

BC66&BC66-NA

AT Commands Manual

NB-IoT Module Series

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About the Document

Revision History

Version	Date	Author	Description
1.0	2018-08-28	Randy LI/ Lebron LIU/ Souly YAN	Initial
2.0	2019-07-09	Jacobi RAO/ Taber JIANG/ Milo WANG	<ol style="list-style-type: none">1. Updated the following commands: AT+CCLK/+QENG/+QCGDEFCONT/+QBAND.2. Added the following commands: AT+CPLS/+CPOL/+CLCK/+CPWD/+QRELLOCK/+ QCFG/+QCCLK.3. Added TCP/IP, MQTT, DFOTA and LwM2M related AT commands.4. Updated the classifications of AT commands.
2.1	2020-03-20	Jacobi RAO/ Taber JIANG	<ol style="list-style-type: none">1. Added the description of data mode (Chapter 1.3).2. Updated the following commands: AT+CGDCONT/+CGACT/+CPOL/+QCFG/ +QPOWD and AT&W.3. Added the following commands : AT+QIPADDR/+QBANDSL/+CPINR/+CRSM/ +QEDRXCFCG/+QADC/+QVBATT.4. Added the characteristics description (validity and command configuration saving mechanism) for each command.

Contents

About the Document	2
Contents	3
Table Index	6
1 Introduction	7
1.1. Definitions	7
1.2. AT Command Syntax.....	7
1.3. Description of Data Mode	8
2 Product Information Query Commands	10
2.1. ATI Display Product Identification Information.....	10
2.2. AT+CGMI Request Manufacturer Identification.....	11
2.3. AT+CGMM Request Model Identification	11
2.4. AT+CGMR Request Manufacturer Revision.....	12
2.5. AT+CGSN Request Product Serial Number.....	13
3 UART Function Commands	15
3.1. ATE Set Command Echo Mode.....	15
3.2. AT+IPR Set TE-TA Fixed Local Rate	16
4 Network State Query Commands	18
4.1. AT+CESQ Extended Signal Quality.....	18
4.2. AT+CEREG EPS Network Registration Status.....	20
4.3. AT+CGATT PS Attachment or Detachment.....	24
4.4. AT+CGPADDR Show PDP Addresses	25
4.5. AT+CSCON Signaling Connection Status	27
4.6. AT+CSQ Signal Quality Report.....	29
4.7. AT+QENG Engineering Mode.....	30
4.8. AT+QIPADDR Query the IP Address of UE	34
5 PDN and APN Commands	35
5.1. AT+CGACT PDP Context Activation/Deactivation.....	35
5.2. AT+CGAPNRC APN Rate Control.....	37
5.3. AT+CGDCONT Define a PDP Context	38
5.4. AT+CIPCA Initial PDP Context Activation.....	43
5.5. AT+QCGDEFCONT Set Default PSD Connection Settings.....	44
5.6. AT+QGACT Activate/Deactivate a PDN Context	46
6 Other Network Commands	49
6.1. AT+CCIOPT Clot Optimization Configuration.....	49
6.2. AT+COPS Operator Selection	51
6.3. AT+QBAND Get and Set Mobile Operation Band	53
6.4. AT+QBANDSL Set the List of Preferred Bands to be Searched.....	55
6.5. AT+QCSEARFCN Clear NB-IoT Stored EARFCN List.....	55

6.6.	AT+QLOCKF	Lock NB-IoT Frequency.....	56
7	USIM Related Commands		58
7.1.	AT+CIMI	Request International Mobile Subscriber Identity.....	58
7.2.	AT+CLCK	Facility Lock	59
7.3.	AT+CPIN	Enter PIN	61
7.4.	AT+CPINR	Remaining PIN Retries.....	62
7.5.	AT+CPLS	Selection of Preferred PLMN List	64
7.6.	AT+CPOL	Preferred PLMN List	65
7.7.	AT+CPWD	Change Password	67
7.8.	AT+CRSM	Restricted USIM Access	68
7.9.	AT+QCCID	USIM Card Identification.....	70
8	Power Consumption Commands		71
8.1.	AT+CEDRXS	eDRX Setting.....	71
8.2.	AT+CEDRXRDP	eDRX Read Dynamic Parameters	74
8.3.	AT+QEDRXCFCG	Configure eDRX.....	76
8.4.	AT+CFUN	Set UE Functionality	79
8.5.	AT+CPSMS	Power Saving Mode Setting	80
8.6.	AT+QNBIOTRAI	NB-IoT Release Assistance Indication	83
8.7.	AT+QNBIOTEVENT	Enable/Disable NB-IoT Related Event Report.....	84
8.8.	AT+QRELLOCK	Release Sleep Lock of AT Commands.....	85
8.9.	AT+QSCLK	Configure Sleep Mode	85
9	Platform Related Commands.....		87
9.1.	AT&W	Store Current Parameters to NVRAM	87
9.2.	AT+CBC	Query Power Supply Voltage.....	87
9.3.	AT+CEER	Extended Error Report	88
9.4.	AT+CMEE	Report Mobile Termination Error.....	89
9.5.	AT+QADC	Query the Input Voltage of Dedicated ADC Channel.....	91
9.6.	AT+QATWAKEUP	Enable/Disable Deep Sleep Wakeup Indication.....	92
9.7.	AT+QCFG	Configure System Settings	93
9.8.	AT+QPOWD	Power off the Module	95
9.9.	AT+QRST	Automatically Reset.....	96
9.10.	AT+QVBATT	Configure the Voltage Threshold.....	96
10	Time Related Commands.....		99
10.1.	AT+CCLK	Set and Get Current Date and Time	99
10.2.	AT+CTZR	Time Zone Reporting	100
10.3.	AT+QCCLK	Set and Get Current Date and UTC	101
11	Other Related Commands.....		103
11.1.	TCP/IP Related Commands		103
11.2.	MQTT Related Commands.....		104
11.3.	SSL Related Commands		104
11.4.	LwM2M Related Commands		105
11.5.	DFOTA Related Commands		105

12	Summary of Error Codes	107
13	Appendix A References.....	110

Table Index

Table 1: Types of AT Commands and Responses	8
Table 2: List of TCP/IP Related AT Commands	103
Table 3: List of MQTT Related AT Commands.....	104
Table 4: List of SSL Related AT Commands	104
Table 5: List of LwM2M Related AT Commands	105
Table 6: List of DFOTA Related AT Commands	106
Table 7: Summary of General <err> (27.007)	107
Table 8: Summary of Proprietary <err>	108
Table 9: References	110
Table 10: Terms and Abbreviations	110

1 Introduction

This document gives details of the AT Command Set supported by Quectel NB-IoT modules BC66 and BC66-NA.

By default, the module is in auto-baud mode. When powering on the module, the MCU has to send AT command consecutively to synchronize baud rate with the module until **OK** is returned. After successful synchronization, the MCU can send **AT+IPR=<rate>** command to configure the baud rate for communication afterwards. If the baud rate is not specified, re-synchronization should be executed in the next reboot.

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

The **AT** or **at** prefix must be added at the beginning of each command line. Entering **<CR>** will terminate a command line. Commands are usually followed by a response that includes **<CR><LF><response><CR><LF>**. Throughout this document, only the response **<response>** will be presented, **<CR><LF>** are omitted intentionally.

AT commands implemented by BC66/BC66-NA can be split into three categories syntactically: **Basic**, **S Parameter**, 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 missing.

- **S Parameter Syntax**

These AT commands have the format of **ATS<n>=<m>**, where <n> is the index of the **S** register to set, and <m> is the value to assign to it. <m> is optional; if it is missing, then a default value is assigned.

- **Extended Syntax**

These commands can be operated in several modes, as following table:

Table 1: Types of AT Commands and Responses

Test Command	AT+<cmd>=?	This command returns the list of parameters and value ranges set by the corresponding Write Command or internal processes.
Read Command	AT+<cmd>?	This command returns the currently set value of the parameter or parameters.
Write Command	AT+<cmd>=<p1>[,<p2>[,<p3>[...]]]	This command sets the user-definable parameter values.
Execution Command	AT+<cmd>	This command reads non-variable parameters affected by internal processes in the module.

NOTE

Each time a single AT command is supported. Only when execution of the previous AT command is finished, the next AT command will be executed.

1.3. Description of Data Mode

BC66/BC66-NA supports two working modes of COM port: AT command mode and data mode. In AT command mode, the inputted data via COM port will be treated as AT commands. While in data mode, it will be treated as data.

In AT command mode, the module will enter data mode within 500 ms after the > response, after which if **Ctrl+Z** is entered, the module will exit data mode and send the data to COM port, however if **Esc** is entered, the module will exit data mode and cancel sending data to COM port.

NOTES

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

2 Product Information Query Commands

2.1. ATI Display Product Identification Information

The execution command returns product identification information.

ATI Display Product Identification Information

Execution Command ATI	Response Quectel_Ltd <objectID> Revision: <revision> OK
Maximum Response Time	300 ms
Characteristics	/

Parameter

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

Example

```
ATI
Quectel_Ltd
Quectel_BC66
Revision: BC66NBR01A01

OK
```

2.2. AT+CGMI Request Manufacturer Identification

The 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: MTK_2625 OK
Maximum Response Time	300 ms
Characteristics	/

Parameter

<objectID> String type. Identifier of device type

Example

```

AT+CGMI
Quectel_Ltd
Quectel_BC66
Revision: MTK_2625

OK
  
```

2.3. AT+CGMM Request Model Identification

The 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	300 ms
Characteristics	/

Parameter

<objectID> String type. Identifier of device type

Example

```
AT+CGMM
Quectel_BC66

OK
```

2.4. AT+CGMR Request Manufacturer Revision

The 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	300 ms
Characteristics	/

Parameter

<revision> String type. Revision of software release

Example

AT+CGMR

Revision: BC66NBR01A01

OK

2.5. AT+CGSN Request Product Serial Number

The execution command returns the IMEI (International Mobile station Equipment Identity) number and related information. For a TA which does not support **<snt>**, only **OK** will be returned.

Please refer to **Chapter 12** for possible **<err>** values.

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

	<p>If there is any error: ERROR or +CME ERROR: <err></p>
<p>Execution Command AT+CGSN</p>	<p>Response <SN></p> <p>OK If there is any error: ERROR or +CME ERROR: <err></p>
Maximum Response Time	300 ms
Characteristics	/

Parameter

<snt>	Integer type. The serial number type that has been requested.
<u>0</u>	Returns the 128-bit UUID
1	Returns the IMEI number
2	Returns the IMEISV (International Mobile station Equipment Identity and Software Version) number
3	Returns the SVN (Software Version Number)
<SN>	String type. The 128-bit UUID of the UE. The total number of characters, including line terminators. The information text shall not exceed 2048 characters, and shall not contain the sequence 0 <CR> or OK<CR> .
<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.

Example

```
AT+CGSN=1           //Request the IMEI number
+CGSN: 490154203237511
OK
```

3 UART Function Commands

3.1. ATE Set Command Echo Mode

The execution command determines whether or not the UE echoes characters received from external MCU during command state.

ATE Set Command Echo Mode	
Execution Command ATE<value>	Response OK
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM (should execute AT&W after this command is issued).

Parameter

<value>	Integer type.
0	Echo mode OFF
1	Echo mode ON

Example

```

ATE0
OK
ATI
Quectel_Ltd
Quectel_BC66
Revision: BC66NBR01A01

OK
ATE1
OK
ATI

```


ATI
Quectel_Ltd
Quectel_BC66
Revision: BC66NBR01A01

OK

3.2. AT+IPR Set TE-TA Fixed Local Rate

Please refer to **Chapter 12** for possible **<err>** values.

AT+IPR Set TE-TA Fixed Local Rate

Test Command AT+IPR=?	Response +IPR: (list of supported auto detectable <rate>s),(list of supported fixed <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	300 ms
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<rate>	Baud rate per second 0 (Auto baud) 110 300 1200
---------------------	---

2400
4800
9600
19200
38400
57600
115200
230400
460800
921600

NOTES

1. The settings will apply to all channels routed through one connection level for UART.
2. The command is not applicable for USB interface.
3. Only auto-baud synchronization below 115200 bps is supported.

Example

```
AT+IPR=115200           //Set the fixed baud rate to 115200 bps.
OK
AT+IPR?
+IPR: 115200
OK
```

4 Network State Query Commands

4.1. AT+CESQ Extended Signal Quality

The execution command returns received signal quality parameters.

The terminal will provide a current signal strength indicator of 0 to 99 where a larger number indicates better signal quality.

The test command returns supported values as a compound value.

Please refer to **Chapter 12** for possible **<err>** 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	300 ms
Characteristics	/

Parameter

<rxlev>	Integer type. Received signal strength level.
0	$\text{<rssi>} < -110 \text{ dBm}$
1	$-110 \text{ dBm} \leq \text{<rssi>} < -109 \text{ dBm}$
2	$-109 \text{ dBm} \leq \text{<rssi>} < -108 \text{ dBm}$
...	
61	$-50 \text{ dBm} \leq \text{<rssi>} < -49 \text{ dBm}$
62	$-49 \text{ dBm} \leq \text{<rssi>} < -48 \text{ dBm}$
63	$-48 \text{ dBm} \leq \text{<rssi>}$
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 3GPP TS 45.008
99	Not known or not detectable
<rsdp>	Integer type. Received signal code power (see 3GPP 25.133 and 3GPP 25.123).
0	-120 dBm or less
1	$-120 \text{ dBm} \leq \text{<rsdp>} < -119 \text{ dBm}$
2	$-119 \text{ dBm} \leq \text{<rsdp>} < -118 \text{ dBm}$
...	
94	$-27 \text{ dBm} \leq \text{<rsdp>} < -26 \text{ dBm}$
95	$-26 \text{ dBm} \leq \text{<rsdp>} < -25 \text{ dBm}$
96	$-25 \text{ dBm} \leq \text{<rsdp>}$
255	Not known or not detectable
<ecno>	Integer type. Ec/No (see 3GPP 25.133)
0	-24 dBm or less
1	$-24 \text{ dBm} \leq \text{<ecno>} < -23.5 \text{ dBm}$
2	$-23.5 \text{ dBm} \leq \text{<ecno>} < -23 \text{ dBm}$
...	
47	$-1 \text{ dBm} \leq \text{<ecno>} < -0.5 \text{ dBm}$
48	$-0.5 \text{ dBm} \leq \text{<ecno>} < 0 \text{ dBm}$
49	$0 \text{ dBm} \leq \text{<ecno>}$
255	Not known or not detectable
<RSRQ>	Integer type. Reference signal received quality (see 3GPP 36.133). When sending data is needed, RSRQ is recommended to be greater than -10 dB.
0	-19.5 dB or less
1	$-19.5 \text{ dB} \leq \text{<RSRQ>} < -19 \text{ dB}$
2	$-19 \text{ dB} \leq \text{<RSRQ>} < -18.5 \text{ dB}$
...	
32	$-4 \text{ dB} \leq \text{<RSRQ>} < -3.5 \text{ dB}$
33	$-3.5 \text{ dB} \leq \text{<RSRQ>} < -3 \text{ dB}$
34	$-3 \text{ dB} \leq \text{<RSRQ>}$
255	Not known or not detectable
<RSRP>	Integer type. Reference signal received power (see 3GPP 36.133). When sending data is needed, RSRP is recommended to be greater than -115dbm.

0	-140 dBm or less
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

Example

AT+CESQ

+CESQ: 15,99,255,255,8,30

OK

NOTES

1. <rsrp> and <ecno> are not applicable for NB-IoT network so they should be set to "not known or not detectable" (255) for BC66/BC66-NA.
2. In order to facilitate customers to understand the network environment, the network quality can be evaluated according to a general rule as specified below:
 - Strong: RSRP ≥ -100 dbm, and RSRQ ≥ -7 dB
 - Median: -100 dbm ≥ RSRP ≥ -110 dbm, and RSRQ ≥ -11 dB
 - Weak: RSRP < -115 dbm, or RSRQ < -11 dBb

4.2. AT+CEREG EPS Network Registration Status

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

If the UE requests PSM for reducing its power consumption, the write command controls the presentation of the following unsolicited result code:

+CEREG: <stat>,[<tac>],[<ci>],[<AcT>],[<cause_type>],[<reject_cause>],[<active_time>],[<periodicTAU>]]].

When <n>=4, the unsolicited result code will provide the UE with additional information for the active time

value and the extended periodic TAU value if there is a change of the network cell in E-UTRAN. **<n>=5** further enhances the unsolicited result code with **<cause_type>** and **<reject_cause>** when the value of **<stat>** changes. The parameters **<AcT>**, **<tac>**, **<ci>**, **<cause_type>**, **<reject_cause>**, **<active_time>** and **<periodicTAU>** are provided only if available.

The 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 on the network. The parameters **[,<cause_type>,<reject_cause>]**, if available, are returned when **<n>=3**.

The test command returns supported parameter values.

Please refer to **Chapter 12** for possible **<err>** values.

AT+CEREG EPS Network Registration Status	
Test Command AT+CEREG=?	Response +CEREG: (range of supported <n>s) OK
Read Command AT+CEREG?	Response When <n>=0, 1, 2 or 3 and the command is executed successfully: +CEREG: <n>,<stat>[,<tac>],[<ci>],[<AcT>[,<cause_type>,<reject_cause>]]] When <n>=4 or 5 and the command is executed successfully: +CEREG: <n>,<stat>[,<lac>],[<ci>],[<AcT>][,<cause_type>,<reject_cause>][,<active_time>],[<periodicTAU>]]] OK If there is any error: ERROR or +CME ERROR: <err>
Write Command AT+CEREG=<n>	Response OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	300 ms

Characteristics

The AT commands take effect immediately.
Remain valid after deep-sleep wakeup.
The configuration will be saved to NVRAM (should execute **AT&W** after this command is issued).

Parameter

<n>	Integer type <ul style="list-style-type: none"> 0 Disable network registration unsolicited result code 1 Enable network registration unsolicited result code: +CEREG: <stat> 2 Enable network registration and location information unsolicited result code: +CEREG: <stat>[,<tac>],[<ci>],[<AcT>] 3 Enable network registration, location information and EMM cause value information unsolicited result code: +CEREG: <stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>] 4 For a UE that requests PSM, enable network registration and location information unsolicited result code: +CEREG: <stat>[,<tac>],[<ci>],[<AcT>][,],[<active_time>],[<periodicTAU>]]] 5 For a UE that requests PSM, enable network registration, location information and EMM cause value information unsolicited result code: +CEREG: <stat>[,<lac>],[<ci>],[<AcT>][,],[<cause_type>],[<reject_cause>][,],[<active_time>],[<periodicRAU>]]]
<stat>	Integer type. EPS registration status. <ul style="list-style-type: none"> 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 bytes tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).
<lac>	String type. Two bytes location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).
<ci>	String type. Four bytes E-UTRAN cell ID in hexadecimal format.
<AcT>	Integer type. Access technology of the registered network. <ul style="list-style-type: none"> 7 E-UTRAN 9 E-UTRAN (NB-S1 mode)
<cause_type>	Integer type. The type of <reject_cause> . <ul style="list-style-type: none"> 0 Indicates that <reject_cause> contains an EMM cause value (see 3GPP TS 24.008[8] Annex G) 1 Indicates that <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>	<p>String type. One byte in an 8-bit format. Indicates the 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, please refer to the <i>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</i>.</p> <p>Bits 5 to 1 represent the binary coded timer value.</p> <p>Bits 6 to 8 defines the timer value unit for the GPRS timer as follows:</p> <p>Bits</p> <p>8 7 6</p> <p>0 0 0 value is incremented in multiples of 2 seconds</p> <p>0 0 1 value is incremented in multiples of 1 minute</p> <p>0 1 0 value is incremented in multiples of decihours</p> <p>1 1 1 value indicates that the timer is deactivated.</p>
<periodicTAU>	<p>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, please refer to the <i>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</i>.</p> <p>Bits 5 to 1 represent the binary coded timer value</p> <p>Bits 6 to 8 define 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</p> <p>1 1 1 value indicates that the timer is deactivated</p>

Example

```

AT+CEREG=1           //Enable network registration URC.
OK

AT+CEREG?
+CEREG: 1,1

OK

AT+CEREG=?

```


+CEREG: (0-5)

OK

4.3. AT+CGATT PS Attachment or Detachment

The write command is used to attach 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 will be ignored and the **OK** response will still be returned. If the requested state cannot be achieved, an **ERROR** or **+CME ERROR** response will be returned. Please refer to **Chapter 12** for possible **<err>** values.

Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.

The read command returns the current packet domain service state.

The test command is used for requesting information on the supported packet domain service states.

AT+CGATT PS Attachment or Detachment

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	85 s, determined by network.
Characteristics	/

Parameter

<state>	Integer type. The state of PDP context activation.
0	Detached
1	Attached
When <state>=1 , AT+COPS=0 is automatically selected.	

NOTES

1. If the initial PDP context is supported, the context with **<cid>=1** is automatically defined at startup.
2. If **AT+CGATT** is in progress, further execution of this command before the finishing of attachment or detachment procedure will return an error.

Example

```
AT+CGATT?
+CGATT: 0

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

OK
```

4.4. AT+CGPADDR Show PDP Addresses

The command returns the IP address of the device.

The 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.

The 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	Response
AT+CGPADDR=?	+CGPADDR: (list of defined <cid> s)
	OK

Read Command AT+CGPADDR?	<p>Response</p> <p>[+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]]</p> <p>[+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]]</p> <p>[...]</p> <p>OK</p>
Write Command AT+CGPADDR=<cid>[,<cid>[,...]]	<p>Response</p> <p>[+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]]</p> <p>[+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]]</p> <p>[...]</p> <p>OK</p>
Execution Command AT+CGPADDR	<p>Response</p> <p>[+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]]</p> <p>[+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]]</p> <p>[...]</p> <p>OK</p>
Maximum Response Time	300 ms
Characteristics	/

Parameter

<cid>	Integer type. A numeric parameter which specifies a particular PDP context definition (see AT+CGDCONT command). If no <cid> is specified, the addresses for all defined contexts are returned.
<PDP_addr_1> and <PDP_addr_2>	<p>String type. Identify the MT in the address space applicable to the PDP. The address may be static or dynamic.</p> <p>For a static address, it will be the one set by the AT+CGDCONT command when the context was defined.</p> <p>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.</p> <p>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</p>

<PDP_addr_2> containing the IPv6 address.

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

a1.a2.a3.a4 for IPv4 and a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16 for IPv6.

NOTES

1. In dual-stack terminals (<PDP_type>="IPv4V6"), the IPv6 address will be 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=1
+CGPADDR: 1,101.43.5.1

OK
AT+CGPADDR=?
+CGPADDR: (1)

OK
```

4.5. AT+CSCON Signaling Connection Status

The command gives details of the TA's perceived radio connection status (i.e. to the 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 a base station due to a change in the link quality.

The write command controls the presentation of an unsolicited result code. 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.

The 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.

The test command returns supported values as a compound value.

Please refer to **Chapter 12** for possible **<err>** values.

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	300 ms
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will not be saved to NVRAM.

Parameter

<n>	Integer type. Enable/disable the unsolicited result code. 0 Disable unsolicited result code 1 Enable unsolicited result code +CSCON: <mode>
<mode>	Integer type. The signaling connection status. 0 Idle 1 Connected

Example

```
AT+CSCON=0
OK
```

```

AT+CSCON?
+CSCON: 0,1

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

OK
AT+CSCON=1
OK
AT+CSCON?
+CSCON: 1,1

OK

```

4.6. AT+CSQ Signal Quality Report

The execution command returns the received signal strength level **<rss>** and the channel bit error rate **<ber>** from the MT.

The test command returns supported values as a compound value.

Please refer to **Chapter 12** for possible **<err>** values.

AT+CSQ Signal Quality Report

Test Command AT+CSQ=?	Response +CSQ: (list of supported <rss>s),(list of supported <ber>s) OK
Execution Command AT+CSQ	Response +CSQ: <rss>,<ber> OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	/

Parameter

<rssI>	Integer type. Received signal strength level.
0	-113 dBm or less
1	-111 dBm
2...30	-109...-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 3GPP TS 45.008
99	Not known or not detectable

Example

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

4.7. AT+QENG Engineering Mode

This command is used to query current modem status information for serving cell and current network status in Engineering Mode. When the module is in PSM state or no service state, the write command does not support **<mode>=0**, and **<mode>=1** is only available in RRC connected state.

Please refer to **Chapter 12** for possible **<err>** values.

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_EARFCN_offset>,<nc_pci>,<nc_RSRP>,[...] OK

	<p>When <mode>=1:</p> <p>+QENG: 2,<RLC_UL_BLER>,<RLC_DL_BLER>,<MAC_UL_BLER>,<MAC_DL_BLER>,<MAC_UL_total_bytes>,<MAC_DL_total_bytes>,<MAC_UL_total_HARQ_Tx>,<MAC_DL_total_HARQ_Tx>,<MAC_UL_HARQ_re_Tx>,<MAC_DL_HARQ_re_Tx>,<RLC_UL_tput>,<RLC_DL_tput>,<MAC_UL_tput>,<MAC_DL_tput></p> <p>OK</p> <p>When <mode>=2:</p> <p>+QENG: 3,<sleep_duration>,<Rx_time>,<Tx_time></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	300 ms
Characteristics	/

Parameter

<mode>	Integer type. Requested engineering information. 0 Display radio information for serving and neighbor cells 1 Display data transfer information only if modem in RRC-CONNECTED state 2 Display Tx/Rx total working duration time information.
<sc_EARFCN>	Integer type. The EARFCN for serving cell. Range: 0-262143.
<sc_EARFCN_offset>	Integer type. The EARFCN offset for serving cell: 0 Offset of -2 1 Offset of -1 2 Offset of -0.5 3 Offset of 0 4 Offset of 1
<sc_pci>	Integer type. Serving cell physical cell ID. Range: 0-503.
<sc_cellID>	String type. Four-byte (28-bit) cell ID in hexadecimal format for serving cell.
<sc_RSRP>	Signed integer. Serving cell RSRP value in dBm (can be negative value).
<sc_RSRQ>	Signed integer. Serving cell RSRQ value in dB (can be negative value).
<sc_RSSI>	Signed integer. Serving cell RSSI value in dBm (can be negative value).
<sc_SINR>	Signed integer. The last SINR value for serving cell in dB (can be negative value).

<sc_band>	Integer type. The 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 serving cell. Range: 0-2. Only available in RRC connected state.
<sc_Tx_pwr>	Signed integer. The current transmit power of UE. Unit: cBm (0cBm=1mW, 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 for neighbor cell. Range: 0-262143.
<nc_EARFCN_offset>	Integer type. The EARFCN offset for neighbor cell: 0 Offset of -2 1 Offset of -1 2 Offset of -0.5 3 Offset of 0 4 Offset of 1
<nc_pci>	Integer type. Neighbor cell physical cell ID. Range: 0-503.
<nc_RSRP>	Signed integer. Neighbor cell RSRP value in dBm (can be negative value).
<RLC_UL_BLER>	Integer type. Represented in % value (range: 0 to 100). UL block error rate (as per ARQ) in RLC. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established/resumed RRC connection or since previous AT+QENG query with <mode>=1 , whichever is later.
<RLC_DL_BLER>	Integer type. Represented in % (range: 0 to 100). DL block error rate (as per ARQ) in RLC. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established/resumed RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later.
<MAC_UL_BLER>	Integer type. Represented in % (range: 0 to 100). UL block error rate (as per HARQ) in MAC for UL-SCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later.
<MAC_DL_BLER>	Integer type. Represented in % (range: 0 to 100). DL block error rate (as per HARQ) in MAC for DL-SCH, excluding BCCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later.
<MAC_UL_total_bytes>	Integer type. Total number of transport block bytes (re)transmitted on UL-SCH. Calculated for UL-SCH over all HARQ transmissions and retransmissions. Calculated from the beginning of successfully established / resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later. Unit: bytes.

<MAC_DL_total_bytes>	Integer type. Total number of transport block bytes (re)transmitted on DL-SCH, excluding BCCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later. Unit: bytes.
<MAC_UL_total_HARQ_Tx>	Integer type. Total number of HARQ (re)transmissions for transport blocks on UL-SCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later.
<MAC_DL_total_HARQ_Tx>	Integer type. Total number of HARQ (re)transmissions for transport blocks on DL-SCH, excluding BCCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later.
<MAC_UL_HARQ_re_Tx>	Integer type. Number of HARQ retransmissions for transport blocks on UL-SCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later.
<MAC_DL_HARQ_re_Tx>	Integer type. Number of HARQ retransmissions for transport blocks on DL-SCH, excluding BCCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later.
<RLC_UL_tput>	Integer type. RLC uplink throughput. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established/resumed RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later. Unit: kbits/s.
<RLC_DL_tput>	Integer type. RLC downlink throughput. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established/resumed RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later. Unit: kbits/s.
<MAC_UL_tput>	Integer type. UL throughput in MAC for UL-SCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later. Unit: kbits/s.
<MAC_DL_tput>	Integer type. DL throughput in MAC for DL-SCH, excluding BCCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous AT+QENG query with <mode>=1 , whichever is later. Unit: kbits/s.
<sleep_duration>	Integer type. The total sleep duration from the latest boot-up. Unit: 0.1s.
<Rx_time>	Integer type. The total Rx time from the latest boot-up. Unit: 0.1s.
<Tx_time>	Integer type. The total Tx time from the latest boot-up. Unit: 0.1s.

4.8. AT+QIPADDR Query the IP Address of UE

The execution command returns the IP address of the UE.

AT+QIPADDR Query the IP Address of UE

Execution Command AT+QIPADDR	Response +QIPADDR: <ip_addr> OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	/

Parameter

<ip_addr>	String type. IP address of the UE.
------------------------	------------------------------------

Example

```

AT+QIPADDR
+QIPADDR: fe80:0:0:0:3c:ffb8:f4c9:1207
+QIPADDR: 2001:14bb:170:4c91:3c: ffh8:f4c9:1207
+QIPADDR: 178.55.211.180
+QIPADDR: 127.0.0.1

OK
  
```

5 PDN and APN Commands

5.1. AT+CGACT PDP Context Activation/Deactivation

The write command is used to activate or deactivate the specified PDP context(s). After the command has completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context will remain unchanged. If the requested state for any specified context cannot be achieved, an **ERROR** or **+CME ERROR** response will be returned. Extended error responses are enabled by the **AT+CMEE** command.

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.

Please note that in the *3GPP TS 27.007* specification there is the following statement:

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.

The read command returns the current activation states for all the defined PDP contexts.

The test command is used for requesting information on the supported PDP context activation states.

Please refer to **Chapter 12** for possible **<err>** values.

AT+CGACT PDP Context Activation/Deactivation

Test Command	Response
AT+CGACT=?	+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 If the context is activated successfully: OK If the context is deactivated successfully: NO CARRIER If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	150 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 command).

NOTE

If the initial PDP context is supported, the context with **<cid>=1** is automatically defined at startup.

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

The write command returns the APN rate control parameters (see *3GPP TS 24.008 [8]*) associated to the provided context identifier **<cid>**.

If the parameter **<cid>** is omitted in the write command, then the APN rate control parameters for all active PDP contexts are returned.

The test command returns a list of **<cid>**s associated with secondary and non-secondary active PDP contexts.

Please refer to **Chapter 12** for possible **<err>** values.

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>]]] [+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	300 ms

Characteristics

/

Parameter

<cid>	Integer type. A particular PDP context definition (see the AT+CGDCONT command).
<additional_exception_reports>	Integer type. Whether or not additional exception reports are allowed to be sent 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 [8] 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 [8] subclause 10.5.6.3.2</i> . 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 [8] subclause 10.5.6.3.2</i> .

5.3. AT+CGDCONT Define a PDP Context

The 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.

The read command returns the current settings for each defined context.

The 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 context with **<cid>=1** (context number 1) is defined upon startup and does not need to be created with the **AT+CGDCONT** command. The initial PDP context has particular manufacturer specific default settings disassociated with any other default settings of **AT+CGDCONT**. 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** command. If all active contexts are deactivated, the initial PDP context can be (re)established.

Please refer to **Chapter 12** for possible **<err>** values.

AT+CGDCONT Define a PDP Context

Test Command
AT+CGDCONT=?

Response

+CGDCONT: (range of supported **<cid>s**),(list of supported **<PDP_type>s**),,,(range of supported **<d_comp>s**),(range of supported **<h_comp>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**)

+CGDCONT: (range of supported **<cid>s**),(list of supported **<PDP_type>s**),,,(range of supported **<d_comp>s**),(range of supported **<h_comp>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**)[...]

OK

Read Command AT+CGDCONT?	<p>Response</p> <p>[+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4_addr_alloc>[,<request_type>[,<P-CSCF_discovery>[,<IM_CN_signaling_flag_ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>[,<local_addr_ind>[,<Non-IP_MTU_discovery>]]]]]]]]]]</p> <p>+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4_addr_alloc>[,<request_type>[,<P-CSCF_discovery>[,<IM_CN_signaling_flag_ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>[,<local_addr_ind>[,<Non-IP_MTU_discovery>]]]]]]]]]]</p> <p>[...]</p> <p>OK</p>
Write Command AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4_addr_alloc>[,<request_type>[,<P-CSCF_discovery>[,<IM_CN_signaling_flag_ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>[,<local_addr_ind>[,<Non-IP_MTU_discovery>]]]]]]]]]]]]]	<p>Response</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	300 ms
Characteristics	<p>The command take effect immediately.</p> <p>The configurations will not be saved to NVRAM.</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. The range is 1-15.
<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 [103]</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 will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the **AT+CGPADDR** command.

<d_comp> Integer type. PDP data compression control.

- 0 Off
- 1 On
- 2 V.42bis
- 3 V.44bis

<h_comp> Integer type. PDP header compression control.

- 0 Off (default if the value is omitted)
- 1 On
- 2 RFC 1144 (applicable for SNDCP only)
- 3 RFC 2507
- 4 RFC 3095[ROHC] (applicable for PDCP only)

<IPv4_addr_alloc> Integer type. Control 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. Please refer to *3GPP TS 24.301 (subclause 6.5.1.2)* and *3GPP TS 24.008 (subclause 10.5.6.17)*. If the initial PDP context is supported it is not allowed to assign **<cid>=0** for emergency bearer services. According to *3GPP TS 24.008 (subclause 4.2.4.2.2 and subclause 4.2.5.1.4)* and *3GPP TS 24.301 (subclause 5.2.2.3.3 and subclause 5.2.3.2.2)*, 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 (please refer to *3GPP TS 23.401 subclause 4.3.12.9*).

- 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. Influence how the MT/TA requests to get the P-CSCF address (refer to *3GPP TS 24.229 [89] annex B* and *annex L*).

- 0 Preference of P-CSCF address discovery not influenced by **AT+CGDCONT**
- 1 Preference of P-CSCF address discovery through NAS signaling
- 2 Preference of P-CSCF address discovery through DHCP

<IM_CN_signaling_flag_ind> Integer type. Indicates to the network whether the PDP context is for IM CN subsystem related signaling only or not.

- 0 UE indicates that the PDP context is not for IM CN subsystem-related signaling only

	<p>1 UE indicates that the PDP context is for IM CN subsystem-related signaling only</p>
<NSLPI>	<p>Integer type. The NAS signaling priority requested for this PDP context.</p> <p>0 Indicates that this PDP context is to be activated with the value for the low priority indicator configured in the MT.</p> <p>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".</p> <p>The MT utilizes the provided NSLPI information as specified in <i>3GPP TS 24.301 [83]</i> and <i>3GPP TS 24.008</i>.</p>
<securePCO>	<p>Integer type. Specify whether security protected transmission of PCO is requested or not (applicable for EPS only).</p> <p>0 Security protected transmission of PCO is not requested</p> <p>1 Security protected transmission of PCO is requested</p>
<IPv4_MTU_discovery>	<p>Integer type. Influences how the MT/TA requests to get the IPv4 MTU size, refer to <i>3GPP TS 24.008 subclause 10.5.6.3</i>.</p> <p>0 Preference of IPv4 MTU size discovery not influenced by AT+CGDCONT</p> <p>1 Preference of IPv4 MTU size discovery through NAS signaling</p>
<local_addr_ind>	<p>Integer type. Indicates whether MS supports local IP address in TFTs</p> <p>0 indicates that the MS does not support local IP address in TFTs</p> <p>1 indicates that the MS supports local IP address in TFTs</p>
<Non-IP_MTU_discovery>	<p>Integer type. Influence how the MT/TA requests to get the Non-IP MTU size (please refer to <i>3GPP TS 24.008 subclause 10.5.6.3</i>).</p> <p>0 Preference of Non-IP MTU size discovery not influenced by AT+CGDCONT</p> <p>1 Preference of Non-IP MTU size discovery through NAS signaling</p>

NOTES

- Only 3 PDP contexts can be activated simultaneously.
- For EPS, <PDP_addr> field is omitted.
- The following parameters are not supported in modem protocol:
 - <IPv4_addr_alloc>
 - <request_type>
 - <P-CSCF_discovery>
 - <IM_CN_signaling_flag_ind>
 - <NSLPI>
 - <securePCO>
 - <local_addr_ind>
- If the defined <cid> is activated, it will still exist after deep-sleep wakeup. Otherwise, it will be deleted after deep-sleep wakeup.

Example

```

AT+CGDCONT=?
+CGDCONT: (1-15),"IP",,(0-2),(0-4),(0),,,,,,(0,1),,(0,1)
+CGDCONT: (1-15),"IPV6",,(0-2),(0-4),(0),,,,,,(0,1),,(0,1)
+CGDCONT: (1-15),"IPV4V6",,(0-2),(0-4),(0),,,,,,(0,1),,(0,1)
+CGDCONT: (1-15),"Non-IP",,(0-2),(0-4),(0),,,,,,(0,1),,(0,1)

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

OK

```

5.4. AT+CIPCA Initial PDP Context Activation

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

The read command returns the current settings of the command.

The test command returns values supported as a compound value.

Please refer to **Chapter 12** for possible **<err>** values.

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 not be saved to NVRAM.

Parameter

<n>	Integer type. Activation of PDP context upon attaching. 3 No change in current setting
<attach_without_PDN>	Integer type. EPS attachment with or without PDN connection. 0 EPS attachment with PDN connection 1 EPS attachment without PDN connection

Example

```

AT+CIPCA=3,1
OK
AT+CIPCA?
+CIPCA: 3,1

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

OK

```

5.5. AT+QCGDEFCONT Set Default PSD Connection Settings

This command is used to set the PSD connection settings for PDN connection on power-up. When attaching to the NB-IoT network on power-on, a PDN connection setup must be performed. In order to allow this to happen, PDN connection settings must be stored in NVRAM, thus making it to be used by the

modem during the attach procedure.

Please refer to **Chapter 12** for possible **<err>** values.

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>] OK
Write Command AT+QCGDEFCONT=<PDP_type>[,<APN>[,<user_name>[,password]]]	Response OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	The command takes effect after reboot. Remain valid after deep-sleep wakeup. The configurations will be 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. It is the user name for accessing to the IP network, and is mandatory for the activation requirement and should be omitted for the deactivation requirement.
<password>	String type. It is the password for accessing to the IP network, and is mandatory for the activation requirement and should be omitted for the deactivation requirement.

5.6. AT+QGACT Activate/Deactivate a PDN Context

The command activates or deactivates a specified PDN context.

There are three kinds of responses for both the activation and the deactivation requirements. If the PDN context is active/inactive, **+QGACT: <cid>,<type>,<result>[,<activated_PDP_type>] OK** is returned immediately for activation/deactivation requirement. If not activated/deactivated, **+QGACT: <cid> OK** is returned first and the URC **+QGACT: <cid>,<type>,<result>[,<activated_PDP_type>]** is reported for the activation/deactivation result later. If any error occurs, such as invalid parameter(s), **ERROR** is returned immediately. In any case, **<activated_PDP_type>** only exists for the activation requirement.

Additionally, URC **+QGACT: <cid>,<type>** is reported when passive deactivation occurs.

For the activation requirement, the format of the write command is **AT+QGACT=<op>,<PDP_type>,<APN>[,<user_name>,<pwd>[,<bearer_type>[,<SIM_ID>]]]**, while for the deactivation requirement the format is **AT+QGACT=<op>,<cid>**. For the purpose of normalization, the format of is: **AT+QGACT=<op>,<PDP_type/cid>[,<APN>[,<user_name>,<pwd>[,<bearer_type>[,<SIM_ID>]]]]**.

Please refer to **Chapter 12** for possible **<err>** values.

AT+QGACT Activate/Deactivate a PDN Context

Write Command

AT+QGACT=<op>,<PDP_type/cid>[,<APN>[,<user_name>,<pwd>[,<bearer_type>[,<SIM_ID>]]]]

Response

If the PDN context is already in active/inactive state:

+QGACT: <cid>,<type>,<result>[,<activated_PDP_type>]

OK

If the PDN context is not in active/inactive state:

+QGACT: <cid>

OK

+QGACT: <cid>,<type>,<result>[,<activated_PDP_type>]

If there is any error:

ERROR

or

+CME ERROR: <err>

Maximum Response Time

300 ms

Characteristics

/

Parameter

<op>	Integer type. Deactivation/activation requirement. 0 Deactivation requirement 1 Activation requirement
<PDP_type>	Integer type. PDP type to be activated. 1 IPv4 2 IPv6 3 IPv4v6 4 Non-IP
<cid>	Integer type. It is a numeric parameter specifying a particular PDP context.
<APN>	String type. It is the access point name which is mandatory for the activation requirement and should be omitted for the deactivation requirement.
<user_name>	String type. It is the user name for accessing to the IP network, and is mandatory for the activation requirement and should be omitted for the deactivation requirement.
<pwd>	String type. It is the password for accessing to the IP network, and is mandatory for the activation requirement and should be omitted for the deactivation requirement.
<bearer_type>	Integer type. It is the type of bearer wanted to be activated, and is optional for the activation requirement and should be omitted for the deactivation requirement. 1 NB-IoT (Only NB-IoT is supported currently)
<SIM_ID>	Integer type. It is the ID of the USIM card wanted to be used, and is optional for the activation requirement and should be omitted for the deactivation requirement. 1 USIM card 1 (Only USIM card 1 is supported currently).
<type>	Integer type. 0 Result/URC for deactivation requirement 1 Result/URC for activation requirement 2 URC for passive deactivation
<result>	Integer type. The result of activation/deactivation. 0 Failure 1 Successful
<activated_PDP_type>	Integer type. It is the PDP type actually activated. 1 IPv4 2 IPv6 3 IPv4v6 4 Non-IP

NOTE

The default PDN (<cid>=1) will be established automatically after the module is registered on network.

Example

```
AT+QGACT=1,1,"apn","","" //Activate a PDN context

+QGACT: 1

OK //Return OK immediately if no error

+QGACT: 1,1,1,1 //Notify activation result via URC
AT+QGACT=0,1 //Deactivate a PDN context
+QGACT: 1

OK //Return OK immediately if no error

+QGACT: 1,0,1 //Notify deactivation result via URC
```

6 Other Network Commands

6.1. AT+CCIOTOPT CloT Optimization Configuration

The 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 support control plane CloT EPS optimization or user plane CloT EPS optimization or both (see 3GPP TS 24.301, sub-clause 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, sub-clause 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, sub-clause 9.9.3.12A).

The write command is used also to control the URC **+CCIOTOPTI**. The URC **+CCIOTOPTI: <supported_network_opt>** is used to indicate the supported CloT EPS optimization by the network.

The read command returns the current settings for supported and preferred CloT EPS optimization and the current status of unsolicited result code **+CCIOTOPTI**.

Please refer to **Chapter 12** for possible **<err>** values.

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	Response

AT+CCIOTOPT=<n>[,<supported_UE_opt>[,<preferred_UE_opt>]]	<p>When <n>=0 or 2: OK</p> <p>When <n>=1: OK</p> <p>+CCIOTOPTI: <supported_network_opt></p> <p>If there is any error: ERROR or +CME ERROR: <err></p>
Maximum Response Time	300 ms
Characteristics	<p>The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM (should execute AT&W after this command is issued).</p>

Parameter

<n>	<p>Integer type. Enable/disable reporting of URC +CCIOTOPTI.</p> <ul style="list-style-type: none"> 0 Disable reporting 1 Enable reporting 2 Disable reporting and reset the parameters for CloT EPS optimization to the default values
<supported_UE_opt>	<p>Integer type. Indicates the UE's support for CloT EPS optimizations.</p> <ul style="list-style-type: none"> 1 Support control plane CloT EPS optimization 3 Support both control plane and user plane CloT EPS optimizations
<preferred_UE_opt>	<p>Integer type. Indicates the UE's preference for CloT EPS optimizations.</p> <ul style="list-style-type: none"> 0 No preference 1 Preference for control plane CloT EPS optimization 2 Preference for user plane CloT EPS optimization
<supported_network_opt>	<p>Integer type. Indicates the network's support for CloT EPS optimizations.</p> <ul style="list-style-type: none"> 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

6.2. AT+COPS Operator Selection

The 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 registration/deregistration attempt is made.

The 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.

The 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.

Please refer to **Chapter 12** for possible **<err>** values.

AT+COPS Operator Selection

Test Command

AT+COPS=?

Response

+COPS: (range of supported **<stat>**s),(list of supported **<oper>**s),(list of supported **<AcT>**s),(range of supported **<mode>**s),(list of supported **<format>**s)

OK

If there is any error:

ERROR

Or

+CME ERROR: <err>

Read Command AT+COPS?	<p>Response</p> <p>+COPS: <mode>[,<format>,<oper>][,<AcT>]</p> <p>OK</p> <p>If there is any error:</p> <p>ERROR</p> <p>Or</p> <p>+CME ERROR: <err></p>
Write Command AT+COPS=<mode>[,<format>[,<oper>][,<AcT>]]	<p>Response</p> <p>If the module registers to network successfully:</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	900 s
Characteristics	<p>The command takes effect immediately.</p> <p>Remain valid after deep-sleep wakeup.</p> <p>The configurations will be saved to NVRAM.</p>

Parameter

<mode>	<p>Integer type.</p> <p>0 Automatic mode (<oper> field is ignored)</p> <p>1 Manual operator selection (<oper> field shall be present)</p> <p>2 Manually deregister from network</p> <p>3 Set <format> not shown in read command response</p> <p>4 Manual/automatic selected. If manual selection fails, automatic mode (<mode>=0) is entered</p>
<format>	<p>Integer type.</p> <p>2 Numeric <oper></p>
<oper>	<p>String type. <format> indicates if the format 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.</p>
<stat>	<p>Integer type.</p> <p>0 Unknown</p> <p>1 Operator available</p> <p>2 Operator currently selected</p> <p>3 Operator forbidden to be selected</p>
<AcT>	<p>Integer type. Access technology selected.</p>

7	E-UTRAN
9	E-UTRAN (NB-S1 mode)

NOTES

1. The test command can only be executed when the module is in idle state, otherwise an error will be returned.
2. The write command can only be executed when the module is in idle state or de-registered state with USIM card inserted, otherwise an error will be returned.

Example

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

6.3. AT+QBAND Get and Set Mobile Operation Band

The command is used to get the currently registered band or set the bands to be locked.

Please refer to **Chapter 12** for possible **<err>** values.

AT+QBAND Get and Set Mobile Operation Band

Test Command AT+QBAND=?	Response +QBAND: (list of supported <band_number>s),(list of supported <operating_band>s) OK
Read Command AT+QBAND?	Response +QBAND: <operating_band> OK If there is any error: ERROR or +CME ERROR: <err>

Write Command AT+QBAND=<band_number>[,<band>[,<band>[,...]]]	Response OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	The command takes effect after reboot. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<band_number>	Integer type. Preferred band number to be searched. 0 All bands 1-16 Number of bands to be locked
<band>	Integer type. Currently preferred NB-IoT band to be searched. Valid values: 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28, 66, 71, 85.
<operating_band>	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, 26, 28, 66, 71, 85.

Example

```

AT+QBAND=?           //Query the list of supported bands for BC66
+QBAND: (0-16),(1,2,3,4,5,8,12,13,17,18,19,20,25,26,28,66)

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

```

NOTES

1. BC66 supports 16 bands, including bands 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28 and 66.
2. BC66-NA supports 18 bands, including bands 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28, 66, 71 and 85.

6.4. AT+QBANDSL Set the List of Preferred Bands to be Searched

The write command sets the list of preferred bands to be searched, and the search order depends on the band setting order. A maximum of four preferred bands can be set. The preferred bands set by this command will not affect the preferred bands matched according to the USIM card. Please refer to **Chapter 12** for possible **<err>** values.

AT+QBANDSL Set the List of Preferred Bands to be Searched

Write Command AT+QBANDSL=<mode>,<band_number>,<band1>[,<band2>[,<band3>[,<band4>]]]	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 not be saved to NVRAM.

Parameter

<mode>	Integer type. Enable/disable setting bands to be searched with priority. 0 Disable 1 Enable
<band_number>	Integer type. Number of bands to be searched with priority. Valid values: 1, 2, 3, 4.
<band>	Integer type. The band to be searched with priority.

Example

```
AT+QBANDSL=1,2,8,3 //Set B8 and B3 as the preferred bands to be searched.
OK
```

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

This command is used to clear stored EARFCN list for the UE.

Please refer to **Chapter 12** for possible **<err>** values.

AT+QCSEARFCN Clear NB-IoT Stored EARFCN List

Execution Command AT+QCSEARFCN	Response +QCSEARFCN: <status> OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	/

Parameter

<status>	Integer type. Result of EARFCN clear.
0	Successful
2	Failure
3	Not found

Example

```
AT+QCSEARFCN
+QCSEARFCN: 0

OK
```

6.6. AT+QLOCKF Lock NB-IoT Frequency

This command is used to lock the UE to a specific frequency and an optional cell ID. After rebooting the module, the command settings will be lost.

Please refer to **Chapter 12** for possible **<err>** values.

AT+QLOCKF Lock NB-IoT Frequency

Test Command AT+QLOCKF=?	Response OK
Read Command	Response

AT+QLOCKF?	OK
Write Command AT+QLOCKF=<mode>,<EARFCN>,<EARFCN_offset>[,<pci>]	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 not be saved to NVRAM.

Parameter

<mode>	Integer type. Activate/remove the lock. 0 Remove lock 1 Activate lock
<EARFCN>	Integer type. The requested EARFCN on which to lock. Range: 0-262143. Value 0 indicates to remove any lock for EARFCN and cell.
<EARFCN_offset>	Integer type. The requested EARFCN offset. 0 Offset of -2 1 Offset of -1 2 Offset of -0.5 3 Offset of 0 4 Offset of 1
<pci>	Integer type. The physical cell ID. Range: 0-503.

7 USIM Related Commands

7.1. AT+CIMI Request International Mobile Subscriber Identity

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

The execution command causes the TA to return **<IMSI>**, which is intended to permit the TE to identify the USIM which is attached to MT.

Please refer to **Chapter 12** for possible **<err>** values.

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	300 ms
Characteristics	/

Parameter

<IMSI> String type without double quotes. International Mobile Subscriber Identity.

Example

```
AT+CIMI
460001357924680
```

OK

7.2. AT+CLK Facility Lock

This command is used to lock, unlock or interrogate 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.

The test command returns facility values supported as a compound value.

Please refer to **Chapter 12** for possible **<err>** values.

AT+CLK Facility Lock

Test Command AT+CLK=?	<p>Response</p> <p>+CLK: (list of supported <fac>s)</p> <p>OK</p> <p>If there is any error:</p> <p>ERROR</p> <p>or</p> <p>+CME ERROR: <err></p>
Write Command AT+CLK=<fac>,<mode>[,<passwd>[,<class>]]	<p>Response</p> <p>when <mode>=0 or 1 and the command is executed successfully:</p> <p>OK</p> <p>when <mode>=2 and the command is executed successfully:</p> <p>+CLK: <status>[,<class1></p> <p>[+CLK: <status>,<class2></p> <p>[...]]</p> <p>OK</p> <p>If there is any error:</p> <p>ERROR</p> <p>or</p>

	+CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	<p>The command takes effect after reboot.</p> <p>Remain valid after deep-sleep wakeup.</p> <p>The configurations will be saved to NVRAM automatically.</p>

Parameter

<fac>	String type. Network facility. "PS" PH-SIM (lock phone to USIM card installed in the currently selected card slot) (MT asks password when other than the current USIM card is inserted; MT may remember certain amount of previously used cards thus not requiring password when they are inserted) "SC" SIM (lock USIM card installed in the currently selected card slot) (USIM asks password in MT power-up and when this lock command issued) "PN" Network personalization (refer <i>3GPP TS 22.022 [33]</i>) "PU" Network subset personalization (refer <i>3GPP TS 22.022 [33]</i>) "PP" Service provider personalization (refer <i>3GPP TS 22.022 [33]</i>) "PC" Corporate personalization (refer <i>3GPP TS 22.022 [33]</i>)
<mode>	Integer type. 0 Unlock 1 Lock 2 Query status
<status>	Integer type. 0 Not active 1 Active
<passwd>	String type. Shall be the same as the password specified for the facility from the MT user interface or with the password set with AT+CPWD .
<class>	A sum of integers each representing a class of information (default 7 - voice, data and fax): 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

Example

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

OK
```

7.3. AT+CPIN Enter PIN

Please refer to **Chapter 12** for possible **<err>** values.

AT+CPIN Enter PIN

Test Command AT+CPIN=?	Response OK
Read Command AT+CPIN?	Response TA returns an alphanumeric string indicating whether or not a password is required. +CPIN: <code> OK
Write Command AT+CPIN=<pin>[,<new_pin>][,<new_pin>]	Response TA stores a password, such as "SIM PIN", "SIM PUK", "PH-SIM PIN", etc., which is necessary before it can be operated. 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 and an error message, +CME ERROR , will be returned to TE. If the PIN required is "SIM PUK" or "SIM PUK2", the second pin is required. This second pin, <new_pin> , is used to replace the old pin in the USIM. When a new password is set, a third optional parameter may also be specified. This extra parameter is compared to the new password to check whether they are equivalent as an additional security feature. OK If there is any error: ERROR or +CME ERROR: <err>

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

Parameter

<code>	String type.	
	READY	No further entry needed
	SIM PIN	MT is waiting for USIM PIN
	SIM PUK	MT is waiting for USIM PUK
	PH_SIM PIN	MT is waiting for phone-to-USIM card password (antitheft)
	PH_NET PIN	Network personalization password is required.
	PH_NETSUB PIN	Network subset is required.
	PH_SP PIN	Service provider personalization password is required.
	PH_CORP PIN	Corporate personalization password is required.
	SIM PIN2	MT is waiting for USIM PIN 2 to be given. Possible only if the preceding command was acknowledged with +CME ERROR: 17 .
	SIM PUK2	MT is waiting for USIM PUK 2 to be given. Possible only if the preceding command was acknowledged with error +CME ERROR: 18 .
<pin>	String type. Password.	
<new_pin>	String type. If the PIN required is "SIM PUK" or "SIM PUK2", it is the new password.	

Example

```
AT+CPIN?
+CPIN: READY

OK
```

7.4. AT+CPINR Remaining PIN Retries

The 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>]** for standard PINs and **+CPINRE: <ext_code>,<retries>[,<default_retries>]** for manufacturer specific PINs. One line with one intermediate result code is returned for every **<code>** or **<ext_code>** selected by **<sel_code>**.

When the command is issued without the optional parameter **<sel_code>**, intermediate result codes are returned for all **<code>**s and **<ext_code>**s.

In the intermediate result codes, the parameter **<default_retries>** is an optional parameter, per **<code>** and **<ext_code>**.

AT+CPINR Remaining PIN Retries

Test Command AT+CPINR=?	Response 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. Same values as for the <code> and <ext_code> parameters.
<retries>	Integer type. Number of remaining retries per PIN.
<default_retries>	Integer type. Number of default retries per PIN.
<code>	Type of PIN. All values listed under the description of the <code> parameter in AT+CPIN command, except 'READY'.

Example

AT+CPINR

```
+CPINR: "SIM PIN",3,3
+CPINR: "SIM PUK",10,10
+CPINR: "SIM PIN2",3,3
+CPINR: "SIM PUK2",10,10
```

OK

7.5. AT+CPLS Selection of Preferred PLMN List

This command is used to select one PLMN Selector with Access Technology list in the USIM, that is used by **AT+CPOL** command.

The write command selects a list in the USIM.

The read command returns the selected PLMN selector list from the USIM.

The test command returns the whole index range supported lists by the USIM as a compound value.

Please refer to **Chapter 12** for possible **<err>** values.

AT+CPLS Selection of Preferred PLMN List	
Test Command AT+CPLS=?	Response +CPLS: <list_range> OK If there is any error: ERROR or +CME ERROR: <err>
Read Command AT+CPLS?	Response +CPLS: <selected_list> OK If there is any error: ERROR or +CME ERROR: <err>
Write Command AT+CPLS=<list>	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 configuration will not be saved to NVRAM.

Parameter

<list>	Integer type. 0 User Controlled PLMN Selector with Access Technology EFPLMNwAcT, if not found in the USIM then PLMN preferred list EFPLMNsel (this file is only available in USIM card) 1 Operator Controlled PLMN Selector with Access Technology EFOPLMNwAcT 2 HPLMN Selector with Access Technology EFHPLMNwAcT
<selected_list>	Integer type. The selected list.
<list_range>	Integer type. The range of PLMN list. Now the range is 0-2.

Example

AT+CPLS?

+CPLS: 1

OK

7.6. AT+CPOL Preferred PLMN List

This command is used to edit the PLMN Selector with Access Technology lists in the USIM card.

The write command writes an entry in the USIM list of preferred PLMNs, previously selected by **AT+CPLS**. If no list has been previously selected, the User Controlled PLMN Selector with Access Technology EFPLMNwAcT, is the one accessed by default.

The read command returns all used entries from the USIM list of preferred PLMNs, previously selected by the command **AT+CPLS**, with the Access Technologies for each PLMN in the list.

The test command returns the whole index range and operator format supported by the USIM.

Please refer to **Chapter 12** for possible **<err>** values.

AT+CPOL Preferred PLMN List

Test Command	Response
AT+CPOL=?	+CPOL: (range of supported <index> s),(list of supported <format> s)

	<p>OK</p> <p>If there is any error: ERROR or +CME ERROR: <err></p>
<p>Read Command AT+CPOL?</p>	<p>Response: +CPOL: <index1>,<format>,<oper1>[,<GSM_AcT1>,<GSM_compact_AcT1>,<UTRAN_AcT1>,<E-UTRAN_AcT1>,<NG-RAN_AcT1>] [+CPOL:<index2>,<format>,<oper2>[,<GSM_AcT2>,<GSM_compact_AcT2>,<UTRAN_AcT2>,<E-UTRAN_AcT2>,<NG-RAN_AcT2>]] [...]</p> <p>OK</p> <p>If there is any error: ERROR or +CME ERROR: <err></p>
<p>Write Command AT+CPOL=<index></p>	<p>Response OK</p> <p>If there is any error: ERROR or +CME ERROR: <err></p>
Maximum Response Time	300 ms
Characteristics	<p>The command takes effect immediately.</p> <p>Remain valid after deep-sleep wakeup.</p> <p>The configuration will not be saved to NVRAM.</p>

Parameter

<index>	Integer type. The order number of operator in the USIM preferred operator list. The range is 1-80.
<format>	Integer type. Operator format. 2 Numeric <oper>
<GSM_AcT>	Integer type. GSM access technology. 0 Access technology not selected 1 Access technology selected
<GSM_compact_AcT>	Integer type. GSM compact access technology.

	0	Access technology not selected
	1	Access technology selected
<UTRAN_AcT>	Integer type. UTRAN access technology.	
	0	Access technology not selected
	1	Access technology selected
<E-UTRAN_AcT>	Integer type. E-UTRAN access technology.	
	0	Access technology not selected
	1	Access technology selected
<NG-RAN_AcT>	Integer type. NG-RAN access technology.	
	0	Access technology not selected
	1	Access technology selected

NOTES

1. MT can also update the User Controlled PLMN Selector with Access Technology, EFPLMNwAcT, automatically when new networks are selected.
2. The Operator Controlled PLMN Selector with Access Technology EFOPLMNwAcT can only be written if the write access condition in the USIM has been previously verified.
3. Currently, only <format>=2 is supported.

7.7. AT+CPWD Change Password

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

The test command returns a list of pairs which present the available facilities and the maximum length of their passwords.

Please refer to **Chapter 12** for possible <err> values.

AT+CPWD Change Password

Test Command	Response
AT+CPWD=?	+CPWD: (list of supported <fac>s),(list of supported <pwdlength>s)
	OK
	If there is any error:
	ERROR
	or
	+CME ERROR: <err>

Write Command AT+CPWD=<fac>,<oldpwd>,<newpwd> >	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 not be saved to NVRAM.

Parameter

<fac>	String type. Network facility. "P2" SIM PIN2 "PS" PH-SIM (lock phone to USIM card installed in the currently selected card slot) (MT asks password when other than the current USIM card is inserted; MT may remember certain amount of previously used cards thus not requiring password when they are inserted) "SC" SIM (lock USIM card installed in the currently selected card slot) (USIM asks password in MT power-up and when this lock command issued) "PN" Network personalization (refer 3GPP TS 22.022 [33]) "PU" Network subset personalization (refer 3GPP TS 22.022 [33]) "PP" Service provider personalization (refer 3GPP TS 22.022 [33]) "PC" Corporate personalization (refer 3GPP TS 22.022 [33])
<oldpwd>,<newpwd>	String type. Old password/new password. 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 and <newpwd> is the new password; the maximum length of password can be determined with <pwdlength> .
<pwdlength>	Integer type. The maximum length of the password for the facility.

7.8. AT+CRSM Restricted USIM Access

This command provides easier but more limited access to the (U)SIM database. It transmits the (U)SIM **<command>** and its required parameters.

AT+CRSM Restricted USIM Card Access

Test Command AT+CRSM=?	Response OK If there is any error: ERROR Or +CME ERROR: <err>
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	300 ms
Characteristics	The command takes effect immediately. The configurations will not be saved to NVRAM.

Parameter

<command>	String type. USIM command index. "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 datafile 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 [28]</i> .
<data>	String type. Information which shall be written to the USIM (hexadecimal character format).
<pathID>	String type. It contains the path of an elementary file on the UICC in hexadecimal format.
<sw1>,<sw2>	Integer type. Information from the (U)SIM about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command.

<response> String type in HEX format. Response of a successful completion of the command previously issued. STATUS and GET RESPONSE return data, which gives information about the current elementary datafield. This information includes the type of file and its size (refer 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.

7.9. AT+QCCID USIM Card Identification

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

Please refer to **Chapter 12** for possible **<err>** values.

AT+QCCID USIM Card Identification

Execution Command AT+QCCID	Response +QCCID: <ICCID> OK
Maximum Response Time	300 ms
Characteristics	/

Parameter

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

Example

```
AT+QCCID
+QCCID: 89860317482035195410
OK
```

8 Power Consumption Commands

8.1. AT+CEDRXS eDRX Setting

The write command controls the setting of the UE's eDRX parameters. The command controls whether the UE wants to apply eDRX or not, as well as the requested eDRX value for each specified type of access technology.

The 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 **<n>=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.

The read command returns the current settings for each defined value of **<AcT_type>**.

The test command returns the supported **<mode>**s and the value ranges for the access technology and the requested eDRX value as a compound value.

Please refer to **Chapter 12** for possible **<err>** values.

AT+CEDRXS eDRX Setting

Test Command AT+CEDRXS=?	Response +CEDRXS: (range of supported <mode> s),(list of supported <AcT_type> s),(list of supported <requested_eDRX_value> s) OK
Read Command AT+CEDRXS?	Response +CEDRXS: <AcT_type> , <requested_eDRX_value> [+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	300 ms
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 technology, i.e. the most recent setting of <mode> will take effect for all specified values of <AcT_type> . 0 Disable the use of eDRX <u>1</u> Enable the use of eDRX 2 Enable the use of eDRX and enable the unsolicited result code +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. 0 Access technology is not using eDRX. This parameter value is only used in the unsolicited result code. 5 E-UTRAN (NB-S1 mode)																																																		
<requested_eDRX_value>	String type. Half a byte in a 4-bit format. NB-S1 mode. bit <table><tr><td>4</td><td>3</td><td>2</td><td>1</td><td>E-UTRAN eDRX cycle length duration</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>20.48 seconds</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>40.96 seconds</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>81.92 seconds</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td><td>163.84 seconds</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>327.68 seconds</td></tr><tr><td>1</td><td>0</td><td>1</td><td>1</td><td>655.36 seconds</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>1310.72 seconds</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1</td><td>2621.44 seconds</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>5242.88 seconds</td></tr></table>	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
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. bit				
	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. bit				
	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

Example

```
AT+CEDRXS=1,5,"0101"
```

```
OK
```

```
AT+CEDRXS?
```

```
+CEDRXS: 5,"0101"
```

```
OK
```

```
AT+CEDRXS=?
```

```
+CEDRXS: (0-3),(5),("0000"-"1111")
```

OK

8.2. AT+CEDRXRDP eDRX Read Dynamic Parameters

The execution command returns **<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 that the MS is currently registered to is not using eDRX, **<AcT_type>=0** will be returned.

Please refer to **Chapter 12** for possible **<err>** values.

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	300 ms
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 is not using eDRX. This parameter value is only used in the unsolicited result code
5	E-UTRAN (NB-S1 mode)
<requested_eDRX_value>	String type. Half a byte in a 4-bit format.
	bit
	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. bit				
	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. bit				
	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

Example

AT+CEDRXRDP

+CEDRXRDP: 5,"0010","1110","0101"

OK

AT+CEDRXRDP=?

OK

8.3. AT+QEDRXCFCG Configure eDRX

The write command controls the setting of UE's eDRX parameters. The command controls whether UE applies eDRX or not, as well as the requested eDRX value and requested paging time window value for each specified type of access technology. Please refer to **Chapter 12** for possible **<err>** values.

AT+QEDRXCFCG Configure eDRX	
Test Command AT+QEDRXCFCG=?	<p>Response</p> <p>+QEDRXCFCG: (range of supported <mode>s),(list of supported <AcT_type>s),(list of supported <requested_eDRX_value>s),(list of supported <requested_paging_time_window_value>s)</p> <p>OK</p>
Read Command AT+QEDRXCFCG?	<p>Response</p> <p>+QEDRXCFCG: <AcT_type>,<requested_eDRX_value>,<requested_paging_time_window_value></p> <p>OK</p>
Write Command AT+QEDRXCFCG=<mode>[,<AcT_type>[,<requested_eDRX_value>[,<requested_paging_time_window_value>]]]	<p>Response</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	300 ms
Characteristics	<p>The command takes effect immediately.</p> <p>Remain valid after deep-sleep wakeup.</p> <p>The configurations will be saved to NVRAM automatically.</p>

Parameter

<mode>	Integer type. Disable or enable the use of eDRX in the UE. This parameter is applicable to all specified types of access technology, 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_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.			
0	Access technology is not using 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.			
	bit			
	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			
<requested_paging_time_window_value>	String type. Half a byte in a 4 bit format. NB-S1 mode.			
	bit			
	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
<NW_provided_eDRX_value>	String type. Half a byte in a 4-bit format. NB-S1 mode. bit				
	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. bit				
	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

Example

```
AT+QEDRXCFCG=1,5,"0101"
```

```
OK
```

```
AT+QEDRXCFCG?
```

```
+QEDRXCFCG: 5,"0101"
```

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

8.4. AT+CFUN Set UE Functionality

The 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.

The read command returns the current setting of **<fun>**.

The test command returns values supported by the MT as a compound value.

Please refer to **Chapter 12** for possible **<err>** values.

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	85 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>	7	Disable USIM only. RF transmitting and receiving circuits are still active.
	Integer type. UE resetting.	
	0	The command takes effect immediately without saving to NVRAM.
	1	The command takes effect after resetting, and the configurations will be saved to NVRAM automatically.
	2	The command takes effect immediately, and the configurations will be saved to NVRAM automatically.

Example

```

AT+CFUN=?
+CFUN: (0,1,4,7),(0-2)

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

OK

```

8.5. AT+CPSMS Power Saving Mode Setting

The 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 that are 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** command will be removed or, if available, set to the default values.

The read command returns the current parameter values.

The 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.
 Please refer to **Chapter 12** for possible **<err>** values.

AT+CPSMS Power Saving Mode Setting

Test Command AT+CPSMS=?	Response +CPSMS: (range of supported <mode>s),,,(list of supported <requested_periodic_TAU>s),(list of supported <requested_active_time>s) OK
Read Command AT+CPSMS?	Response +CPSMS: <mode> [,,, <requested_periodic_TAU>],[<requested_active_time>] OK If there is any error: ERROR Or +CME ERROR: <err>
Write Command AT+CPSMS=<mode> [,,, <requested_periodic_TAU>],[<requested_active_time>]	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 automatically.

Parameter

<mode>	Integer type. Disable or enable the use of PSM in the UE 0 Disable the use of PSM 1 Enable the use of PSM 2 Disable the use of PSM and discard all parameters for PSM or, if available, reset to the default values.
<requested_periodic_TAU>	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). Bits 5 to 1 represent the binary coded timer

value

Bits 6 to 8 define the timer value unit 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 (Note 1)

1 1 1 value indicates that the timer is deactivated (Note 2)

<requested_active_time>

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).

Bits 5 to 1 represent the binary coded timer value.

Bits 6 to 8 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 decihours

1 1 1 value indicates that the timer is deactivated

NOTES

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
```

8.6. AT+QNBIOTRAI NB-IoT Release Assistance Indication

This command is used to set the NB-IoT release assistance indications.

Please refer to **Chapter 12** for possible **<err>** values.

AT+QNBIOTRAI NB-IoT Release Assistance Indication

Test Command AT+QNBIOTRAI=?	Response +QNBIOTRAI: (range of supported <RAI> s) OK
Read Command AT+QNBIOTRAI?	Response +QNBIOTRAI: <RAI> OK
Write Command AT+QNBIOTRAI=<RAI>	Response OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	/

Parameter

<RAI>	Integer type. Specifies release assistance information
<u>0</u>	No information available (or none of the other options apply)
1	TE will send only 1 UL packet and no DL packets expected
2	TE will send only 1 UL packet and only 1 DL packet expected

NOTE

This command only take effects on the next uplink data.

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

This command is used to enable/disable an NB-IoT related event report.

Please refer to **Chapter 12** for possible **<err>** values.

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

Test Command AT+QNBIOTEVENT=?	Response OK
Read Command AT+QNBIOTEVENT?	Response OK
Write Command AT+QNBIOTEVENT=<enable>,<event>	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 (should execute AT&W after this command is issued). .

Parameter

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

8.8. AT+QRELOCK Release Sleep Lock of AT Commands

By default, the module will start a Sleep Lock timer (10s by default) to prevent the module from entering sleep mode after each AT command sending.

The execution command is used to release the Sleep Lock after AT command sending, thus allowing the module to enter sleep mode immediately when there are no other sleep handles available to control the sleep state of the system.

AT+QRELOCK Release Sleep Lock of AT Commands

Execution Command AT+QRELOCK	Response OK
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will not be saved to NVRAM.

Example

```
AT+QRELOCK
OK
```

8.9. AT+QSCLK Configure Sleep Mode

The command is used to configure the UE's sleep mode. Please refer to **Chapter 12** for possible <err> values.

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

	<p>If there is any error:</p> <p>ERROR</p> <p>or</p> <p>+CME ERROR: <err></p>
Maximum Response Time	300 ms
Characteristics	<p>The command takes effect immediately.</p> <p>Remain valid after deep-sleep wakeup.</p> <p>The configuration will not be saved to NVRAM.</p>

Parameter

<n>	Integer type.
0	Disable sleep mode
1	Enable light sleep and deep sleep, wakeup by PSM_EINT (falling edge)
2	Enable light sleep only, wakeup by the Main UART

NOTES

1. UART does not work during light sleep mode. Therefore, when **AT+QSCLK=1/2**, please send **AT** before each command to make sure the UART is woken up first.
2. When **AT+QSCLK=0**, UART is always working. If it is intended to make the module enter sleep mode, please resend **AT+QSCLK=1/2**.
3. During data communication, it is recommended to execute **AT+QSCLK=0** to disable the module from entering sleep mode. 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 light sleep mode again immediately. So it is recommended to wake up the module through sending AT commands and then follow the suggestions in **NOTE 3**.

Example

```
AT+QSCLK=1
OK
```

9 Platform Related Commands

9.1. AT&W Store Current Parameters to NVRAM

The command stores the current parameter settings to a user defined profile in NVRAM. Currently the commands that can be stored via **AT&W** are: **ATE**, **AT+CEREG**, **AT+CTZR**, **AT+CCIOTOPT**, **AT+QNBIOEVENT** and **AT+QATWAKEUP**.

AT&W Store Current Parameters to NVRAM

Execution Command AT&W[<n>]	Response OK
Maximum Response Time	300 ms
Characteristics	/

Parameter

<n>	Integer type.
0	Profile number to store current parameters

9.2. AT+CBC Query Power Supply Voltage

The command is used to query the voltage value of power supply. Please refer to **Chapter 12** for possible **<err>** values.

AT+CBC Query Power Supply Voltage

Test Command AT+CBC=?	Response +CBC: (range of supported <bcs>s),(range of supported <bcl>s),<voltage> OK
Execution Command AT+CBC	Response +CBC: <bcs>,<bcl>,<voltage>

	<p>OK</p> <p>If there is any error: ERROR or +CME ERROR: <err></p>
Maximum Response Time	300 ms
Characteristics	/

Parameter

<bcs>	Integer type. Battery charging status.
0	ME is not charging
1	ME is charging
2	Charging has been finished
<bcl>	Integer type. Battery charging level.
0-100	Battery has 0-100 percent of capacity remaining
<voltage>	Battery voltage (mV)

NOTE

As BC66/BC66-NA does not support battery charging, **<bcs>** and **<bcl>** are invalid (always 0) while the **<voltage>** still represents the correct voltage of power supply.

Example

```
AT+CBC
+CBC: 0,0,3368

OK
```

9.3. AT+CEER Extended Error Report

The execution command causes the TA to return one or more lines of information text **<report>**, determined by the MT manufacturer, which should offer the user of the TA an extended report of the reason for the following errors:

- The failure in the last unsuccessful PDP context activation;

- The failure in the PDP context deactivation.

Typically, the text will consist of a single line containing the cause information given by the network in textual format.

AT+CEER Extended Error Report

Test Command AT+CEER=?	Response OK
Execution Command AT+CEER	Response +CEER: <report> OK
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will not be saved to NVRAM.

Parameter

<report> String type. Extended error report. The total number of characters, including line terminators, in the information text shall not exceed 2041 characters. The text shall not contain the sequence **0<CR>** or **OK<CR>**.

Example

```
AT+CEER
+CEER: EMM_CAUSE_EPS_AND_NON_EPS_SERVICES_NOT_ALLOWED

OK
AT+CEER=?
OK
```

9.4. AT+CMEE Report Mobile Termination Error

The 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 the MT. When enabled, MT related errors cause **+CME ERROR: <err>** final result code instead of the regular **ERROR** final result code. **ERROR** is returned normally when an error is related to syntax, invalid parameters or TA functionality.

The read command returns the current setting of **<n>**.

The test command returns values supported as a compound value.

Please refer to **Chapter 12** for possible **<err>** values.

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 TA disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the ME. OK
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will not be saved to NVRAM.

Parameter

<n>	Integer type. Enable/disable the use of result code +CME ERROR: <err> .
<u>0</u>	Disable result code
1	Enable result code and use numeric values
2	Enable result code and use verbose values

Example

```
AT+CMEE?
+CMEE: 0

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

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

This command is used to query 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 <status>s),(range of supported <voltage>s) OK
Read Command AT+QADC?	Response +QADC: <status>,<voltage> OK
Write Command AT+QADC=<channel>[,<sample_cnt>[,<interval_time>]]	Response +QADC: <status>,<voltage> OK
Maximum Response Time	300 ms (Except for commands with delayed operations)
Characteristics	/

Parameter

<status>	Integer type. ADC conversion status. 0 Failed 2 Successful
<voltage>	Integer type. Sampling voltage value or average value of sampling voltage. Unit: millivolt. Range: 0-1400.
<channel>	Integer type. ADC conversion channel. Range: 0-6. Currently only channel 0 (ADC0) is valid.
<sample_cnt>	Integer type. Number of sampling times. Range: 1-100. Default value: 1.
<interval_time>	Integer type. ADC sampling interval. Unit: millisecond. Range: 0-100. The value is an integer multiple of 10. Default value: 0.

Example

```
AT+QADC?
+QADC: 2,796

OK
```

9.6. AT+QATWAKEUP Enable/Disable Deep Sleep Wakeup Indication

This command is used to enable/disable an unsolicited result code **+QATWAKEUP** on a channel that indicates when the modem is fully woken up after a deep sleep.

Please refer to **Chapter 12** for possible **<err>** values.

AT+QATWAKEUP Enable/Disable Deep Sleep Wakeup Indication	
Test Command AT+QATWAKEUP=?	Response +QATWAKEUP: (list of supported <enable> s) OK
Read Command AT+QATWAKEUP?	Response +QATWAKEUP: <enable> OK
Write Command AT+QATWAKEUP=<enable>	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 configuration will be saved to NVRAM (should execute AT&W after this command is issued). .

Parameter

<enable>	Integer type. Enable/disable URC +QATWAKEUP . <u>0</u> Disable indication on this channel when modem wakes up from deep sleep 1 Enable indication on this channel when modem wakes up from deep sleep
-----------------------	--

Example

```
AT+QATWAKEUP=1     //Enable wakeup indication
```

```
OK
(Modem is woken up from deep sleep mode)
```

+QATWAKEUP //The modem has been fully woken up and ready to receive AT commands/data

9.7. AT+QCFG Configure System Settings

This command is used to configure some configurable settings of the system.

Please refer to **Chapter 12** for possible **<err>** values.

AT+QCFG Configure System Settings

Test Command AT+QCFG=?	Response +QCFG: (list of supported <function> s),(list of supported <value> s) OK
Write Command AT+QCFG=<function>[,<value>]	Response If <value> is omitted, query the current system settings: +QCFG: <function>,<value> OK If <value> is specified, configure the system settings: OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	The command takes effect after reboot. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM automatically.

Parameter

<function>	String type. Functions to be configured.
"epco"	Configure the extended protocol configuration options (EPCO)
"combinedattach"	Configure combined attach
"up"	Configure whether to enable user plane function
"upopt"	Configure whether to enable user plane optimization
"multidrb"	Configure whether to enable multi-DRB

"autopdn"	Configure the PDN auto activation option
"ripin"	Configure the default output level for RI pin
"initlocktime"	Configure the initial Sleep Lock duration after reboot or deep sleep wake up by PSM_EINT
"dsevent"	Configure whether to enable the URC ENTER DEEPSLEEP of deep sleep event
"atlocktime"	Configure the Sleep Lock duration by AT command
"urc/ri/mask"	Configure whether to trigger RI pin behavior when URC is reported
"vbattimes"	Configure the voltage detection cycle for AT+QVBATT command
"activetimer"	Configure whether to use the value of active timer
<value>	Integer type/ String type.
<function >	<value> Description
"epco"	0 Disable EPCO
"epco"	1 Enable EPCO
"combinedattach"	0 Disable combined attach
"combinedattach"	1 Enable combined attach
"up"	0 Disable user plane function
"up"	1 Enable user plane function
"upopt"	0 Disable user plane optimization
"upopt"	1 Enable user plane optimization
"multidrb"	0 Disable user multi-DRB
"multidrb"	1 Enable user multi-DRB
"autopdn"	0 Disable PDN auto activation
"autopdn"	1 Enable PDN auto activation
"ripin"	0 Default output level is high for RI pin
"ripin"	1 Default output level is low for RI pin
"dsevent"	0 Disable the URC for deep sleep event
"dsevent"	1 Enable the URC for deep sleep event
"initlocktime"	1-30 Configure the initial Sleep Lock duration (unit: s)
"atlocktime"	0-10 Configure the Sleep Lock duration (unit: s) by AT command
"urc/ri/mask"	0,<URC> Re-enable the disabled RI pin behaviors when the specified URC is reported
"urc/ri/mask"	1,<URC> Disable RI pin behaviors when the specified URC is reported
"urc/ri/mask"	2 Enable RI pin behaviors when any URC is reported
"vbattimes"	1-600 Configure the voltage detection cycle (unit: s) for AT+QVBATT
"activetimer"	0 Set the value of active timer to 0
"activetimer"	1 Use the value of active timer received from core network

NOTE

Currently, "vbattimes" and "activetimer" are only applicable to BC66-NA.

9.8. AT+QPOWD Power off the Module

The command is used to power off the module. Please refer to **Chapter 12** for possible **<err>** values.

AT+QPOWD Power off the Module

Test Command AT+QPOWD=?	Response +QPOWD: (list of supported <op> s) OK
Write Command AT+QPOWD=<op>	Response OK If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	85 s
Characteristics	/

Parameter

<op>	Integer type
<u>0</u>	Normal power-off
1	Forced power-off
2	Reset the module without power-off after the response OK

Example

```
AT+QPOWD=0
OK
```


NOTE

Currently, <op>=1 is only applicable to BC66-NA.

9.9. AT+QRST Automatically Reset

This command is used to reset the module immediately. Please refer to **Chapter 12** for possible <err> values.

AT+QRST Automatically Reset

Test Command AT+QRST=?	Response +QRST: (list of supported <mode>s) OK
Write Command AT+QRST=<mode>	Response Automatically and immediately reset If there is any error: ERROR or +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	/

Parameter

<mode>	Integer type.
<u>1</u>	Automatically and immediately reset without detachment from the network.

9.10. AT+QVBATT Configure the Voltage Threshold

The command is used to configure the high and low voltage threshold for warning and power down.

AT+QVBATT Configure the Voltage Threshold

Test Command AT+QVBATT=?	Response +QVBATT: 0,(2100-2900),(0,1)
------------------------------------	---

	+QVBATT: 1,(2000-2800),(0,1) +QVBATT: 2,(3200-3600),(0,1) +QVBATT: 3,(3300-3700),(0,1) OK
Read Command AT+QVBATT?	Response +QVBATT: 0,<voltage>,<state> +QVBATT: 1,<voltage>,<state> +QVBATT: 2,<voltage>,<state> +QVBATT: 3,<voltage>,<state> OK
Write Command AT+QVBATT=<threshold_type> [,<voltage>,<state>]	Response +QVBATT: <threshold_type>,<voltage>,<state> OK
Maximum Response Time	300 ms (Except for commands with delayed operations)
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<threshold_type>	Integer type. Voltage threshold type. 0 Under voltage warning 1 Under voltage power down 2 Over voltage warning 3 Over voltage power down
<voltage>	Integer type. Voltage threshold. Unit: millivolt. When <threshold_type> =0, the range of <voltage> is 2100–2900. When <threshold_type> =1, the range of <voltage> is 2000–2800. When <threshold_type> =2, the range of <voltage> is 3200–3600. When <threshold_type> =3, the range of <voltage> is 3300–3700.
<state>	Integer type. Function state of <threshold_type> . 0 The function is disabled 1 The function is enabled

NOTES

- A URC will be reported when the battery voltage reaches the set threshold:
 - UNDER VOLTAGE WARNING
 - UNDER VOLTAGE POWER DOWN

- OVER VOLTAGE WARNING
- OVER VOLTAGE POWER DOWN

2. Currently, the command is only applicable to BC66-NA.

Example

AT+QVBATT?

+QVBATT: 0,2900,0

+QVBATT: 1,2800,0

+QVBATT: 2,3600,0

+QVBATT: 3,3700,0

OK

AT+QVBATT=?

+QVBATT: 0,(2100-2900),(0,1)

+QVBATT: 1,(2000-2800),(0,1)

+QVBATT: 2,(3200-3600),(0,1)

+QVBATT: 3,(3300-3700),(0,1)

OK

10 Time Related Commands

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

The RTC clock will be automatically synchronized once the UE received EMM INFORMATION signaling.

The 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	300 ms
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 "yyyy/mm/dd,hh:mm:ss±zz", where characters indicate year, month, day, hour, minute, second and time zone (indicates the difference, expressed in an hour, between the local time and GMT; and range is -12 ~ +12). For example, 6th of May 2019, 22:10:00 GMT+2 hours equals "2019/05/06,22:10:00GMT+02"
---------------------	---

Example

AT+CCLK?

+CCLK: 2019/05/06,22:10:00GMT+2

OK

10.2. AT+CTZR Time Zone Reporting

The write command enables/disables the time zone change event reporting. If the reporting is enabled the MT returns the unsolicited result code **+CTZV: <tz>** or **+CTZE: <tz>,<dst>,[<time>]** whenever the time zone is changed. Please refer to **Chapter 12** for possible **<err>** values.

AT+CTZR Time Zone Reporting

Test Command AT+CTZR=?	Response +CTZR: (range of supported <on_off>s) OK
Read Command AT+CTZR?	Response +CTZR: <on_off> OK If there is any error: ERROR or +CME ERROR: <err>
Write Command AT+CTZR=<on_off>	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 configuration will be saved to NVRAM (should execute AT&W after this command is issued). .

Parameter

<on_off>	Integer type. 0 Disable time zone change event reporting 1 Enable time zone change event reporting by unsolicited result code +CTZV: <tz> 2 Enable extended time zone and local time reporting by unsolicited result code +CTZE: <tz>,<dst>,[<time>]
<tz>	String type. Represent the 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 -47 ~ +48. To maintain a fixed width, numbers in the range -9 ~ +9 are expressed with a leading zero, e.g. "-09", "+00" and "+09".
<dst>	Integer type. Whether <tz> includes daylight savings adjustment. 0 <tz> includes no adjustment for Daylight Saving Time 1 <tz> includes +1 hour (equals 4 quarters in <tz>) adjustment for daylight saving time
<time>	String Type. Current local date and time.

NOTE

This command has to be set before the module camps on the network.

Example

```

AT+CTZR=?
+CTZR: (0-2)

OK
AT+CTZR=0
OK
AT+CTZR?
+CTZR: 0

OK
  
```

10.3. AT+QCCLK Set and Get Current Date and UTC

The write command sets the real-time clock of the MT. If setting fails, an MT error **+CME ERROR: <err>** will be returned.

The read command returns the current date and UTC (Universal Time Coordinated) of the clock.

Please refer to **Chapter 12** for possible **<err>** values.

AT+QCCLK Set and Get Current Date and UTC

Test Command AT+QCCLK=?	Response OK
Read Command AT+QCCLK?	Response +QCCLK: <time> OK
Write Command AT+QCCLK=<time>	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 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; and range is -47 ~ +48). For example, 6th of May 2019, 22:10:00 GMT+2 hours equals "19/05/06,22:10:00+08"
---------------------	--

Example

```

AT+QCCLK=?
OK
AT+QCCLK="19/05/06,22:10:00+08"
OK
AT+QCCLK?
+QCCLK: 19/05/06,22:10:00+08

OK

```

11 Other Related Commands

11.1. TCP/IP Related Commands

For more details, please refer to *Quectel_BC66&BC66-NA_TCP(IP)_Application_Note*.

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
[5]	AT+QIRD	Retrieve the Received TCP/IP Data
[6]	AT+QISENDEX	Send Hex String Data
[7]	AT+QISWTMD	Switch Data Access Modes
[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
[13]	AT+QIGETERROR	Query the Last Error Code

11.2. MQTT Related Commands

For more details, please refer to *Quectel_BC66&BC66-NA_MQTT_Application_Note*.

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

11.3. SSL Related Commands

For more details, please refer to *Quectel_BC66&BC66-NA_SSL_Application_Note*.

Table 4: List of SSL Related AT Commands

SN	AT Command	Description
[1]	AT+QSSLCFG	Configure Parameters of an SSL Context
[2]	AT+QSSLOPEN	Open an SSL Socket to Connect a Remote Server
[3]	AT+QSSLSEND	Send Data through SSL Connection
[4]	AT+QSSLCLOSE	Close an SSL Connection

11.4. LwM2M Related Commands

For more details, please refer to *Quectel_BC66&BC66-NA_LwM2M_Application_Note*.

Table 5: List of LwM2M Related AT Commands

SN	AT Command	Description
[1]	AT+QLWCONFIG	Configure Registration Parameters of IoT Platform
[2]	AT+QLWCFG	Configure Optional Registration Parameters
[3]	AT+QLWREG	Send a Register Request
[4]	AT+QLWUPDATE	Send an Update Request
[5]	AT+QLWDEREG	Send a Deregister Request
[6]	AT+QLWADDOBJ	Add a LwM2M Object
[7]	AT+QLWDELOBJ	Delete a LwM2M Object
[8]	AT+QLWRDRSP	Respond to the Read Request
[9]	AT+QLWWRRSP	Respond to the Write Request
[10]	AT+QLWEXERSP	Respond to the Execute Request
[11]	AT+QLWOBSRSP	Respond to the Observe Request
[12]	AT+QLWNOTIFY	Notify the Data to Server
[13]	AT+QLWRD	Read Buffered Data
[14]	AT+QLWSTATUS	Query Current LwM2M Status
[15]	AT+QLWRECOVER	Manually Trigger the LwM2M Context Recovery Process

11.5. DFOTA Related Commands

For more details, please refer to *Quectel_BC66&BC66-NA_DFOTA_Application_Note*.

Table 6: List of DFOTA Related AT Commands

SN	AT Command	Description
[1]	AT+QFOTADL	Trigger Automatic Firmware Upgrade
[2]	AT+QFUPLEX	Upload Delta Firmware to Module via UART

12 Summary of Error Codes

This chapter introduces the **<err>** codes related to BC66/BC66-NA module.

The error codes listed in the following two tables are compliant with the 3GPP specifications. Customers can refer to *3GPP TS 27.007 V13.5.0, sub-clause 9.2* for all possible **<err>** values.

Table 7: Summary of General <err> (27.007)

<err>	Description
3	Operation not allowed
4	Operation not supported
10	USIM not inserted
13	USIM failure
14	USIM busy
20	USIM memory full
23	Memory failure
24	Text string too long
25	Invalid characters in text string
30	No network service
31	Network timeout
32	Network not allowed - emergency calls only
50	Incorrect parameters
100	Unknown

The following error codes are specific ones for BC66/BC66-NA module.

Table 8: Summary of Proprietary <err>

<err>	Description
107	PSD services not allowed
111	PLMN not allowed
112	Location area not allowed
113	Roaming not allowed in this location area
132	Service option not supported
133	Requested service option not subscribed
149	PDP authentication failure
584	Combined service not allowed
588	Feature not supported
591	Implicitly detached
592	Insufficient resources
596	Invalid <cid> value
598	Mode value not in range
606	Low layer failure
607	Missing or unknown failure
615	Network failure
630	Profile (<cid>) not defined
631	Unspecified protocol error
639	Service type not yet available
675	PDN type IPv4 only allowed
676	PDN type IPv6 only allowed
692	EPS service not allowed
695	EPS tracking area not allowed
696	Roaming not allowed in TA

697	Roaming not allowed in PLMN
698	Not suitable cells in TA
700	ESM failure
703	Congestion
704	UE security capability mismatch
705	Security mode rejected
709	No EPS bearer context activated
765	Invalid input value
766	Unsupported value or mode
767	Operation failed
769	Unable to get control of required module
770	USIM Invalid – network reject
772	USIM powered down
840	No service state
841	In cell search state
842	ERRC is deactivated
843	In cell-reselection state
845	In re-establishment state
846	In PSM state
847	No data transfer in idle state

NOTE

AT+CME=<n> command disables (<n>=0) or enables (<n>=1) the use of final result code **+CME ERROR: <err>**. When <n>=1, a limited set of error codes will be returned.

13 Appendix A References

Table 9: References

SN	References
[1]	MQTT V3.1 Protocol Specification
[2]	MQTT V3.1.1 Protocol Specification
[3]	3GPP 27.007 AT Command Set for User Equipment
[4]	3GPP 27.005 Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
[5]	http://www.openmobilealliance.org/wp/OMNA/LwM2M/LwM2MRegistry.html
[6]	http://www.openmobilealliance.org/release/LightweightM2M/V1_1-20180710-A/
[7]	https://www.omaspecworks.org/
[8]	OMA-ERELD-LightweightM2M-V1_1-20180710-A
[9]	OMA-RD-LightweightM2M-V1_1-20180710-A
[10]	OMA-TS-LightweightM2M_Core-V1_1-20180710-A
[11]	OMA-TS-LightweightM2M_Transport-V1_1-20180710-A

Table 10: Terms and Abbreviations

Abbreviation	Description
3GPP	3 rd Generation Partnership Project
ACK	Acknowledgement
AM	Acknowledged Mode
APN	Access Point Name

ARQ	Automatic Repeat ReQuest
BCCH	Broadcast Control Channel
BCD	Binary Coded Decimal
CN	Core Network
DCE	Data Communication Equipment (typically the module)
DHCP	Dynamic Host Configuration Protocol
DL	Downlink (Forward Link)
DL-SCH	Downlink Shared channel
DTE	Data Terminal Equipment (typically the MCU/external processor)
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
ECL	Enhanced Coverage Level
EMM	EPS Mobility Management
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
eDRX	Extended Discontinuous Reception
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 ARQ
HPLMN	Home Public Land Mobile Network
HSDPA	High Speed Downlink Packet Access

HSUPA	High-Speed Uplink Packet Access
ICCID	Integrated Circuit Card Identity
ICMP	Internet Control Messages Protocol
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
MQTT	Message Queuing Telemetry Transport
MS	Mobile Station
MT	Mobile Termination (typically the module)
MTU	Maximum Transfer Unit
NB-IoT	Narrow Band Internet of Thing
NSLPI	NAS Signaling Low Priority Indication
NVRAM	Non-Volatile Random-Access Memory
PAD	Packet Assembler/Disassemble
PCI	Physical Cell Identification
PCO	Protocol Configuration Options
P-CSCF	Proxy CSCF
PDCP	Packet Data Convergence Protocol
PDN	Public Data Network
PDP	Packet Data Protocol
PSM	Power Saving Mode
PSD	Packet Switch Domain
PSK	Pre-Shared key
QoS	Quality of Service

RAM	Random Access Memory
RFC	Request For Comments
RLC	Radio Link Control
RRC	Radio Resource Control
RSRP	Received Signal Received Power
RSRQ	Reference Signal Received Quality
RSSI	Received Signal Strength Indicator
RTC	Real Time Clock
SNDCP	Sub-Network Dependent Convergence Protocol
SNR	Signal-to-Noise Ratio
SVN	Software Version Number
TA	Terminal Adapter (typically the module)
TCP	Transmission Control Protocol
TE	Terminal Equipment (typically the MCU/external processor)
TTL	Time To Live
UDP	User Datagram Protocol
UE	User Equipment (typically the module)
UICC	Universal Integrated Circuit Card
UL	Uplink (Reverse Link)
UL-SCH	Uplink Shared Channel
URC	Unsolicited Result Code
UTC	Universal Time Coordinated
UUID	Universally Unique Identifier