved to NVRAM.

Parameter

<code>	String type. Type of password required.
READY	No further entry needed
SIM PIN	MT is waiting for USIM PIN
SIM PUK	MT is waiting for USIM PUK
<pin>	String type. Password.
<newpin>	String type. If the PIN required is "SIM PUK", it is the new password.
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CPIN?
+CPIN: READY
OK
```

8.7. AT+CPINR Remaining PIN Retries

This command causes the MT to return the number of remaining PIN retries for the MT passwords with intermediate result code **+CPINR: <code>,<retries>[,<default_retries>]**.

When the command is issued without the optional parameter **<sel_code>**, intermediate result codes are returned for all **<code>**s. In the intermediate result codes, **<default_retries>** is an optional parameter, per **<code>**.

AT+CPINR Remaining PIN Retries	
Test Command	Response

AT+CPINR=?	OK
Write/Execution Command AT+CPINR[=<sel_code>]	Response [+CPINR: <code>,<retries>[,<default_retries>]] [+CPINR: <code>,<retries>[,<default_retries>]] [...] OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<sel_code>	String type. Selected type of PIN. "SIM PIN" "SIM PUK"
<retries>	Integer type. Number of remaining retries per PIN.
<default_retries>	Integer type. Number of default retries per PIN.
<code>	String type. Type of PIN. All values listed under the description of <code> in AT+CPIN , except "READY".
<err>	Error code. See Chapter 14 for details.

Example

```

AT+CPINR
+CPINR: "SIM PIN",3,3
+CPINR: "SIM PUK",10,10

OK
    
```

8.8. AT+CPWD Change Password

This command sets a new password for the facility lock function defined by **AT+CLCK**.

This Test Command returns a list of pairs which present the available facilities and the maximum length of their passwords.

AT+CPWD Change Password	
Test Command AT+CPWD=?	Response +CPWD: (list of supported <fac> , <pwdlength> s) OK
Write Command AT+CPWD=<fac>,<oldpwd>,<newpwd>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Whether the configurations are saved to the USIM card depends on the USIM card in use. The configurations will not be saved to NVRAM.

Parameter

<fac>	String type. Network facility. "SC" SIM (lock USIM card installed in the currently selected card slot) (USIM asks password on MT power-up and when this lock command is issued)
<oldpwd>,<newpwd>	String type. Old password/new password. The maximum length of password can be determined with <pwdlength> . Old password <oldpwd> shall be the same as the password specified for the facility from the MT user interface or with that set in AT+CPWD . <newpwd> is the new password.
<pwdlength>	Integer type. The maximum length of the password for the facility. Unit: Byte.
<err>	Error code. See Chapter 14 for details.

8.9. AT+CRSM Restricted USIM Access

This command provides easy but limited access to the USIM database. It transmits the USIM **<command>** and its required parameters.

AT+CRSM Restricted USIM Access	
Test Command AT+CRSM=?	Response OK
Write Command AT+CRSM=<command>[,<fileID>[,<P1>,<P2>,<P3>[,<data>][,<pathID>]]]	Response +CRSM: <sw1>,<sw2>[,<response>] OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Whether the configurations are saved to the USIM card depends on the USIM card in use. The configurations will not be saved to NVRAM.

Parameter

<command>	Integer type. Command passed on by the MT to the USIM. 176 READ BINARY 178 READ RECORD 192 GET RESPONSE 214 UPDATE BINARY 220 UPDATE RECORD 242 STATUS
<fileID>	Integer type. The identifier of an elementary data file on USIM. Mandatory for every command except STATUS.
<P1>,<P2>,<P3>	Integer type. Parameters passed on by the MT to the USIM. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in <i>3GPP TS 51.011</i> .
<data>	String type. Information (in hexadecimal format) which shall be written to the USIM.
<pathID>	String type. It contains the path of an elementary file on the UICC in hexadecimal format.
<sw1>,<sw2>	Integer type. Information from the USIM about the actual command execution

<response>	result. These parameters are delivered to the TE in both cases of successful or failed execution of the command. String type. Response of a successful completion of the command previously issued in hexadecimal format. STATUS and GET RESPONSE return data, which gives information about the current elementary data field. This information includes the type of file and its size (see 3GPP TS 51.011/102.221/31.102). After READ BINARY or READ RECORD command the requested data will be returned. <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command.
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CRSM=176,28512,0,0,0
+CRSM: 144,0,"FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFF
F0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFF
FFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFF
FFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFF
0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFF
F0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFFFFF0000FFFFF
```

OK

NOTE

1. If the USIM card is not allowed to hibernate, the whole system cannot enter the hibernation mode, and thus the module's power consumption will not be reduced.
2. It is needed to execute **AT+QSIMSLEEP** to disable USIM hibernation before executing **AT+CRSM/AT+CSIM**.

8.10. AT+CSIM Generic USIM Access

This Write Command transmits to the MT the **<command>** it then shall send as it is to the USIM. In the same manner, the USIM **<response>** shall be sent back by the MT to the TA as it is.

This command allows a direct control of the USIM that is installed in the selected card slot, by a distant application on the TE. The TE shall then take care of processing USIM information within the frame specified by GSM/UMTS.

AT+CSIM Generic USIM Access	
Write Command AT+CSIM=<length>,<command>	Response +CSIM: <length>,<response> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Whether the configurations are saved to the USIM card depends on the USIM card in use. The configurations will not be saved to NVRAM.

Parameter

<length>	Integer type. Length of the characters that are sent to TE in <command> or <response> (two times the actual length of the command or response).
<command>	String type in hexadecimal format. Command passed on by the MT to the USIM card. For details, see <i>3GPP TS 51.011</i> .
<response>	String type in hexadecimal format. Response to the command passed on by the USIM card to the MT.
<err>	Error code. See Chapter 14 for details.

NOTE

1. If the USIM card is not allowed to hibernate, the whole system cannot enter the hibernation mode, and thus the module's power consumption will not be reduced.
2. It is needed to execute **AT+QSIMSLEEP** to disable USIM hibernation before executing **AT+CRSM** or **AT+CSIM**.

8.11. AT+QCCID USIM Card Identification

This command reads ICCID of the USIM card. If no USIM card is present, or the USIM card is unreadable, no data will be returned.

AT+QCCID USIM Card Identification	
Execution Command AT+QCCID	Response +QCCID: <ICCID> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<ICCID> String type. USIM card identification number (integrated circuit card identity).

Example

```
AT+QCCID
+QCCID: 89860446091891372008

OK
```

8.12. AT+QSIMPOLL USIM Card Polling

This command enables or disables the polling of USIM card. If USIM card polling is enabled, the module detects USIM card periodically and sends **status** to get USIM card status. If USIM card polling is disabled, UE interacts with USIM card only in the situation that the card is required, and tries to temporarily store some information to avoid unnecessarily frequent interactions so as to lower the power consumption.

AT+QSIMPOLL USIM Card Polling	
Test Command	Response

AT+QSIMPOLL=?	+QSIMPOLL: (list of supported <mode>s) OK
Read Command AT+QSIMPOLL?	Response +QSIMPOLL: <mode> OK
Write Command AT+QSIMPOLL=<mode>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<mode> Integer type. Enable/disable USIM card polling.
 0 Disable
1 Enable

Example

```
AT+QSIMPOLL=?
+QSIMPOLL: (0,1)

OK
AT+QSIMPOLL=1
OK
AT+QSIMPOLL?
+QSIMPOLL: 1

OK
```

NOTE

The module cannot detect USIM card when the card is powered off even if USIM card polling is enabled, and the polling timer will be discarded in such case.

8.13. AT+QSIMSLEEP USIM Sleep Control

This command configures whether to allow USIM card to sleep. When USIM card is not allowed to sleep, USIM card will prevent the whole system from going to sleep. In this case, the power consumption of the module will increase. Therefore, it is recommended to enable USIM card sleep when using the module.

AT+QSIMSLEEP USIM Sleep Control	
Test Command AT+QSIMSLEEP=?	Response +QSIMSLEEP: (list of supported <mode>s) OK If there is any error: ERROR Or +CME ERROR: <err>
Read Command AT+QSIMSLEEP?	Response +QSIMSLEEP: <mode> OK
Write Command AT+QSIMSLEEP=<mode>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will not be saved to NVRAM automatically.

Parameter

<mode>	Integer type. 0 Disable USIM card sleep <u>1</u> Enable USIM card sleep
---------------------	---

NOTE

1. When USIM card sleep is disabled, the whole module cannot enter sleep mode, resulting in the increase of power consumption.
2. Before **AT+CRSM** or **AT+CSIM** is executed, it is necessary to execute this command to disable USIM card sleep.

Example

```
AT+QSIMSLEEP?
```

```
+QSIMSLEEP: 1
```

```
OK
```

9 Power Consumption Commands

9.1. AT+CEDRXS eDRX Setting

This Write Command controls the setting of the UE's eDRX parameters. It controls whether the UE wants to apply eDRX or not, as well as the requested eDRX value for each specified type of access technology.

This Write Command also controls the presentation of an unsolicited result code **+CEDRXP:** **<AcT_type>[,<requested_eDRX_value>[,<NW_provided_eDRX_value>[,<paging_time_window>]]]** when **<mode>=2** and there is a change in the eDRX parameters provided by the network.

A special form of the command can be given as **AT+CEDRXS=3**. In this form, eDRX will be disabled and data for all parameters in **AT+CEDRXS** will be removed or, if available, set to the default values.

This Read Command returns the current settings for each defined value of **<AcT_type>**.

This Test Command returns the supported **<mode>s** and the value ranges for the access technology and the requested eDRX value as a compound value.

AT+CEDRXS eDRX Setting	
Test Command AT+CEDRXS=?	Response +CEDRXS: (range of supported <mode>s),(list of supported <AcT_type>s),(range of supported <requested_eDRX_value>s) OK
Read Command AT+CEDRXS?	Response +CEDRXS: <AcT_type> , <requested_eDRX_value> OK
Write Command AT+CEDRXS=<mode>[,<AcT_type>[,<requested_eDRX_value>]]	Response OK If there is any error: ERROR Or

	+CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<mode>	Integer type. Disable or enable the use of eDRX in the UE. This parameter is applicable to all specified types of access technologies, i.e. the most recent setting of <mode> takes effect for all specified values of <AcT_type> . 0 Disable the use of eDRX 1 Enable the use of eDRX 2 Enable the use of eDRX and enable URC +CEDRXP: <AcT_type>[,<requested_eDRX_value>[,<NW_provided_eDRX_value>[,<paging_time_window>]]] 3 Disable the use of eDRX and discard all parameters for eDRX or, if available, reset to default values
<AcT_type>	Integer type. The type of access technology. AT+CEDRXS? specifies the relationship between the type of access technology and the requested eDRX value. 5 E-UTRAN (NB-S1 mode)
<requested_eDRX_value>	String type. Half a byte in a 4-bit format. NB-S1 mode. Bits 4 3 2 1 E-UTRAN eDRX cycle length duration 0 0 1 0 20.48 seconds 0 0 1 1 40.96 seconds 0 1 0 1 81.92 seconds 1 0 0 1 163.84 seconds 1 0 1 0 327.68 seconds 1 0 1 1 655.36 seconds 1 1 0 0 1310.72 seconds 1 1 0 1 2621.44 seconds 1 1 1 0 5242.88 seconds 1 1 1 1 10485.76 seconds
<NW_provided_eDRX_value>	String type. Half a byte in a 4-bit format. NB-S1 mode. Bits 4 3 2 1 E-UTRAN eDRX cycle length duration 0 0 1 0 20.48 seconds 0 0 1 1 40.96 seconds 0 1 0 1 81.92 seconds

1	0	0	1	163.84 seconds
1	0	1	0	327.68 seconds
1	0	1	1	655.36 seconds
1	1	0	0	1310.72 seconds
1	1	0	1	2621.44 seconds
1	1	1	0	5242.88 seconds
1	1	1	1	10485.76 seconds

<paging_time_window> String type. Half a byte in a 4-bit format. NB-S1 mode.

Bits

4	3	2	1	Paging Time Window length
0	0	0	0	2.56 seconds
0	0	0	1	5.12 seconds
0	0	1	0	7.68 seconds
0	0	1	1	10.24 seconds
0	1	0	0	12.8 seconds
0	1	0	1	15.36 seconds
0	1	1	0	17.92 seconds
0	1	1	1	20.48 seconds
1	0	0	0	23.04 seconds
1	0	0	1	25.6 seconds
1	0	1	0	28.16 seconds
1	0	1	1	30.72 seconds
1	1	0	0	33.28 seconds
1	1	0	1	35.84 seconds
1	1	1	0	38.4 seconds
1	1	1	1	40.96 seconds

<err> Error code. See **Chapter 14** for details.

Example

```

AT+CEDRXS=1,5,"0101"
OK
AT+CEDRXS?
+CEDRXS: 5,"0011"

OK
AT+CEDRXS=?
+CEDRXS: (0-3),(5),("0000"-"1111")

OK
    
```

9.2. AT+CEDRXRDP eDRX Read Dynamic Parameters

This Execution Command returns the values of **<AcT_type>**, **<requested_eDRX_value>**, **<NW_provided_eDRX_value>** and **<paging_time_window>** if eDRX is used for the cell that the MS is currently registered to.

If the cell to which the MS is currently registered is not using eDRX, **<AcT_type>=0** is returned.

AT+CEDRXRDP eDRX Read Dynamic Parameters	
Test Command AT+CEDRXRDP=?	Response OK
Execution Command AT+CEDRXRDP	Response +CEDRXRDP: <AcT_type>[,<requested_eDRX_value>[,<NW_provided_eDRX_value>[,<paging_time_window>]]] OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<AcT_type>	Integer type. The type of access technology. AT+CEDRXS? specifies the relationship between the type of access technology and the requested eDRX value. 0 Access technology not supporting eDRX. 5 E-UTRAN (NB-S1 mode)
<requested_eDRX_value>	String type. Half a byte in a 4-bit format. Bits 4 3 2 1 E-UTRAN eDRX cycle length duration 0 0 1 0 20.48 seconds 0 0 1 1 40.96 seconds 0 1 0 1 81.92 seconds 1 0 0 1 163.84 seconds 1 0 1 0 327.68 seconds 1 0 1 1 655.36 seconds 1 1 0 0 1310.72 seconds

	1	1	0	1	2621.44 seconds
	1	1	1	0	5242.88 seconds
	1	1	1	1	10485.76 seconds
<NW_provided_eDRX_value>	String type. Half a byte in a 4-bit format.				
	Bits				
	4	3	2	1	E-UTRAN eDRX cycle length duration
	0	0	1	0	20.48 seconds
	0	0	1	1	40.96 seconds
	0	1	0	1	81.92 seconds
	1	0	0	1	163.84 seconds
	1	0	1	0	327.68 seconds
	1	0	1	1	655.36 seconds
	1	1	0	0	1310.72 seconds
	1	1	0	1	2621.44 seconds
	1	1	1	0	5242.88 seconds
	1	1	1	1	10485.76 seconds
<paging_time_window>	String type. Half a byte in a 4-bit format.				
	Bits				
	4	3	2	1	Paging Time Window length
	0	0	0	0	2.56 seconds
	0	0	0	1	5.12 seconds
	0	0	1	0	7.68 seconds
	0	0	1	1	10.24 seconds
	0	1	0	0	12.8 seconds
	0	1	0	1	15.36 seconds
	0	1	1	0	17.92 seconds
	0	1	1	1	20.48 seconds
	1	0	0	0	23.04 seconds
	1	0	0	1	25.6 seconds
	1	0	1	0	28.16 seconds
	1	0	1	1	30.72 seconds
	1	1	0	0	33.28 seconds
	1	1	0	1	35.84 seconds
	1	1	1	0	38.4 seconds
	1	1	1	1	40.96 seconds
<err>	Error code. See Chapter 14 for details.				

Example

```

AT+CEDRXRDP
+CEDRXRDP: 5,"0011","0011","0011"
OK
AT+CEDRXRDP=?
OK
    
```

9.3. AT+CFUN Set UE Functionality

This Write Command selects the level of functionality in the MT. Level "full functionality" is where the highest level of power is drawn. "Minimum functionality" is where minimum power is drawn.

This Read Command returns the current setting of **<fun>**.

This Test Command returns values supported by the MT as a compound value.

AT+CFUN Set UE Functionality	
Test Command AT+CFUN=?	Response +CFUN: (list of supported <fun> s),(list of supported <rst> s) OK
Read Command AT+CFUN?	Response +CFUN: <fun> OK
Write Command AT+CFUN=<fun>[,<rst>]	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	25 s, determined by network.
Characteristics	See parameters description.

Parameter

<fun>	Integer type. UE functionality level. 0 Minimum functionality 1 Full functionality 4 Disable RF transmitting and receiving
<rst>	Integer type. UE resetting. 0 Need not to reset the UE for setting it to a functionality level. 1 Need to reset the UE for setting it to a functionality level (not supported currently).
<err>	Error code. See Chapter 14 for details.

Example

```

AT+CFUN=?
+CFUN: (0,1,4),(0,1)

OK
AT+CFUN=1
OK
AT+CFUN?
+CFUN: 1

OK
    
```

9.4. AT+CPSMS Power Saving Mode Setting

This Write Command controls the setting of the UE's power saving mode (PSM) parameters. It controls whether the UE wants to apply PSM or not, as well as the requested extended periodic TAU value in E-UTRAN and the requested Active Time value. See the unsolicited result codes provided by **AT+CEREG** for the Active Time value and the extended periodic TAU value allocated to the UE by the network in E-UTRAN.

A special form of the command can be given as **AT+CPSMS=2**. In this form the use of PSM will be disabled and data for all parameters in **AT+CPSMS** will be removed or, if available, set to the default values.

This Read Command returns the current parameter values.

This Test Command returns the supported **<mode>s** and the value ranges for the requested extended periodic TAU value in E-UTRAN and the requested Active Time value as a compound value.

AT+CPSMS Power Saving Mode Setting	
Test Command AT+CPSMS=?	Response +CPSMS: (range of supported <mode>s),,(range of supported <requested_periodic_TAU>s),(range of supported <requested_active_time>s) OK
Read Command AT+CPSMS?	Response +CPSMS: <mode> ,,, <requested_periodic_TAU> , <requested_active_time> OK

	<p>If there is any error: ERROR Or +CME ERROR: <err></p>
<p>Write Command AT+CPSMS=<mode>[,,<requested_periodic_TAU>[,<requested_active_time>]]</p>	<p>Response OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
Maximum Response Time	5 s
Characteristics	<p>The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.</p>

Parameter

<mode>	<p>Integer type. Disable or enable the use of PSM in the UE</p> <p>0 Disable the use of PSM</p> <p><u>1</u> Enable the use of PSM</p> <p>2 Disable the use of PSM and discard all parameters for PSM or, if available, reset to the default values</p>
<requested_periodic_TAU>	<p>String type. One byte in an 8-bit format. Requested extended periodic TAU value (T3412) to be allocated to the UE in E-UTRAN. (e.g. "01000111" equals 70 hours).</p> <p>Bits 5 to 1 represents the binary coded timer value.</p> <p>Bits 8 to 6 defines the timer value unit as follows:</p> <p>Bits</p> <p>8 7 6</p> <p>0 0 0 value is incremented in multiples of 10 minutes</p> <p>0 0 1 value is incremented in multiples of 1 hour</p> <p>0 1 0 value is incremented in multiples of 10 hours</p> <p>0 1 1 value is incremented in multiples of 2 seconds</p> <p>1 0 0 value is incremented in multiples of 30 seconds</p> <p>1 0 1 value is incremented in multiples of 1 minute</p> <p>1 1 0 value is incremented in multiples of 320 hours (Note 1)</p> <p>1 1 1 value indicates that the timer is deactivated (Note 2)</p>
<requested_active_time>	<p>String type. One byte in an 8-bit format. Requested Active Time value (T3324) to be allocated to the UE (e.g., "00100100" equals 4 minutes).</p> <p>Bits 5 to 1 represent the binary coded timer value.</p> <p>Bits 8 to 6 defines the timer value unit for the GPRS timer as follows:</p>

Bits	
8 7 6	
0 0 0	value is incremented in multiples of 2 seconds
0 0 1	value is incremented in multiples of 1 minute
0 1 0	value is incremented in multiples of 6 minutes
1 1 1	value indicates that the timer is deactivated

<err> Error code. See **Chapter 14** for details.

NOTE

1. This timer value unit is only applicable to the T3412 extended value IE. If it is received in an integrity protected message, the value shall be interpreted as multiples of 320 hours. Otherwise, the value shall be interpreted as multiples of 1 hour.
2. The timer value is not applicable to the T3412 extended value IE. If this timer value is received, the T3412 extended value IE shall be considered as not included in this message.

Example

```
AT+CPSMS=1,,,"01000011","01000011"
OK
AT+CPSMS?
+CPSMS: 1,,,"01000011","01000011"
OK
AT+CPSMS=?
+CPSMS: (0-2),,,"00000000"- "11111111"),("00000000"- "11111111")
OK
```

9.5. AT+QDRX Query DRX Status

This Read Command queries the DRX status.

AT+QDRX Query DRX Status

Test Command AT+QDRX=?	Response OK
Read Command AT+QDRX?	Response When the module is not in connected mode: +QDRX: <mode>[,<drxcycle_IDLE>] OK

	<p>When the module is in connected mode: +QDRX: <mode>,<drxInactivityTimer>,<drxRetransmissionTimer>,<drxStartOffset>,<drxULRetransmissionTimer>,<longdrxCycle>,<onDurationTimer></p> <p>OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
Maximum Response Time	5 s
Characteristics	/

Parameter

<mode>	Integer type. The mode of RRC connection. 0 RRC connection is neither in Idle mode nor in connected mode, e.g., PSM/Deregistered 1 Idle mode 2 Connected mode
<drxcycle_IDLE>	Integer type. Indicates DRX cycle in IDLE mode. Unit: ms.
<drxInactivityTimer>	Integer type. Indicates the duration of the drx-InactivityTimer. Unit: PDCCH Period. Value: 0,1,2,3,4,8,16,32. See 3GPP TS 36.321.
<drxRetransmissionTimer>	Integer type. Indicates the duration of the drx-RetransmissionTimer. Unit: PDCCH Period. See 3GPP TS 36.321.
<longdrxCycle>	Integer type. Indicates the duration of the DRX cycle in connected mode. Unit: sub-frame. See 3GPP TS 36.321.
<drxStartOffset>	Integer type. Indicates the value of drxStartOffset, represented by the number of sub-frames obtained by the operation of (<longdrxCycle> / 256). Range: 0–255.
<drxULRetransmissionTimer>	Integer type. Indicates the duration of the drx-ULRetransmissionTimer. Unit: PDCCH period. See 3GPP TS 36.321.
<onDurationTimer>	Integer type. Indicates the duration of the onDurationTimer. Unit: PDCCH Period. See 3GPP TS 36.321.

Example`AT+QDRX?``+QDRX: 1,1280``OK`

9.6. AT+QEDRXCFCG Configure eDRX and PTW

This Write Command controls the setting of UE's eDRX parameters. The command controls whether or not UE applies eDRX, the requested eDRX value and requested paging time window value for each specified type of access technology.

AT+QEDRXCFCG Configure eDRX and PTW	
Test Command AT+QEDRXCFCG=?	Response +QEDRXCFCG: (range of supported <mode> s),(list of supported <AcT_type> s),(range of supported <requested_eDRX_value> s),(range of supported <requested_paging_time_window_value> s) OK
Read Command AT+QEDRXCFCG?	Response +QEDRXCFCG: <AcT_type> , <requested_eDRX_value> , <requested_paging_time_window_value> OK
Write Command AT+QEDRXCFCG=<mode>[,<AcT_type>][,<requested_eDRX_value>][,<requested_paging_time_window_value>]]]	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<mode>	Integer type. Disable or enable the use of eDRX in the UE. This parameter is applicable to all specified types of access technologies, i.e. the most recent setting of <mode> will take effect for all specified values of <AcT_type> . 0 Disable the use of eDRX 1 Enable the use of eDRX 2 Enable the use of eDRX and enable URC +CEDRXP: <AcT_type>[,<requested_eDRX_value>][,<NW_provided_eDRX_v
---------------------	---

	alue>[,<paging_time_window>]]]
	3 Disable the use of eDRX and discard all parameters for eDRX or, if available, reset to default values
<AcT_type>	Integer type. The type of access technology. AT+CEDRXS? specifies the relationship between the type of access technology and the requested eDRX value.
	0 Access technology not supporting eDRX. This parameter value is only used in URC
	5 E-UTRAN (NB-S1 mode)
<requested_eDRX_value>	String type. Half a byte in a 4-bit format. NB-S1 mode.
	Bits
	4 3 2 1 E-UTRAN eDRX cycle
	0 0 1 0 20.48 seconds
	0 0 1 1 40.96 seconds
	0 1 0 1 81.92 seconds
	1 0 0 1 163.84 seconds
	1 0 1 0 327.68 seconds
	1 0 1 1 655.36 seconds
	1 1 0 0 1310.72 seconds
	1 1 0 1 2621.44 seconds
	1 1 1 0 5242.88 seconds
	1 1 1 1 10485.76 seconds
<requested_paging_time_window_value>	String type. Half a byte in a 4-bit format. NB-S1 mode.
	Bits
	4 3 2 1 Paging Time Window
	0 0 0 0 2.56 seconds
	0 0 0 1 5.12 seconds
	0 0 1 0 7.68 seconds
	0 0 1 1 10.24 seconds
	0 1 0 0 12.8 seconds
	0 1 0 1 15.36 seconds
	0 1 1 0 17.92 seconds
	0 1 1 1 20.48 seconds
	1 0 0 0 23.04 seconds
	1 0 0 1 25.6 seconds
	1 0 1 0 28.16 seconds
	1 0 1 1 30.72 seconds
	1 1 0 0 33.28 seconds
	1 1 0 1 35.84 seconds
	1 1 1 0 38.4 seconds
	1 1 1 1 40.96 seconds
<NW_provided_eDRX_value>	String type. Half a byte in a 4-bit format. NB-S1 mode.
	Bits
	4 3 2 1 E-UTRAN eDRX cycle

0	0	1	0	20.48 seconds
0	0	1	1	40.96 seconds
0	1	0	1	81.92 seconds
1	0	0	1	163.84 seconds
1	0	1	0	327.68 seconds
1	0	1	1	655.36 seconds
1	1	0	0	1310.72 seconds
1	1	0	1	2621.44 seconds
1	1	1	0	5242.88 seconds
1	1	1	1	10485.76 seconds

<paging_time_window>

String type. Half a byte in a 4-bit format. NB-S1 mode.

Bits

4	3	2	1	Paging Time Window
0	0	0	0	2.56 seconds
0	0	0	1	5.12 seconds
0	0	1	0	7.68 seconds
0	0	1	1	10.24 seconds
0	1	0	0	12.8 seconds
0	1	0	1	15.36 seconds
0	1	1	0	17.92 seconds
0	1	1	1	20.48 seconds
1	0	0	0	23.04 seconds
1	0	0	1	25.6 seconds
1	0	1	0	28.16 seconds
1	0	1	1	30.72 seconds
1	1	0	0	33.28 seconds
1	1	0	1	35.84 seconds
1	1	1	0	38.4 seconds
1	1	1	1	40.96 seconds

<err>

Error code. See **Chapter 14** for details.

Example

```

AT+QEDRXCFG=1,5,"0101"
OK
AT+QEDRXCFG?
+QEDRXCFG: 5,"0011","0011"

OK
AT+QEDRXCFG=?
+QEDRXCFG: (0-3),(5),("0000"- "1111"),("0000"- "1111")

OK
    
```

9.7. AT+QNBIOTRAI NB-IoT Release Assistance Indication

This command sets the NB-IoT release assistance indications.

AT+QNBIOTRAI NB-IoT Release Assistance Indication	
Test Command AT+QNBIOTRAI=?	Response +QNBIOTRAI: (list of supported <rai_mode>s) OK
Write Command AT+QNBIOTRAI=<rai_mode>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	Only can be set when RRC is in connected state. The command takes effect immediately.

Parameter

<rai_mode>	Integer type. Specifies release assistance information. 0 TE sends a single UL data packet without the RAI mark to the network. 1 TE informs the network to release the RRC connection by sending it a single UL packet with RAI flag.
<err>	Error code. See Chapter 14 for details.

9.8. AT+QNBIOTEVENT Enable/Disable NB-IoT Related Event Report

This command enables/disables an NB-IoT related event report.

AT+QNBIOTEVENT Enable/Disable NB-IoT Related Event Report	
Test Command AT+QNBIOTEVENT=?	Response OK
Read Command AT+QNBIOTEVENT?	Response +QNBIOTEVENT: <enable>,<event> OK

Write Command AT+QNBIOTEVENT=<enable>,<event>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<enable>	Integer type. Enable/disable a specific event report. 0 Disable the indication of the specific event 1 Enable the indication of the specific event by URC +QNBIOTEVENT: <event_value>
<event>	Integer type. The reported event. 1 PSM state
<event_value>	String type. When the reported event is PSM: ENTER PSM EXIT PSM
<err>	Error code. See Chapter 14 for details.

Example

```
AT+QNBIOTEVENT?
+QNBIOTEVENT: 1,1
OK
```

9.9. AT+QPSMS Power Saving Mode Setting

This command sets and gets PSM related timer value in seconds. And **<N_T2>** is always the period TAU timer. This is convenient for customer to use.

Whatever the timer value is, PSM will be enabled automatically upon the execution of this command. If the requested value of T3324 or extended T3412 is not available, the module will choose the greatest available value that is not greater than the requested one.

<T1> is the value of T3324. In Write Command, the value will be set to T3324 and requested in TAU or ATTACH_REQUEST message. In Read Command, <N_T1> is the value of T3324 provided by the network.

<T2> is the value of T_PTAU. In Write Command, the value will be set to extend T3412. In Read Command, when extended T3412 is enabled, the value of <N_T2> is extended T3412; when extended T3412 is disabled, the value is T3412.

To disable PSM, use **AT+CPMS** command.

AT+QPSMS Power Saving Mode Setting	
Test Command AT+QPSMS=?	Response +QSCLK: (range of supported <T1>s),(range of supported <T2>s) OK
Read Command AT+QPSMS?	Response +QPSMS: <N_T1>,<N_T2> OK
Write Command AT+QSCLK=<T1>,<T2>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will not be saved to NVRAM.

Parameter

<T1>	Integer type. The value of T3324. Unit: seconds. Range: 0–11160.
<T2>	Integer type. The value of extended T3412. Unit: seconds. Range: 0–35712000.
<N_T1>	Integer type. The value of T3324 provided by the network. Unit: seconds. Range: 0–11160. If the value is 1, T3324 is disabled.
<N_T2>	Integer type. The value of extended T3412 provided by the network if the value of extended T3412 exists. The value of T3412 if the extended T3412 value does not exist. Unit: seconds. Range: 0–35712000. If the value is 1, the value of extended T3412 and value of T3412 are disabled.
<err>	Error code. See Chapter 14 for details.

9.10. AT+QSCLK Configure Sleep Mode

This command configures the TE's sleep modes.

AT+QSCLK Configure Sleep Mode	
Test Command AT+QSCLK=?	Response +QSCLK: (range of supported <n>s) OK
Read Command AT+QSCLK?	Response +QSCLK: <n> OK
Write Command AT+QSCLK=<n>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will not be saved to NVRAM.

Parameter

<n>	Integer type. 0 Disable sleep modes <u>1</u> Enable light sleep and deep sleep, wakeup by PSM_EINT (at falling edge) and the Main UART 2 Enable light sleep only, wakeup by the Main UART or PSM_EINT
<err>	Error code. See Chapter 14 for details.

NOTE

1. UART does not work during the light sleep mode. Therefore, when **AT+QSCLK=1** or **AT+QSCLK=2**, send **AT** before each command to make sure the UART is woken up.
2. When **AT+QSCLK=0**, UART is always working. To make the module enter sleep modes, send **AT+QSCLK=1** or **AT+QSCLK=2**.
3. Before data communication, it is recommended to execute **AT+QSCLK=0** to disable sleep modes.

After data communication is completed, it is recommended to execute **AT+QSCLK=1** to enable sleep mode again to save power.

4. When the module is woken up from light sleep mode by PSM_EINT, the module will enter the light sleep mode again immediately. It is recommended to wake up the module through sending AT commands and then follow the suggestion in **Note 3**.

Example

```
AT+QSCLK=0
OK
```

9.11. AT+QPSC Power Saving Control

This Write Command configures the sleep mechanism of the module in Idle mode. **<minT3324>**, **<minT3412>** and **<minTeDRX>** are used to control the minimum threshold of T3324, T3412 and the minimum eDRX cycle in Deep Sleep respectively.

If eDRX is not enabled by the network, the threshold of **<minTeDRX>** will fallback for controlling the threshold of DRX cycle.

Only when PSM is enabled by the network, and the actual T3324 is greater than minT3324, T3412/T3412 EXT greater than minT3412, DRX/eDRX cycle greater than minTeDRX, can the module enter Deep Sleep mode in IDLE state.

When PSM is disabled by the network, and the actual DRX/eDRX cycle is greater than **<minTeDRX>**, the module can enter Deep Sleep in Idle mode. Otherwise, the module cannot enter Deep Sleep in Idle mode.

This Execution Command restores the default value of the threshold.

AT+QPSC Power Saving Control	
Test Command AT+QPSC=?	Response +QPSC: (range of supported <minT3324> s),(range of supported <minT3412> s),(range of supported <minTeDRX> s) OK
Read Command AT+QPSC?	Response +QPSC: "minT3324",<minT3324>,"minT3412",<minT3412>,"minTeDRX",<minTeDRX> OK

Write Command AT+QPSC=<minT3324>,<minT3412>,<minTeDRX>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Execution Command AT+QPSC	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM.

Parameter

<minT3324>	Integer type. The minimum T3324 threshold to enter Deep Sleep mode. Default value: 0. Unit: seconds. Range: 0–65535.
<minT3412>	Integer type. The minimum T3412 threshold to enter Deep Sleep mode. Default value: 0. Unit: seconds. Range: 0–268435455.
<minTeDRX >	Integer type. The minimum eDRX cycle threshold to enter Deep Sleep mode. Default value: 0. Unit: seconds. Range: 0–65535.
<err>	Error code. See Chapter 14 for details.

NOTE

If the module does not enter Deep Sleep mode for a long time, it has a certain impact on the power consumption and lifespan of the terminal. However, if the module enters or exits Deep Sleep mode frequently, extra flash erasing may occur resulting in the decrease of lifespan of the terminal.

Example

```
AT+QPSC?
+QPSC: "minT3324",0,"minT3412",0,"minTeDRX",0
OK
```


10 Platform Related Commands

10.1. AT+CBC Query Power Supply Voltage

This command queries the voltage value of power supply.

AT+CBC Query Power Supply Voltage	
Test Command AT+CBC=?	Response OK
Execution Command AT+CBC	Response +CBC: <voltage> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<voltage>	Integer type. Battery voltage. Unit: mV.
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CBC
+CBC: 3369

OK
```

10.2. AT+CMEE Report Mobile Termination Error

This Write Command disables or enables the use of final result code **+CME ERROR: <err>** as an indication of an error relating to the functionality of MT. When the report of the final result code **+CME ERROR: <err>** is enabled, MT-related errors cause **+CME ERROR: <err>** as the final result code instead of the regular **ERROR** as the final result code. **ERROR** is returned normally when there is an error related to syntax, invalid parameters or TA functionality.

This Read Command returns the current setting of **<n>**.

The Test Command returns values supported as a compound value.

AT+CMEE Report Mobile Termination Error	
Test Command AT+CMEE=?	Response +CMEE: (range of supported <n>s) OK
Read Command AT+CMEE?	Response +CMEE: <n> OK
Write Command AT+CMEE=<n>	Response OK
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM.

Parameter

<n>	Integer type. Enable/disable the use of result code +CME ERROR: <err> . <ul style="list-style-type: none"> <u>0</u> Disable result code 1 Enable result code and use numeric values 2 Enable result code and use verbose values
<err>	Error code. See Chapter 14 for details.

Example

```
AT+CMEE?
+CMEE: 1

OK
```

```
AT+CMEE=?
+CMEE: (0-2)
OK
```

10.3. AT+QADC Query the Input Voltage of Dedicated ADC Channel

This command queries the input voltage of a dedicated ADC channel.

AT+QADC Query the Input Voltage of Dedicated ADC Channel

Test Command AT+QADC=?	Response +QADC: (list of supported <channel>s) OK
Read Command AT+QADC?	Response +QADC: <channel>,<voltage> OK
Write Command AT+QADC=<channel>	Response +QADC: <channel>,<voltage> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<channel>	Integer type. ADC conversion channel. Range: 0–6. Currently only channel 0 (ADC0) is valid.
<voltage>	Integer type. Sample voltage value or the average value of sample voltages. Range: 0–1200. Unit: mV.

NOTE

1. **AT+QADC** queries the input voltage value of the ADC0 channel.
2. Detection results between 0.1–1.1 V are fine in accuracy, while detection results between 0–0.1 V or 1.1–1.2 V are less accurate.

Example

```
AT+QADC?
+QADC: 0,796
OK
```

10.4. AT+QRST Module Reset

This command resets the module immediately.

AT+QRST Module Reset	
Test Command AT+QRST=?	Response +QRST: (list of supported <mode> s) OK
Write Command AT+QRST=<mode>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

- <mode>** Integer type.
1 The module resets immediately after **OK** is returned without detaching from the network.
- <err>** Error code. See **Chapter 14** for details.

10.5. AT+QRFSTAT Query RF Status

This command is used to query RF Status

AT+QRFSTAT Query RF Status	
Test Command AT+QRFSTAT=?	Response OK
Execution Command AT+QRFSTAT	Response +QRFSTAT: <status> OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<status>	String type. RF calibration status. CALIBRATE RF has been calibrated NOT CALIBRATE RF has not been calibrated. The module cannot be used
<err>	Error code. See Chapter 14 for details.

11 General Configuration Commands

11.1. AT+QCFG System Configuration

This command configures the system.

AT+QCFG System Configuration	
Test Command AT+QCFG=?	Response List of +QCFG: <function>,(list of supported <value>s) ... OK
Read Command AT+QCFG?	Response List of +QCFG: <function>,<value> ... OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	/

Parameter

<function>	String type. Functions to be configured.
"EPCO"	Configure the extended protocol configuration options (EPCO)
"DataInactTimer"	Configure inactivity timer
"OOSScheme"	Configure network searching mechanism in OOS
"logbaudrate"	Configure baud rate
"slplocktimes"	Configure sleep duration

"dsevent"	Configure whether to enable the URC ENTER DEEPSLEEP of deep sleep event or not
"statisr"	Configure the report interval of statistics URC
"MacRAI"	Enable or disable RAI in MAC layer
"relversion"	Configure protocol release version
"NBcategory"	Configure UE category
"wakeupRXD"	Determine whether the UE can be woken up by RXD
"faultaction"	Set the action performed by UE after an error occurs
"GPIO"	Configure GPIO status
"NcellMeas"	Enable or disable neighbor cell measurement
"SimBip"	Enable or disable SIMBIP
<value>	Integer type/String type. See Chapter 11.1.1–Chapter 11.1.15 for details.
<err>	Error code. See Chapter 14 for details.

NOTE

For some special requirements from mobile network operators, the configuration may not take effect.

11.1.1. AT+QCFG="EPCO" Enable/Disable EPCO

This command enables or disables extended protocol configuration options. This Write Command can only be used when **AT+CFUN=0**.

AT+QCFG="EPCO" Enable/Disable EPCO	
Write Command AT+QCFG="EPCO"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "EPCO",<value> OK If the optional parameter is specified, enable or disable EPCO: OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup.

The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type 0 Disable EPCO 1 Enable EPCO
<err>	Error code. See Chapter 14 for details.

11.1.2. AT+QCFG="DataInactTimer" Configure Inactivity Timer

This command configures the data inactivity timer of UE. This Write Command can only be used when **AT+CFUN=0**. The inactivity timer, after being enabled, starts when there is neither UL data nor DL data being sent or received, including RRC and NAS signaling, and restarts every time a UL or DL transmission begins. After the timer expires, the module will release the RRC connection.

AT+QCFG="DataInactTimer" Configure Inactivity Timer

Write Command AT+QCFG="DataInactTimer"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "DataInactTimer",<value> OK If the optional parameter is specified, configure the inactivity timer of UE: OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command can only be used in CFUN0 mode, and takes effect after the mode changes into CFUN1. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type. Configure time of the inactivity timer. Unit: second. Default value: 60.
----------------------	--

0	Disable inactivity timer
15–255	Enable inactivity timer and set the timer
<err>	Error code. See Chapter 14 for details.

11.1.3. AT+QCFG="OOScheme" Configure Network Searching Mechanism in OOS

This command configures the network searching mechanism of UE in OOS.

AT+QCFG="OOScheme" Configure Network Searching Mechanism in OOS	
Write Command AT+QCFG="OOScheme"[,<value>]	<p>Response</p> <p>If the optional parameter is omitted, query the current configuration: +QCFG: "OOScheme",<value></p> <p>OK</p> <p>If the optional parameter is specified, configure the network searching mechanism in OOS: OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
Maximum Response Time	5 s
Characteristics	<p>The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.</p>

Parameter

<value>	<p>Integer type. Network searching mechanism in OOS.</p> <p>0 Search PLMN at the interval of 30 secs, 1 min, 2 min</p> <p><u>1</u> Search PLMN at the interval of 5 min, 10 min, 15 min</p> <p>2 Search PLMN at the interval of 10 min, 30 min, 1 hour</p> <p>3 Search PLMN at the interval of 30 secs, then stop searching PLMN till AT+QPLMNS is executed (see Chapter 7.8)</p>
<err>	Error code. See Chapter 14 for details.

11.1.4. AT+QCFG="logbaudrate" Configure Baud Rate

This command configures the baud rate for log capture. The default baud rate is 6000000 bps. If your serial chip does not support 6000000 bps, you can configure it to 3000000 bps or lower. The lower the baud rate, the more log information is likely to be lost. The baud rate configured here should be the same as the baud rate selected by the log tool. Otherwise, the log cannot be captured.

AT+QCFG="logbaudrate" Configure Baud Rate	
Write Command AT+QCFG="logbaudrate"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "logbaudrate",<value> OK If the optional parameter is specified, configure baud rate: OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type. Baud rate of the port for log capture. Unit: bps. Range: 921600–6000000. Unit: bps. Default value: 6000000.
<err>	Error code. See Chapter 14 for details.

11.1.5. AT+QCFG="slplocktimes" Configure Countdown to Entering Sleep Mode

This command configures the countdown for the UE to enter sleep mode.

AT+QCFG="slplocktimes" Configure Countdown to Entering Sleep Mode	
Write Command AT+QCFG="slplocktimes"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "slplocktimes",<value>

	<p>OK</p> <p>If the optional parameter is specified, configure the sleep duration of UE:</p> <p>OK</p> <p>If there is any error:</p> <p>ERROR</p> <p>Or</p> <p>+CME ERROR: <err></p>
Maximum Response Time	5 s
Characteristics	<p>The command takes effect after the module is rebooted.</p> <p>Remain valid after deep-sleep wakeup.</p> <p>The configuration will be saved to NVRAM automatically.</p>

Parameter

<value>	Integer type. The countdown for the module to enter sleep mode. Range: 0–30. Unit: second. Default value: 10.
<err>	Error code. See Chapter 14 for details.

11.1.6. AT+QCFG="dsevent" Control the Reporting of URC Indicating Deep Sleep

This command disables or enables the report of URC that indicates deep sleep. If the URC is enabled, an URC will be reported when the module enters or exits from the deep sleep mode.

AT+QCFG="dsevent" Control the Reporting of URC Indicating Deep Sleep

<p>Write Command</p> <p>AT+QCFG="dsevent"[,<value>]</p>	<p>Response</p> <p>If the optional parameter is omitted, query the current configuration:</p> <p>+QCFG: "dsevent",<value></p> <p>OK</p> <p>If the optional parameter is specified, control the reporting of the deep sleep URC:</p> <p>OK</p> <p>If there is any error:</p> <p>ERROR</p> <p>Or</p>
--	--

	+CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type. Disable/enable the reporting of deep sleep event URC. 0 Disable 1 Enable
<err>	Error code. See Chapter 14 for details.

11.1.7. AT+QCFG="statisr" Configure Report Interval of Statistics URC

This command configures the report interval of the URC reporting statistics. After the interval is set, it can only be modified after enabling the URC reporting again.

The URC formats are listed as below:

+STATISR: PHY DL, AvgRSRP: -77, AvgSnr: 14, DIBler: 0%, PhyDITpt: 0 bps, AvgTBS: 0, Avgltbs: 0, AvgNRep: 0, AvgSbfrmNum: 0, Harq2Ratio: 0%

+STATISR: PHY UL, UIBler: 0%, PhyUITpt: 0 bps, AvgTBS: 0, Avgltbs: 0, AvgNRep: 0, AvgSbfrmNum: 0, Harq2Ratio: 0%, AvgScNum: 0

+STATISR: MAC, MacUIBytes:0, MacUIPadBytes:0, MacDIBytes: 0, MacDIPadBytes: 0, MacUITpt: 0 bps, MacDITpt: 0 bps

+STATISR: RLC, RlcUIPduBytes:0, RlcUIRetxBytes:0, RlcDIPduBytes: 0, RlcUITpt: 0 bps, RlcDITpt: 0 bps

+STATISR: PDCP, PdcpUIPduBytes: 0, PdcpDIPduBytes: 0, PdcpULDiscardBytes: 0, PdcpUITpt: 0 bps, PdcpDITpt: 0 bps

AT+QCFG="statisr" Configure Report Interval of Statistics URC

Write Command AT+QCFG="statisr"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "statisr",<value> OK
---	--

	<p>If the optional parameter is specified, configure the report interval: OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>
Maximum Response Time	5 s
Characteristics	<p>The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will not be saved to NVRAM.</p>

Parameter

<value>	<p>Integer type. Report interval of statistics URC. Default value: 0.</p> <p>0 Disable the reporting of statistics URC</p> <p>5–600 Enable the reporting of statistics URC and set the report interval. Unit: second</p>
<err>	Error code. See Chapter 14 for details.

11.1.8. AT+QCFG="MacRAI" Enable/Disable RAI in MAC Layer

This command enables or disables RAI in MAC layer. It can only be used when **AT+CFUN=0**. This feature can only be available when the **AT+QCFG="relversion"** is set to R14.

AT+QCFG="MacRAI" Enable/Disable RAI in MAC Layer	
<p>Write Command AT+QCFG="MacRAI"[,<value>]</p>	<p>Response</p> <p>If the optional parameter is omitted, query the current configuration: +QCFG: "MacRAI",<value></p> <p>OK</p> <p>If the optional parameter is specified, enable or disable RAI in MAC layer: OK</p> <p>If there is any error: ERROR Or +CME ERROR: <err></p>

Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type. Enable or disable MAC RAI feature. 0 Disable RAI in AS 1 Enable RAI in AS
<err>	Error code. See Chapter 14 for details.

NOTE

AT+QCFG="MacRAI" only applies to networks supporting the 3GPP R14 protocol.

11.1.9. AT+QCFG="relversion" Configure Protocol Release Version

This command configures protocol release version. It can only be used when **AT+CFUN=0**.

Some features, such as MACRAI and 2-HARQ, eTBs, are supported only in R14 protocol. If the release version is changed to R14 from R13, the **AT+QCFG="NBcategory"** (see **Chapter 11.1.10**) is set to 2 automatically.

AT+QCFG="relversion" Configure Protocol Release Version

Write Command AT+QCFG="relversion"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "relversion",<value> OK If the optional parameter is specified, configure the protocol release version: OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s

Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.
-----------------	--

Parameter

<value>	Integer type. Protocol release version. 13 Release 13 14 Release 14
<err>	Error code. See Chapter 14 for details.

NOTE

AT+QCFG="relversion" only applies to networks supporting the 3GPP R14 Protocol.

11.1.10. AT+QCFG="NBcategory" Configure UE Category

This command configures UE category. It can only be used when **AT+CFUN=0**. Only when the category is set to NB2, the module can use extended features such as TBs and 2-HARQ. The maximum TBs in cat NB2 is 2536 bits in both DL and UL, while the maximum TBs in cat NB1 is only 1000 bits in UL and 680 bits in DL.

AT+QCFG="NBcategory" Configure UE Category	
Write Command AT+QCFG="NBcategory"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "NBcategory",<value> OK If the optional parameter is specified, configure UE category: OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type. UE-Category. 1 Category NB1 2 Category NB2, only valid when AT+QCFG="relversion" is set to 14
<err>	Integer type. Error code. See Chapter 14 for details.

NOTE

AT+QCFG="NBcategory" only applies to networks supporting the 3GPP R14 Protocol.

11.1.11. AT+QCFG="wakeupRXD" Enable/Disable RXD to Wake Up UE

This command determines whether the UE can be woken up by RXD.

AT+QCFG="wakeupRXD" Enable/Disable RXD to Wake Up UE

Write Command AT+QCFG="wakeupRXD"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "wakeupRXD",<value> OK If the optional parameter is specified, determines whether the UE can be woken up by RXD: OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type. Enable/disable RXD to wake up UE 0 Disable 1 Enable
----------------------	---

<err> Error code. See **Chapter 14** for details.

11.1.12. AT+QCFG="faultaction" Configure UE Reaction to System Crash

This command sets the action performed by UE after a crash.

AT+QCFG="faultaction" Configure UE Reaction to System Crash	
Write Command AT+QCFG="faultAction"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "faultAction",<value> OK If the optional parameter is specified, configure UE action: OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type. Action performed by UE after a crash. 0 Dump full exception info to flash and EPAT tool and then get trapped in endless loop 1 Print necessary exception info then reset 2 Dump full exception info to flash then reset 3 Dump full exception info to flash and EPAT tool then reset 4 Reset directly
<err>	Error code. See Chapter 14 for details.

11.1.13. AT+QCFG="GPIO" Configure GPIO Status

The command queries and configures the GPIO status. If **<mode>** is omitted, the default value 2 is used. If **<pin>** is omitted, the module returns status of all GPIOs in ascending order of GPIO serial number; if **<pin>** is specified, the module returns the status of the specific GPIO only. If **<mode>** is 1 or 3, **<pin>** should be specified, and the returned value is only for the specific GPIO.

AT+QCFG="GPIO" Configure GPIO Status

Write Command AT+QCFG="GPIO" [<mode>,<pin>,<dir>,<pullsel>,<level>]	Response: when <mode>=1, no parameter shall be omitted: OK when <mode>=2 or is omitted: +QCFG: "GPIO",<level>,<level>,<level>,<level>] OK If <mode>=3, only and must set value of a specified GPIO. OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5s
Characteristics	/

Parameter

<mode>	Integer type. Operation type. 1 Initialize GPIO status 2 Query GPIO status 3 Configure GPIO status										
<pin>	Integer type. GPIO pin number. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Pin No.</th> <th style="text-align: left;">Pin Name</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GPIO1</td> </tr> <tr> <td>2</td> <td>GPIO2</td> </tr> <tr> <td>3</td> <td>GPIO3</td> </tr> <tr> <td>4</td> <td>GPIO4</td> </tr> </tbody> </table>	Pin No.	Pin Name	1	GPIO1	2	GPIO2	3	GPIO3	4	GPIO4
Pin No.	Pin Name										
1	GPIO1										
2	GPIO2										
3	GPIO3										
4	GPIO4										
<dir>	Integer type. GPIO pin direction. 0 Input 1 Output										
<pullsel>	Integer type. GPIO pin pull type. 0 Pull the GPIO up 1 Pull the GPIO down 2 Leave the GPIO as it is										
<level>	Integer type. GPIO logic level. 0 Low 1 High										

<err> Error code. See **Chapter 14** for details.

Example

```

AT+QCFG="GPIO"
+QCFG: "GPIO",1,1,1,1

OK
AT+QCFG="GPIO",2
+QCFG: "GPIO",1,1,1,1

OK
AT+QCFG="GPIO",2,1
+QCFG: "GPIO",1

OK
    
```

11.1.14. AT+QCFG="NcellMeas" Enable or Disable Neighbor Cell Measurement

This command disables or enables the neighbor cell measurement. Disabled neighbor cell measurement helps decrease the power consumption. This Write Command can only be used when **AT+CFUN=0**.

AT+QCFG="NcellMeas" Enable or Disable Neighbor Cell Measurement	
Write Command AT+QCFG="NcellMeas"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "NcellMeas",<value> OK If the optional parameter is specified, enable or disable the neighbor cell measurement: OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command can only be used in CFUN0 mode, and takes effect after the mode changes into CFUN1. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type. Enable or disable the neighbor cell measurement. 0 Disable the neighbor cell measurement 1 Enable the neighbor cell measurement
<err>	Error code. See Chapter 14 for details.

11.1.15. AT+QCFG="SimBip" Enable or Disable SIMBIP

This command enables or disables SIMBIP.

AT+QCFG="SimBip" Enable or Disable SIMBIP	
Write Command AT+QCFG="SimBip"[,<value>]	Response If the optional parameter is omitted, query the current configuration: +QCFG: "SimBip",<value> OK If the optional parameter is specified, enable or disable SIMBIP: OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect after the module is rebooted. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<value>	Integer type 0 Disable SIMBIP 1 Enable SIMBIP
<err>	Error code. See Chapter 14 for details.

12 Time Related Commands

12.1. AT+CCLK Set and Get Current Date and Time

This Write Command sets the real-time clock. RTC is automatically synchronized once UE has received EMM INFORMATION signaling.

This Read Command returns the current setting of the clock.

AT+CCLK Set and Get Current Date and Time	
Test Command AT+CCLK=?	Response OK
Read Command AT+CCLK?	Response +CCLK: <time> OK
Write Command AT+CCLK=<time>	Response OK If there is any error: ERROR Or +CME ERROR: <err>
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will not be saved to NVRAM

Parameter

<time>	String type. The format is "YY/MM/DD,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minute, second and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; the range is -96 to +96.) For instance, 6th of May 2014, 22:10:00 GMT+2 hours equals "14/05/06,22:10:00+08"
---------------------	--

<err> Error code. See **Chapter 14** for details.

Example

```

AT+CCLK? //Query the current setting of the clock.
+CCLK: 20/11/03,06:25:06+32

OK
AT+CCLK="20/02/27,01:30:48+23"
OK
    
```

12.2. AT+CTZR Time Zone Reporting

This Write Command controls the time zone change event reporting. If reporting is enabled, the MT returns the unsolicited result code **+CTZV: <tz>**, **+CTZE:<tz>,<dst>,<time>**, or **+CTZEU: <tz>,<dst>,<utime>** whenever the time zone is changed. The MT also provides the time zone upon network registration if provided by the network. If setting fails in an MT error, **+CME ERROR: <err>** is returned.

This Read Command returns the current reporting settings in the MT.

AT+CTZR Time Zone Reporting	
Test Command AT+CTZR=?	Response +CTZR: (range of supported <reporting>s) OK
Read Command AT+CTZR?	Response +CTZR: <reporting> OK If there is any error: ERROR Or +CME ERROR: <err>
Write Command AT+CTZR=<reporting>	Response OK If there is any error: ERROR Or +CME ERROR: <err>

Maximum Response Time	5 s
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<reporting>	Integer type. <ul style="list-style-type: none"> 0 Disable time zone change event reporting 1 Enable time zone change event reporting by URC +CTZV: <tz> 2 Enable extended time zone and local time reporting by unsolicited result code +CTZE: <tz>,<dst>,<time> 3 Enable extended time zone and universal time reporting by unsolicited result code +CTZEU: <tz>,<dst>,<utime>
<tz>	String type. Sum of the local time zone (difference between the local time and GMT expressed in quarters of an hour) plus daylight saving time. The format is “±zz”, expressed as a fixed width, two digits integer with the range of -47 to +48. To maintain a fixed width, numbers in the range of -9 to +9 are expressed with a leading zero, e.g. “-09”, “+00”, and “+09”.
<dst>	Integer type. Whether <tz> includes daylight savings adjustment or not. <ul style="list-style-type: none"> 0 <tz> includes no adjustment for Daylight Saving Time 1 <tz> includes +1 hour (equals 4 quarters in <tz>) adjustment for daylight saving time 2 <tz> includes +2 hours (equals 8 quarters in <tz>) adjustment for daylight saving time
<time>	String Type. Local time. The format is "YYYY/MM/DD,hh:mm:ss" expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). The local time can be derived by the MT from information provided by the network at the time of delivering time zone information and is present in the unsolicited result code for extended time zone and local time reporting if the universal time is provided by the network.
<utime>	String Type. Universal time. The format is "YYYY/MM/DD,hh:mm:ss", expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). The universal time can be provided by the network at the time of delivering time zone information and is present in the unsolicited result code for extended time zone and universal time reporting if provided by the network.
<err>	Error code. See Chapter 14 for details.

NOTE

This command needs to be set before the module camps on a cell.

Example

```
AT+CTZR=?  
+CTZR: (0-3)  
  
OK  
AT+CTZR=1 //Enable time zone change event reporting by URC +CTZV: <tz>  
OK  
AT+CTZR? //Query the current configuration.  
+CTZR: 1  
  
OK
```


13 Other Related Commands

13.1. TCP/IP Related Commands

Table 2: List of TCP/IP Related AT Commands

SN	AT Command	Description
[1]	AT+QIOPEN	Open a Socket Service
[2]	AT+QICLOSE	Close a Socket Service
[3]	AT+QISTATE	Query Socket Service Status
[4]	AT+QISEND	Send Hex/Text String Data
[8]	AT+QPING	Ping a Remote Server
[9]	AT+QNTP	Synchronize Local Time through NTP Server
[10]	AT+QIDNSGIP	Get IP Address by Domain Name
[11]	AT+QIDNSCFG	Configure DNS Server Address
[12]	AT+QICFG	Configure Optional Parameters

For more details, see *document [1]*.

13.2. MQTT Related Commands

Table 3: List of MQTT Related AT Commands

SN	AT Command	Description
[1]	AT+QMTCFG	Configure Optional Parameters of MQTT
[2]	AT+QMTOPEN	Open a Network for MQTT Client
[3]	AT+QMTCLOSE	Close a Network for MQTT Client
[4]	AT+QMTCONN	Connect a Client to MQTT Server
[5]	AT+QMTDISC	Disconnect a Client from MQTT Server
[6]	AT+QMTSUB	Subscribe to Topics
[7]	AT+QMTUNS	Unsubscribe from Topics
[8]	AT+QMTPUB	Publish Messages

For more details, see *document [2]*.

13.3. DFOTA Related Commands

Table 4: List of DFOTA Related AT Commands

SN	AT Command	Description
[1]	AT+QFOTADL	Trigger Automatic DFOTA over HTTP

For more details, see *document [3]*.

14 Summary of Error Codes

This chapter introduces the <err> codes related to the BC660K-GL module.

The error codes listed in the following tables are compliant with 3GPP specifications.

Table 5: Summary of General <err>

<err>	Description
1	MT not connected
2	MT link reserved
3	Operation not allowed
4	Operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	USIM not inserted
11	USIM PIN required
12	USIM PUK required
13	USIM failure
14	USIM busy
15	USIM wrong
16	Incorrect password
17	USIM PIN2 required
18	USIM PUK2 required

20	Memory full
21	Invalid index
22	Not found
23	Memory failure
24	Text string too long
25	Invalid characters in text string
26	Dial string too long
27	Invalid characters in dial string
30	No network service
31	Network timeout
32	Network not allowed - emergency call only
40	Network personalization PIN required
41	Network personalization PUK required
42	Network subset personalization PIN required
43	Network subset personalization PUK required
44	Service provider personalization PIN required
45	Service provider personalization PUK required
46	Corporate personalization PIN required
47	Corporate personalization PUK required
48	Hidden key required
49	EAP method not support
50	Incorrect Parameters
51	Command implemented but currently disabled
52	Command aborted by user
53	Not attached to network due to MT functionality restrictions

54	Modem not allowed - MT restricted to emergency calls only
55	Operation not allowed because of MT functionality restrictions
56	Fixed dialing allowed only - dialed number is not a telephone number
57	Temporarily out of service due to other MT usage
58	Language/alphabet not supported
59	Data value out of range
60	System failure
61	Data missing
62	Call barred
63	Message waiting indication subscription failure
100	Unknown
103	Illegal MS
106	Illegal ME
107	GPRS services not allowed
108	GPRS services and non GPRS services not allowed
111	PLMN not allowed
112	Location area not allowed
113	Roaming not allowed in this location area
114	GPRS services not allowed in this PLMN
115	No suitable cells in location area
122	Congestion
126	Insufficient resources
127	Missing or unknown APN
128	Unknown PDP address or PDP type
129	User authentication failed

130	Activation of PDN rejected by GGSN services GW or PDN GW
131	Activation of PDN rejected for unknown cause
132	Service option not supported
133	Requested service option not subscribed
134	Service option temporarily out of order
140	Feature not supported
141	Semantic errors in the TFT operation
142	Syntactical errors in the TFT operation
143	Unknown PDP context
144	Semantic errors in packet filters
145	Syntactical errors in packet filters
146	PDP context without TFT already activated
148	Unspecified GPRS error
149	PDP authentication failure
150	Invalid mobile class
171	Last PDN disconnection not allowed
172	Semantically incorrect message
173	Mandatory information element error
174	Information element not existent or not implemented
175	Conditional IE error
176	Protocol error unspecified
177	Operator determined barring
178	Reaching max number of PDP contexts
179	Requested APN not supported in current RAT and PLMN combination
180	Request rejected, Bearer control mode violation

181	Unsupported QCI value
182	User data transmission via control plane is congested
301	Internal error base
302	UE busy
303	Not powered on
304	PDN not active
305	PDN not valid
306	PDN invalid type
307	PDN no parameter
308	UE failure
309	PDN type and APN duplicate used
312	USIM PIN already enabled
602	No RRC connection

15 Appendix References

Table 6: Related Documents

Document Name
[1] Quectel_BC660K-GL_TCP(IP)_Application_Note
[2] Quectel_BC660K-GL_MQTT_Application_Note
[3] Quectel_BC660K-GL_DFOTA_Application_Note

Table 7: Terms and Abbreviations

Abbreviation	Description
3GPP	3rd Generation Partnership Project
ACK	Acknowledgement
AM	Acknowledgement Mode
APDU	Application Protocol Data Unit
APN	Access Point Name
AS	Access Stratum
BCD	Binary-Coded Decimal
CHAP	Challenge-Handshake Authentication Protocol
CN	Core Network
DCE	Data Communications Equipment
DF	Dedicated File
DHCP	Dynamic Host Configuration Protocol

DL	Downlink
DTE	Data Terminal Equipment
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
ECL	Enhanced Coverage Level
EMM	EPS Mobility Management
EPS	Evolved Packet System
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
eDRX	Extended Discontinuous Reception
EF	Elementary File
EGPRS	Enhanced General Packet Radio Service
ePCO	Extended Protocol Configuration Options
EPS	Evolved Packet System
ESM	EPS Session Management
GERAN	GSM/EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMT	Greenwich Mean Time
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HARQ	Hybrid Automatic Repeat Request
HPLMN	Home Public Land Mobile Network
ICCID	Integrated Circuit Card Identity
ICMP	Internet Control Messages Protocol
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
IE	Information Element
IM	Intermodulation/IP Multimedia

IMEI	International Mobile Equipment Identity
IMEISV	International Mobile Equipment Identity and Software Version
IMSI	International Mobile Subscriber Identity
MS	Mobile Station
MT	Mobile Termination
MTU	Maximum Transfer Unit
NAS	Non-Access Stratum
NASCONFIG	Non-Access Stratum Configuration
NB-IoT	Narrowband Internet of Things
NSLPI	NAS Signaling Low Priority Indication
NVRAM	Non-Volatile Random Access Memory
OOS	Out of Service
OOSA	Out of Service Area
OPLMN	Operator Controlled PLMN
PAD	Packet Assembler/Disassembler
PAP	Password Authentication Protocol
PCI	Physical Cell Identification
PCO	Protocol Configuration Options
P-CSCF	Proxy Call Session Control Function
PDCCH	Physical Downlink Control Channel
PDCP	Packet Data Convergence Protocol
PDN	Public Data Network
PDP	Packet Data Protocol
PIN	Personal Identification Number
PLMN	Public Land Mobile Network

PSM	Power Saving Mode
PSD	Packet Switch Domain
PSK	Pre-Shared key
PUK	PIN Unlock Key
QCI	Quality of Service Class Indication
RAI	Release Assistance Indication
RFC	Request for Comments
RLC	Radio Link Control
ROHC	Robust Head Compression
RRC	Radio Resource Control
RSCP	Received Signal Code Power
RSRP	Received Signal Received Power
RSRQ	Reference Signal Received Quality
RSSI	Received Signal Strength Indicator
RTC	Real Time Clock
SINR	Signal-to-interference-plus-noise Ratio
SNDCP	Sub-Network Dependent Convergence Protocol
SNR	Signal-to-Noise Ratio
SVN	Software Version Number
TA	Terminal Adapter (typically the module)
TAC	Tracking Area Code
TCP	Transmission Control Protocol
TE	Terminal Equipment (typically the MCU/external processor)
TTL	Time to Live
UDP	User Datagram Protocol

UE	User Equipment
UICC	Universal Integrated Circuit Card
UL	Uplink
UPLMN	User Controlled PLMN
URC	Unsolicited Result Code
UTC	Universal Time Coordinated
UUID	Universally Unique Identifier
VPLMN	Visited Public Land Mobile Network
