CC660D-LS

AT Commands Manual

Satellite Communication Module Series

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About the Document

Revision History

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1 Introduction

This document gives details of the AT Command Set supported by CC660D-LS module.

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>** 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 the command line.
- ● **[...]**   Optional parameter of a command or an optional part of TA information response. Square brackets do not appear on the command line. When an optional parameter is not given in a command, the new value equals to its previous value or the default settings, unless otherwise specified.
- ● **<u>Underline</u>**   Default setting of a parameter.

1.2. AT Command Syntax

All command lines must start with **AT** or **at** and end with **<CR>**. Information responses and result codes always start and end with a carriage return character and a line feed character: **<CR><LF><response><CR><LF>**. In tables presenting commands and responses throughout this document, only the commands and responses are presented, and **<CR>** and **<LF>** are deliberately omitted.

AT commands implemented by CC660D-LS module falls into two categories syntactically: "Basic", and "Extended", as listed below:

- ● **Basic Command**

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<n>**, which tells the DCE (Data

Circuit-terminating Equipment) whether received characters should be echoed back to the DTE (Data Terminal Equipment) according to the value of **<n>**. **<n>** is optional and a default will be used if it is omitted.

- **Extended Command**

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

Table 1: Types of AT Commands

Command Type	Syntax	Description
Test Command	**AT+<cmd>=?**	Test the existence of corresponding Write Command and return information about the type, value, or range of its parameter.
Read Command	**AT+<cmd>?**	Check the current parameter value of a corresponding Write Command.
Write Command	**AT+<cmd>=<p1>[,<p2>[,<p3>[...]]]**	Set user-definable parameter value.
Execution Command	**AT+<cmd>**	Return a specific information parameter or perform a specific action.

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

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

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

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

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

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

1.3. AT Command Responses

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

Responses will be in the format of:

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

Or

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

1.4. Declaration of AT Command Examples

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

1.5. Description of Data Mode

CC660D-LS module supports two working modes of the COM port: AT command mode and data mode. In the AT command mode, the inputted data via a COM port are treated as AT commands. While in the data mode, it will be treated as data.

In the AT command mode, the CC660D-LS module will enter data mode within 500 ms after the **>** response, after which if **"Ctrl" + "Z"** is entered, the modules will exit data mode and send the data to a COM port, however if "**Esc**" is entered, the modules will exit data mode and cancel sending data to the COM port.

> **NOTE**
>
> 1. After the **>** response, it is recommended for the MCU to wait for 500 ms before sending the data.

2. In the data mode, URCs will be discarded. To avoid this, please enter the data to be sent immediately and then exit the data mode as soon as possible.

2 Product Information Query Commands

2.1. ATI   Display Product Identification Information

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

ATI Display Product Identification Information	
Execution Command **ATI**	Response **Quectel_Ltd** **\<objectID\>** **Revision: \<revision\>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

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

Example

```
ATI
Quectel_Ltd
Quectel_CC660D-LS
Revision: CC660DLSAAR01A01

OK
```

2.2. AT+CGMI   Request Manufacturer Identification

This Execution Command returns manufacturer information.

AT+CGMI Request Manufacturer Identification	
Test Command **AT+CGMI=?**	Response **OK**
Execution Command **AT+CGMI**	Response **Quectel_Ltd** **\<objectID\>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

\<objectID\>   String type. Identifier of device type.

Example

AT+CGMI
Quectel_Ltd
Quectel_CC660D-LS

OK

2.3. AT+CGMM   Request Model Identification

This Execution Command returns the model information of the product.

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

Maximum Response Time	300 ms
Characteristics	/

Parameter

<objectID>	String type. Identifier of device type.

Example

AT+CGMM
Quectel_CC660D-LS

OK

2.4. AT+CGMR   Request Manufacturer Revision

This Execution Command returns the manufacturer revision.

AT+CGMR Request Manufacturer Revision	
Test Command **AT+CGMR=?**	Response **OK**
Execution Command **AT+CGMR**	Response **Revision: <revision>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

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

Example

AT+CGMR
Revision: CC660DLSAAR01A01

2.5. AT+CGSN   Request Product Serial Number

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

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

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

Parameter

<snt>	Integer type. The serial number type that has been requested.
	0 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.
<err>	Integer type. Error codes. See *Chapter 12* for details.

Example

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

OK

3 UART Function Commands

3.1. ATE   Set Command Echo Mode

This Execution Command determines whether or not the UE echoes characters received from external MCU 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_CC660D-LS
Revision: CC660DLSAAR01A01

OK
ATE1
OK
ATI
```

ATI
Quectel_Ltd
Quectel_ CC660D-LS
Revision: CC660DLSAAR01A01

OK

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

AT+IPR　Set TE-TA Fixed Local Rate	
Test Command **AT+IPR=?**	Response **+IPR: (**list of supported auto detectable **<rate>**s)**,(**list of s upported 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>	Integer type. Baud rate per second.
	0 (Auto baud)
	110
	300
	1200
	2400
	4800

	9600
	19200
	38400
	57600
	115200
	230400
	460800
	921600
<err>	Integer type. Error codes. See *Chapter 12* for details.

NOTE

1. The settings will apply to all channels routed through one connection level for UART.
2. The command is not applicable for the USB interface.
3. CC660D-LS support synchronizing auto baud rates below 115200 bps (included).

Example

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

4 Network State Query Commands

4.1. AT+CEREG   EPS Network Registration Status

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

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

If the UE requests PSM for reducing its power consumption, the Write Command controls the presentation of the following URC:
+CEREG: <stat>[,[<tac>],[<ci>],[<AcT>][,[<cause_type>],[<reject_cause>][,[<Active-Time>],[<Periodic-TAU>]]]].

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

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

This Test Command returns supported parameter values.

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

	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\>[,[\<tac\>],[\<ci\>],[\<AcT\>][,[\<cause_type\>],[\<reject_cause\>][,[\<Active-Time\>],[\<Periodic-TAU\>]]]]** **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. Disable or enable network registration URC.

0   Disable network registration URC
1   Enable network registration URC: **+CEREG: \<stat\>**
2   Enable network registration and location information URC:
    +CEREG: \<stat\>[,[\<tac\>],[\<ci\>],[\<AcT\>]]
3   Enable network registration, location information and EMM cause value information
    URC:
    +CEREG: \<stat\>[,[\<tac\>],[\<ci\>],[\<AcT\>][,\<cause_type\>,\<reject_cause\>]]
4   For a UE that requests PSM, enable network registration and location information

URC:

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

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

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

<stat>   Integer type. EPS registration status.

0   Not registered, MT is not currently searching an operator to register to.

1   Registered, home network

2   Not registered, but MT is currently trying to attach or searching an operator to register to.

3   Registration denied

4   Unknown (e.g. out of E-UTRAN coverage)

5   Registered, roaming

<tac>   String type. Two bytes tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).

<ci>   String type. Four-byte E-UTRAN cell ID in hexadecimal format.

<AcT>   Integer type. Access technology of the registered network.

7   E-UTRAN

9   E-UTRAN (NB-S1 mode)

<cause_type>   Integer type. The type of **<reject_cause>**.

0   Indicates that **<reject_cause>** contains an EMM cause value (see *3GPP TS 24.008 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>   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 *GPRS Timer 2 IE in 3GPP TS 24.008 Table 10.5.163/3Gpp TS 24.008*, *3GPP TS 23.682* and *3GPP TS 23.401*.

Bits 5 to 1 represents the binary coded timer value.

Bits 8 to 6 defines the timer value unit for the GPRS timer as follows:

Bits

8 7 6

0 0 0 value is incremented in multiples of 2 seconds

0 0 1 value is incremented in multiples of 1 minute

0 1 0 value is incremented in multiples of 6 minutes

1 1 1 value indicates that the timer is deactivated

<Periodic-TAU>   String type. One byte in an 8-bit format. Indicates the extended periodic TAU value (T3412) allocated to the UE in E-UTRAN. The extended periodic TAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours). For the coding and the value range, refer to the

GPRS Timers 3 IE in 3GPP TS 24.008 Table 10.5.163a/3GPP TS 24.008, 3GPP TS 23.682 and 3GPP TS 23.401.

Bits 5 to 1 represents the binary coded timer value.

Bits 8 to 6 defines the timer value 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

1 1 1 value indicates that the timer is deactivated

\<err\>	Integer type. Error codes. See **Chapter 12** for details.

Example

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

OK
AT+CEREG=?
+CEREG: (0-5)

OK

4.2. AT+CESQ   Extended Signal Quality

This Execution Command 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.

This Test Command returns supported values as a compound value.

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 **<rssi>** < -110 dBm
	1 -110 dBm ≤ **<rssi>** < -109 dBm
	2 -109 dBm ≤ **<rssi>** < -108 dBm
	…
	61 -50 dBm ≤ **<rssi>** < -49 dBm
	62 -49 dBm ≤ **<rssi>** < -48 dBm
	63 -48 dBm ≤ **<rssi>**
	99 Not known or not detectable
<ber>	Integer type. Channel bit error rate (in percent).
	0…7 RxQual values RXQUAL_0…RXQUAL_7 as defined in *3GPP TS 45.008*
	99 Not known or not detectable
<rscp>	Integer type. Received signal code power (See *3GPP 25.133* and *3GPP 25.123*).
	0 **<rscp>** < -120 dBm
	1 -120 dBm ≤ **<rscp>** < -119 dBm
	2 -119 dBm ≤ **<rscp>** < -118 dBm
	…
	94 -27 dBm ≤ **<rscp>** < -26 dBm
	95 -26 dBm ≤ **<rscp>** < -25 dBm
	96 -25 dBm ≤ **<rscp>**
	255 Not known or not detectable
<ecno>	Integer type. Ec/No (See *3GPP 25.133*).
	0 **<ecno>** < -24 dBm
	1 -24 dBm ≤ **<ecno>** < -23.5 dBm

	2	-23.5 dBm ≤ **<ecno>** < -23 dBm
	…	
	47	-1 dBm ≤ **<ecno>** < -0.5 dBm
	48	-0.5 dBm ≤ **<ecno>** < 0 dBm
	49	0 dBm ≤ **<ecno>**
	255	Not known or not detectable
<rsrq>	Integer type. Reference signal received quality (RSRQ, see *3GPP 36.133*). When sending data is needed, RSRQ is recommended to be greater than -10 dB.	
	0	**<rsrq>** < -19.5 dB
	1	-19.5 dB ≤ **<rsrq>** < -19 dB
	2	-19 dB ≤ **<rsrq>** < -18.5 dB
	…	
	32	-4 dB ≤ **<rsrq>** < -3.5 dB
	33	-3.5 dB ≤ **<rsrq>** < -3 dB
	34	-3 dB ≤ **<rsrq>**
	255	Not known or not detectable
<rsrp>	Integer type. Reference signal received power (RSRP, see *3GPP 36.133*). When sending data is needed, RSRP is recommended to be greater than -115 dbm.	
	0	**<rsrp>** < -140 dBm
	1	-140 dBm ≤ **<rsrp>** < -139 dBm
	2	-139 dBm ≤ **<rsrp>** < -138 dBm
	…	
	95	-46 dBm ≤ **<rsrp>** < -45 dBm
	96	-45 dBm ≤ **<rsrp>** < -44 dBm
	97	-44 dBm ≤ **<rsrp>**
	255	Not known or not detectable
<err>	Integer type. Error codes. See **Chapter 12** for details.	

NOTE

1. For details of **<rssi>**, see **AT+CSQ**.
2. **<rscp>** and **<ecno>** are not applicable for NB-IoT network and should be set to "not known or not detectable" (255) for CC660D-LS module.
3. 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 < -110 dbm, or RSRQ < -11 dB

Example

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

OK

4.3. AT+CGATT   PS Attachment or Detachment

This 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. Refer to *Chapter 12* for possible **<err>** values.

The packet domain attach command **AT+CGATT=1** can be aborted while attach is in progress. The aborting of the attach progress is accomplished by the transmission from the DTE to DCE of any character. When aborted, detach will be performed and when detach completed, the result code is returned.

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

This Read Command returns the current packet domain service state.

This 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
\<err\>	Integer type. Error codes. See *Chapter 12* for details.

NOTE

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

This command returns the IP address of the device.

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

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

AT+CGPADDR Show PDP Addresses	
Test Command **AT+CGPADDR=?**	Response **[+CGPADDR:** (list of defined **\<cid\>**s)**]** **OK**

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

Parameter

<cid>	Integer type. A numeric parameter which specifies a particular PDP context definition (see **AT+CGDCONT**). If no **<cid>** is specified, the addresses for all defined contexts are returned.
<PDP_addr_1> and **<PDP_addr_2>**	
	String type. Identify the MT in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by **AT+CGDCONT** when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by **<cid>**. **<PDP_address>** is omitted if none is available. Both **<PDP_addr_1>** and **<PDP_addr_2>** are included when both IPv4 and IPv6 addresses are assigned, with **<PDP_addr_1>** containing the IPv4 address and **<PDP_addr_2>** containing the IPv6 address. **<PDP_addr_1>** is preferred for containing address information when there is only one address. The string is given as a dot-separated numeric (0–255) parameter in 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.

> **NOTE**
>
> 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

This 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.

This Write Command controls the presentation of an URC. If **<n>**=1, **+CSCON: <mode>** is sent from the MT when the connection mode of the MT is changed.

When the MT is in E-UTRAN, the mode of the MT refers to idle when no PS signaling connection and to connected mode when a PS signaling connection between MT and network is setup.

The **<state>** value indicates the state of the MT when the MT is in E-UTRAN.

This Read Command returns the status of result code presentation and an integer **<mode>** which shows whether the MT is currently in idle mode or connected mode.
This Test Command returns supported values as a compound value.

AT+CSCON Signaling Connection Status	
Test Command **AT+CSCON=?**	Response **+CSCON: (**list of supported **<n>**s**)**

	OK
Read Command **AT+CSCON?**	Response **+CSCON: <n>,<mode>** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Write Command **AT+CSCON=<n>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	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 URC.
	0 Disable the URC
	1 Enable URC **+CSCON: <mode>**
<mode>	Integer type. The signaling connection status.
	0 Idle
	1 Connected
<err>	Integer type. Error codes. See *Chapter 12* for details.

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

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

This Test Command returns supported values as a compound value.

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

Parameter

<rssi>	Integer type. Received signal strength level.	
	0	-113 dBm or less
	1	-111 dBm
	2–30	-109 to -53 dBm
	31	-51 dBm or greater

	99	Not known or not detectable
<ber>		Integer type. Channel bit error rate (in percent).
	0…7	RxQual values RXQUAL_0…RXQUAL_7 as defined in *3GPP TS 45.008*
	99	Not known or not detectable
<err>		Integer type. Error codes. Please refer to *Chapter 12* for details.

Example

> **AT+CSQ**
> **+CSQ: 22,0**
>
> **OK**

4.7. AT+QENG   Engineering Mode

This command queries 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.

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** When **<mode>**=1: **+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>**

OK

When **<mode>**=2:
+QENG: 3,<sleep_duration>,<Rx_time>,<Tx_time>

OK

When **<mode>**=3:
+QENG: 4,<EMM_state>,<EMM_mode>,<PLMN_state>,<PLMN_type>,<selectPLMN>

OK

If there is any error:
ERROR
Or
+CME ERROR: <err>

Maximum Response Time	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
	3	Display PLMN status
<sc_EARFCN>		Integer type. The EARFCN for the serving cell. Range: 0–262143.
<sc_EARFCN_offset>		Integer type. The EARFCN offset for the 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. Physical cell ID of the serving cell. Range: 0–503.
<sc_cellID>		String type. Four-byte (28-bit) cell ID in hexadecimal format for the serving cell.
<sc_RSRP>		Signed integer. RSRP value in dBm for the serving cell. The value can be negative.
<sc_RSRQ>		Signed integer. RSRQ value in dB for the serving cell. The RSRQ value can be negative.

<sc_RSSI>	Signed integer. RSSI value in dBm for the serving cell. The RSSI value can be negative.
<sc_SINR>	Signed integer. The last SINR value in dB for the serving cell. The value can be negative.
<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 the serving cell. Range: 0–2. Only available in RRC connected state.
<sc_Tx_pwr>	Signed integer. The current transmission power of UE. Unit: cBm. (0 cBm = 1 mW, and this parameter can be a negative value)
<operation_mode>	Integer type. Operation mode of the serving cell: 0 In band same PCI 1 In band different PCI 2 Guard band 3 Stand alone
<nc_EARFCN>	Integer type. The EARFCN for neighbor cell(s). Range: 0–262143.
<nc_EARFCN_offset>	Integer type. The EARFCN offset for the neighbor cell(s): 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. Physical cell ID of the neighbor cell(s). Range: 0–503.
<nc_RSRP>	Signed integer. RSRP value in dBm for neighbor cell(s) which can be negative.
<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: 0–100). 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: 0–100). 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: 0–100). 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: byte.
<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: byte.
<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: 0.1 s.
<Rx_time>	Integer type. The total Rx time from the latest boot-up. Unit: 0.1 s.
<Tx_time>	Integer type. The total Tx time from the latest boot-up. Unit: 0.1 s.
<EMM_state>	Integer type. EMM state.
	0 Null

	1	Deregister
	2	Registered initiated
	3	Registered
	4	Deregister initiated
	5	TAU initiated
	6	Service Request initiated
	7	Unknown
<EMM_mode>	Integer type. Modem state.	
	0	Unknown
	1	Idle
	2	PSM
	3	Connected
<PLMN_state>	Integer type. PLMN state.	
	0	No PLMN
	1	Searching
	2	Selected
	3	Unknown (deregistering or other unknown states)
<PLMN_type>	Integer type. PLMN type.	
	0	EHPLMN
	1	FPLMN
	2	UPLMN
	3	OPLMN
	4	Others
	5	Unknown
<selectPLMN>	String type. Current PLMN in numeric form.	
<err>	Integer type. Error codes. See *Chapter 12* for details.	

4.8. AT+QIPADDR   Query the IP Address of UE

This 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>** **[+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

4.9. AT+QOOSAIND   Enable/Disable the URC Reporting OOSA Status

This command enables/disables the URC **+QOOSAIND: <status>** for indicating whether it's entering/exiting OOSA status.

AT+QOOSAIND Enable/Disable the URC Reporting OOSA Status	
Test Command **AT+QOOSAIND=?**	Response **+QOOSAIND: (**list of supported **<mode>**s**)** **OK**
Read Command **AT+QOOSAIND?**	Response **+QOOSAIND: <mode>,<status>** **OK**
Write Command **AT+QOOSAIND=<mode>**	Response **OK** If there is any error:

	ERROR Or **+CME ERROR: \<err>**
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately. Remain valid after deep-sleep wakeup. The configuration will be saved to NVRAM (**AT&W** should be executed after this command is issued).

Parameter

\<mode>	Integer type. Enable/Disable the URC for indicating whether it's entering/exiting OOSA status.
	<u>0</u> Disable
	1 Enable
\<status>	Integer type. Enter/Exit OOSA status.
	<u>0</u> Exit
	1 Enter

Example

AT+QOOSAIND=?
+QOOSAIND: (0,1)

OK
AT+QOOSAIND?
+QOOSAIND: 0,0

OK

4.10. AT+QGNSSINFO   Set GNSS Information

This command is used by the MCU to actively set and query the current GNSS position information of the terminal. The module will use the GNSS position information inputted by this command for satellite communication timing and frequency compensation. When the module needs GNSS position information, it will actively report URC **+QGNSSINFO: 1** to notify the MCU to input GNSS position information to the module. For URC details, see *Chapter 4.10.1*.

AT+QGNSSINFO Set GNSS Information	
Test Command	Response

AT+QGNSSINFO=?	+QGNSSINFO: (range of supported **<latitude>**s),(range of supported **<longitude>**s),(range of supported **<altitude>**s),(range of supported **<speed>**s),(range of supported **<accuracy>**s) **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Read Command **AT+QGNSSINFO?**	Response **+QGNSSINFO:<latitude>,<longitude>,<altitude>,<speed>,<accuracy>** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Write Command **AT+QGNSSINFO=<latitude>,<longitude>,<altitude>,<speed>,<accuracy>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately. The configurations are not saved.

Parameter

<latitude>	Double type. The latitude value in degrees. The maximum length is 11.
<longitude>	Double type. The longitude value in degrees. The maximum length is 11.
<altitude>	Float type. The altitude value in meters above the WGS84 reference ellipsoid.
<speed>	Double type. The speed in m/s. The maximum length is 11.
<accuracy>	Integer type. The estimated horizontal accuracy radius in meters at the 68th percentile confidence level.
<err>	Error codes. See *Chapter 12* for details.

4.10.1. +QGNSSINFO: \<status\> Indicate Whether MCU Needs to Provide GNSS Information

+QGNSSINFO: \<status\> Indicate Whether MCU Needs to Provide GNSS Information	
+QGNSSINFO: \<status\>	Indicates whether the MCU needs to provide GNSS information.

Parameter

\<status\>	Integer type. Indicates whether the MCU needs to provide GNSS information.
	0 MCU does not need to provide GNSS information
	1 MCU needs to provide GNSS information
	(Set GNSS information through **AT+QGNSSINFO**)

5 PDN and APN Commands

5.1. AT+CGACT   PDP Context Activation/Deactivation

This Write Command activates or deactivates 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.

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

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

AT+CGACT PDP Context Activation/Deactivation	
Test Command **AT+CGACT=?**	Response **+CGACT:** (list of supported **<state>**s) **OK**

Read Command **AT+CGACT?**	Response **+CGACT: <cid>,<state>** **+CGACT: <cid>,<state>** **[…]** **OK**
Write Command **AT+CGACT=<state>,<cid>**	Response 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**).
<err>	Integer type. Error codes. See *Chapter 12* for details.

NOTE

1. For CC660D-LS module, **AT+CGACT** can only activate PDN connection, however, such connection cannot be used to transmit or receive data. To transmit or receive data, see **AT+QCACT** for details of PDP context activation.
2. 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

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

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

AT+CGAPNRC APN Rate Control	
Test Command **AT+CGAPNRC=?**	Response **+CGAPNRC: (**list of **<cid>**s associated with active contexts**)** **OK**
Write Command **AT+CGAPNRC=<cid>**	Response **+CGAPNRC: <cid>[,<additional_exception_reports>[,<uplink_time_unit>[,<maximum_uplink_rate>]]]** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<cid>	Integer type. A particular PDP context definition (see **AT+CGDCONT**).
<additional_exception_reports>	Integer type. Whether additional exception reports are allowed to be sent or not when the maximum uplink rate is reached. This refers to bit-4 of octet-1 of the APN rate control parameters IE as

specified in *3GPP TS 24.008 subclause 10.5.6.3.2*.

<table>
<tr><td></td><td>0</td><td>Additional exception reports at maximum rate reached are not allowed to be sent.</td></tr>
<tr><td></td><td>1</td><td>Additional exception reports at maximum rate reached are allowed to be sent.</td></tr>
<tr><td>**<uplink_time_unit>**</td><td colspan="2">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 3GPP TS 24.008 subclause 10.5.6.3.2*.</td></tr>
<tr><td></td><td>0</td><td>Unrestricted</td></tr>
<tr><td></td><td>1</td><td>Minute</td></tr>
<tr><td></td><td>2</td><td>Hour</td></tr>
<tr><td></td><td>3</td><td>Day</td></tr>
<tr><td></td><td>4</td><td>Week</td></tr>
<tr><td>**<maximum_uplink_rate>**</td><td colspan="2">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 *3GPP TS 24.008 subclause 10.5.6.3.2*.</td></tr>
<tr><td>**<err>**</td><td colspan="2">Integer type. Error codes. See **Chapter 12** for details.</td></tr>
</table>

5.3. AT+CGDCONT   Define a PDP Context

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

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

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

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

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

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)**,(**list of supported **<Reliable_data_service>**s)** **[...]** **OK**
Read Command **AT+CGDCONT?**	Response **[+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>[,<Reliable_data_service>]]]]]]]]]]** **[...]** **OK**
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>[,Reliable_data_service]]]]]]]]]]]]]]]**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command take effect immediately.

	The configurations will not be saved to NVRAM.
	If the defined **<cid>** is activated, the configurations will be valid after deep-sleep wakeup. Otherwise, it will be deleted after deep-sleep wakeup.

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.

        "IP"   Internet Protocol (*IETF STD 5*)
        "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 by **AT+CGPADDR**.
<d_comp>	Integer type. Controls PDP data compression.

        0   Off
        1   On (manufacturer preferred compression)
        2   V.42bis
        3   V.44

<h_comp>	Integer type. Controls PDP header compression.

        <u>0</u>   Off
        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. Controls how the MT/TA requests to get the IPv4 address information.

        <u>0</u>   IPv4 address allocation through NAS signaling
        1   IPv4 address allocated through DHCP

<request_type>	Integer type. The type of PDP context activation request for the PDP context. See *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 (see *3GPP TS 23.401 subclause 4.3.12.9*).

<u>0</u>   PDP context is for new PDP context establishment or for handover from a non-3GPP access network (how the MT decides whether the PDP context is for new PDP context establishment or for handover is implementation specific).

1   PDP context is for emergency bearer services

2   PDP context is for new PDP context establishment

3   PDP context is for handover from a non-3GPP access network

\<P-CSCF_discovery\>Integer type. Influences how the MT/TA requests to get the P-CSCF address (refer to *3GPP TS 24.229 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.

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

1   UE indicates that the PDP context is for IM CN subsystem-related signaling only

\<NSLPI\>   Integer type. The NAS signaling priority requested for this PDP context. MT utilizes the provided NSLPI information as specified in 3GPP TS 24.301 and 3GPP TS 24.008.

0   Indicates that this PDP context is to be activated with the value for the low priority indicator configured in the MT.

1   Indicates that this PDP context is to be activated with the value for the low priority indicator set to "MS is not configured for NAS signaling low priority".

\<securePCO\>   Integer type. Specifies whether security protected transmission of PCO is requested or not (applicable for EPS only).

0   Security protected transmission of PCO is not requested

1   Security protected transmission of PCO is requested

\<IPv4_MTU_discovery\>   Integer type. Influences how the MT/TA requests to get the IPv4 MTU size, see *3GPP TS 24.008 subclause 10.5.6.3*.

0   Preference of IPv4 MTU size discovery not influenced by **AT+CGDCONT**

1   Preference of IPv4 MTU size discovery through NAS signaling

\<local_addr_ind\>   Integer type. Indicates whether MS supports local IP address in TFTs

0   indicates that the MS does not support local IP address in TFTs

1   indicates that the MS supports local IP address in TFTs

\<Non-IP_MTU_discovery\>   Integer type. Influences how the MT/TA requests to get the Non-IP MTU size (see *3GPP TS 24.008 subclause 10.5.6.3).*

	0 Preference of Non-IP MTU size discovery not influenced by **AT+CGDCONT**
	1 Preference of Non-IP MTU size discovery through NAS signaling
<Reliable_data_service>	Integer type. Indicate whether the UE is using Reliable Data Service for a PDN connection or not (see *3GPP TS 24.008 subclause 10.5.6.3* and *3GPP TS 24.301*).
	0 Not use (currently only 0 is supported)
	1 Use
<err>	Integer type. Error codes. See **Chapter 12** for details.

NOTE

1. Only 3 PDP contexts can be activated simultaneously.
2. For EPS, **<PDP_addr>** field is omitted.
3. 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>**

Example

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

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

OK
```

5.4. AT+CIPCA   Initial PDP Context Activation

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

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

This Read Command returns the current settings of the command.

This Test Command returns values supported as a compound value.

AT+CIPCA Initial PDP Context Activation	
Test Command **AT+CIPCA=?**	Response **+CIPCA: (**list of supported **<n>**s**),(**list of supported **<attach_without_PDN>**s**)** **OK**
Read Command **AT+CIPCA?**	Response **+CIPCA: <n>,<attach_without_PDN>** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Write Command **AT+CIPCA=<n>,<attach_without_PDN>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. Remain valid after deep-sleep wakeup. The configurations will 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
<err>	Integer type. Error codes. See **Chapter 12** for details.

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 sets 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.

AT+QCGDEFCONT Set Default PSD Connection Settings	
Test Command **AT+QCGDEFCONT=?**	Response **+QCGDEFCONT: (**list of supported **<PDP_type>**s**)** **OK**
Read Command **AT+QCGDEFCONT?**	Response **+QCGDEFCONT: <PDP_type>[,<APN>[,<user_name>,<password>[,<auth_type>]]]** **OK**
Write Command **AT+QCGDEFCONT=<PDP_type>[,<APN>[,<user_name>,<password>[,<auth_type>]]]**	Response **OK** If there is any error: **ERROR**

	Or
	+CME ERROR: <err>
Maximum Response Time	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 (*IETF STD 5*)
	"IPV6"　　　Internet Protocol version 6 (*IETF RFC 2460*)
	"IPV4V6"　　Dual IP stack (see *3GPP TS 24.301*)
	"Non-IP"　　Transfer of Non-IP data to external packet network (see *3GPP TS 24.301*)
<APN>	String type. A logical name that is used to select the GGSN or the external packet data network. The maximum configurable APN length is 99 bytes. If the value is null or omitted, then the subscription value will be requested.
<user_name>	String type. The user's name for accessing to the IP network.
<password>	String type. The password for accessing to the IP network.
<auth_type>	Integer type. APN authentication type. Range: 0–2.
	0　　None
	1　　PAP
	2　　CHAP
<err>	Integer type. Error codes. See **Chapter 12** for details.

NOTE

1. If **<user_name>** and **<password>** are omitted, **<auth_type>** will be None by default.
2. If **<user_name>** and **<password>** are specified, **<auth_type>** will be PAP by default.

5.6. AT+QGACT　Activate/Deactivate a PDN Context

This 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** or **+CME ERROR: <err>** 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_typ e>,<APN>[,<user_name>,<pwd>[,<bearer_type>[,<SIM_ID>]]]**, while for the deactivation requireme nt 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>]]]]**.

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
<err>	Integer type. Error codes. See *Chapter 12* for details.

> **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.   **54 / 122**

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

+QGACT: 1

6 Other Network Commands

6.1. AT+CCIOTOPT   CIoT Optimization Configuration

This Write Command controls which CIoT 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 CIoT EPS optimizations that are supported by the network. UE supporting CIoT functionality support control plane CIoT EPS optimization or user plane CIoT EPS optimization or both (see *3GPP TS 24.301 subclause 9.9.3.34*). Based on the application characteristics the UE may prefer to be registered for control plane CIoT EPS optimization or for user plane CIoT EPS optimization (*see 3GPP TS 24.301 subclause 9.9.3.0B*).

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

This Write Command is used also to control the URC **+CCIOTOPTI**. The URC **+CCIOTOPTI: <supported_network_opt>** is used to indicate the supported CIoT EPS optimization by the network.

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

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

	If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	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

<n>	Integer type. Enable/disable reporting of URC **+CCIOTOPTI**.
	<u>0</u> Disable reporting
	1 Enable reporting, **+CCIOTOPTI: <supported_network_opt>**
	2 Disable reporting and reset the parameters for CIoT EPS optimization to the default values
<supported_UE_opt>	Integer type. Indicates the UE's support for CIoT EPS optimizations.
	<u>1</u> Support control plane CIoT EPS optimization
	3 Support both control plane and user plane CIoT EPS optimizations
<preferred_UE_opt>	Integer type. Indicates the UE's preference for CIoT EPS optimizations.
	0 No preference
	<u>1</u> Preference for control plane CIoT EPS optimization
	2 Preference for user plane CIoT EPS optimization
<supported_network_opt>	Integer type. Indicates the network's support for CIoT EPS optimizations.
	0 Not support
	1 Support control plane CIoT EPS optimization
	2 Support user plane CIoT EPS optimization
	3 Support both control plane and user plane CIoT EPS optimizations
<err>	Integer type. Error codes. See **Chapter 12** for details.

6.2. AT+COPS　Operator Selection

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

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

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

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

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

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

>[,<AcT>]]	OK
	If there is any error:
	ERROR
	Or
	+CME ERROR: <err>
Maximum Response Time	900 s
Characteristics	The command takes effect immediately.
	Remain valid after deep-sleep wakeup.
	The configurations will be saved to NVRAM.

Parameter

<mode>	Integer type.
	0 Automatic mode (**<oper>** field is ignored)
	1 Manual operator selection (**<oper>** field shall be present)
	2 Manually deregister from network
	3 Set **<format>** not shown in read command response
	4 Manual/automatic selected. If manual selection fails, automatic mode (**<mode>**=0) is entered
<format>	Integer type.
	2 Numeric **<oper>**
<oper>	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.
<stat>	Integer type.
	0 Unknown
	1 Operator available
	2 Operator currently selected
	3 Operator forbidden to be selected
<AcT>	Integer type. Access technology selected.
	7 E-UTRAN
	9 E-UTRAN (NB-S1 mode)
<err>	Integer type. Error codes. See *Chapter 12* for details.

NOTE

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

3. This command will return **OK** only when the network is successfully registered.

Example

AT+COPS=0
OK

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

OK

6.3. AT+CSODCP   Send Originating Data via Control Plane

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

This command optionally indicates that the application on the MT expects that the exchange of data:
● will be completed with this uplink data transfer; or
● will be completed with the next received downlink data.

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

AT+CSODCP Send Originating Data via Control Plane	
Write Command **AT+CSODCP=<cid>,<cpdata_length>,<cpdata>,[<RAI>[,<type_of_user_data>[,<sourcePort>[,<destinationPort >]]]]**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Test Command **AT+CSODCP=?**	Response **+CSODCP: (**range of supported **<cid>**s**),(**maximum number of octets of user data indicated by **<cpdata_length>),(**range of supported **<RAI>**s**),(**list of supported **<type_of_user_data>**s**),(**list of supported **<sourcePort>**s**),(**list of supported **<destinationPort>**s**)**
Maximum Response Time	5 s

Characteristics	/

Parameter

<cid>	Integer type. Specifies a particular PDP context definition. Range: 1–15.
<cpdata_length>	Integer type. Indicates the number of octets of the **<cpdata>** information element. The maximum length is 1500 bytes.
<cpdata>	String type. The data to be sent.
<RAI>	Integer type. Indicates the value of the release assistance indication.
	0 No information available.
	1 The MT expects that the exchange of data will be completed with the transmission of the ESM DATA TRANSPORT message.
	2 The MT expects that the exchange of data will be completed with the receipt of an ESM DATA TRANSPORT message.
<type_of_user_data>	Integer type. Indicates whether the user data that is transmitted is regular or exceptional.
	0 Regular data
	1 Exception data
<sourcePort>	Integer type. Indicates the source port number on the originator entity. Range: 0–15. (refer *3GPP TS 24.250 [168] subclause 5.2.4*).
<destinationPort>	Integer type. Indicates the destination port number on the receiver entity Range: 0–15. (refer *3GPP TS 24.250 [1681 subclause 5.2.5*).
<err>	Error code. See **Chapter 12** for details.

6.4. AT+QBAND   Get and Set Mobile Operation Band

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

AT+QBAND Get and Set Mobile Operation Band	
Test Command **AT+QBAND=?**	Response **+QBAND: (**range of supported **<band_number>**s)**,(**list of supported **<operating_band>**s)** **OK**
Read Command **AT+QBAND?**	Response **+QBAND: <operating_band>** **OK** 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
	1–3 Number of bands to be locked
<band>	Integer type. Currently preferred NB-IoT band to be searched.
	Valid values: 23, 255, 256.
<operating_band>	Integer type. The band(s) that has been set earlier.
	Valid values: 23, 255, 256.
<err>	Integer type. Error codes. See *Chapter 12* for details.

Example

```
AT+QBAND=?                    //Query the list of supported bands for the modules.
+QBAND: (0-3),(23,255,256)

OK
AT+QBAND=1,255                //Set the band to be used.

OK
AT+QBAND?                     //Query the band that has been set earlier.
+QBAND: 255

OK
```

6.5. AT+QBANDSL   Set the List of Preferred Bands to Be Searched

This 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.

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.
<err>	Integer type. Error codes. See *Chapter 12* for details.

Example

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

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

This command clears stored EARFCN list for the UE.

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	The command takes effect after reboot.
	Remain valid after deep-sleep wakeup.
	The configurations will be saved to NVRAM automatically.

Parameter

<status>	Integer type. Result of EARFCN clearance.	
	0	Successful
	2	Failed
	3	Not found
<err>	Integer type. Error codes. See **Chapter 12** for details.	

Example

```
AT+QCSEARFCN
+QCSEARFCN: 0

OK
```

6.7. AT+QLEDMODE*   Configure Network Status Indication Light

This command enables or disables the network status indication light (NETLIGHT).

AT+QLEDMODE* Configure Network Status Indication Light	
Test Command	Response
AT+QLEDMODE=?	**+QLEDMODE: (**list of supported **<mode>**s**)**
	OK
Read Command	Response
AT+QLEDMODE?	**+QLEDMODE: <mode>**
	OK

Write Command	Response
AT+QLEDMODE=<mode>	**OK**
	If there is any error:
	ERROR
	Or
	+CME ERROR: <err>
Characteristics	/

Parameter

<mode>	Integer type.
	0 Disable the network status indication light
	1 Enable the network status indication light
<err>	Integer type. Error codes. See **Chapter 12** for details.

NOTE

When the network status indication light (NETLIGHT) is disabled, it is in LED OFF. When it is enabled, it indicates different states of the modules.
- The NETLIGHT level is always low (LED OFF): the module is not working or in Idle/PSM state.
- The NETLIGHT level is 64 ms high (LED ON)/ 800 ms low (LED OFF): Network Searching.
- The NETLIGHT level is 64 ms high (LED ON)/ 2000 ms low (LED OFF): Network Connected.

Example

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

OK
```

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

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

AT+QLOCKF   Lock NB-IoT Frequency and PCI

Test Command **AT+QLOCKF=?**	Response **OK**
Read Command **AT+QLOCKF?**	Response **OK**
Write Command Unlock NB-IoT Frequency(**<mode>**=0) **AT+QLOCKF=<mode>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Write Command Lock NB-IoT Frequency (**<mode>**=1) **AT+QLOCKF=<mode>,<EARFCN>[,< EARFCN_offset>][,<pci>]**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Write Command Set priority frequency (**<mode>**=2) **AT+QLCOKF=<mode>,<PLMN>,<EAR FCN_number>,<EARFCN>[,EARFCN] …**	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
	2 Set the preferred frequency
<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.
\<PLMN\>		String type. PLMN.
\<EARFCN_number\>		Integer type. The number of EARFCNs to be set. Range: 1–8.
\<err\>		Integer type. Error codes. See *Chapter 12* for details.

NOTE

1. This Write Command should be conducted after executing **AT+CFUN=0**.
2. When setting **\<mode\>**=2, the valid range for **\<EARFCN\>** is from 0 to 65535.
3. **\<mode\>**=2 is only applicable to valid downlink carrier frequency setting.

Example

AT+QLOCKF=2,"46011",1,2508
OK

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).

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

AT+CIMI Request International Mobile Subscriber Identity	
Test Command **AT+CIMI=?**	Response **OK**
Execution Command **AT+CIMI**	Response **<IMSI>** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<IMSI>	String type without double quotes. International Mobile Subscriber Identity.
<err>	Integer type. Error codes. See *Chapter 12* for details.

Example

AT+CIMI
460001357924680

OK

7.2. AT+CLCK   Facility Lock

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

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

AT+CLCK Facility Lock	
Test Command **AT+CLCK=?**	Response **+CLCK: (**list of supported **<fac>**s**)** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Write Command **AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]]**	Response when **<mode>**=0 or 1 and the command is executed successfully: **OK** when **<mode>**=2 and the command is executed successfully: **+CLCK: <status>[,<class>]** **[+CLCK: <status>,<class>** **[...]]** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after reboot. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

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 is issued)
	"PN"	Network personalization (see *3GPP TS 22.022*)
	"PU"	Network subset personalization (see *3GPP TS 22.022*)
	"PP"	Service provider personalization (see *3GPP TS 22.022*)
	"PC"	Corporate personalization (see *3GPP TS 22.022*)
\<mode>	Integer type.	
	0	Unlock
	1	Lock
	2	Query status
\<passwd>	String type. It shall be the same as the password specified for the facility from the MT user interface or as the password set with **AT+CPWD**.	
\<class>	Integer type. A sum of integers each representing a class of information. Default: 7.	
	1	Voice (telephony)
	2	Data (refers to all bearer services; when **\<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)
	7	Voice, data, and fax
	8	Short message service
	16	Data circuit sync
	32	Data circuit async
	64	Dedicated packet access
	128	Dedicated PAD access
\<status>	Integer type. Status of facility.	
	0	Not active
	1	Active
\<err>	Integer type. Error codes. See *Chapter 12* for details.	

NOTE

Some firmware versions of the modules only support **\<fac>**="SC", please contact Quectel Technical Support for details.

Example

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

OK

7.3. AT+CPIN   Enter PIN

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>[,<newpin>][,<newpin>]**	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, **<newpin>**, 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	The command takes effect after reboot. Remain valid after deep-sleep wakeup. The configurations will be saved to NVRAM automatically.

Parameter

<code>	String type. Type of password required.	
	READY	No further entry needed.
	SIM PIN	MT is waiting for USIM PIN.
	SIM PUK	MT is waiting for USIM PUK.
	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 is acknowledged with **+CME ERROR: 17**.
	SIM PUK2	MT is waiting for USIM PUK 2 to be given. Possible only if the preceding command is acknowledged with error **+CME ERROR: 18**.
<pin>	String type. Password.	
<newpin>	String type. If the PIN required is "SIM PUK" or "SIM PUK2", it is the new password.	
<err>	Integer type. Error codes. See *Chapter 12* for details.	

Example

```
AT+CPIN?
+CPIN: READY

OK
```

7.4. AT+CPINR   Remaining PIN Retries

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

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

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

AT+CPINR Remaining PIN Retries	
Test Command **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. Selected type of PIN.
<retries>	Integer type. Number of remaining retries per PIN.
<default_retries>	Integer type. Number of default retries per PIN.
<code>	String type. Type of PIN. All values listed under the description of **<code>** in **AT+CPIN**, except "READY".
<err>	Integer type. Error codes. See *Chapter 12* for details.

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

This Write Command selects a list in the USIM.

This Read Command returns the selected PLMN selector list from the USIM.

This Test Command returns the whole index range supported lists by the USIM as a compound value.

AT+CPLS Selection of Preferred PLMN List	
Test Command **AT+CPLS=?**	Response **+CPLS:** (list of supported **<list>**s) **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Read Command **AT+CPLS?**	Response **+CPLS: <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. The PLMN selector.
	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
<err>	Integer type. Error codes. See **Chapter 12** for details.

Example

AT+CPLS?
+CPLS: 1

OK

7.6. AT+CPOL   Preferred PLMN List

This command edits the PLMN Selector with Access Technology lists in the USIM card.

This 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.

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

This Test Command returns the whole index range and operator format supported by the USIM.

AT+CPOL Preferred PLMN List	
Test Command **AT+CPOL=?**	Response **+CPOL: (**range of supported **<index>**s)**,(**list of supported **<format>**s) **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Read Command **AT+CPOL?**	Response: **+CPOL: <index1>,<format>,<oper1>[,<GSM_AcT1>,<GSM_Compact_AcT1>,<UTRAN_AcT1>,<E-UTRAN_AcT1>** **[+CPOL:<index2>,<format>,<oper2>[,<GSM_AcT2>,<GSM_Compact_AcT2>,<UTRAN_AcT2>,<E-UTRAN_AcT2,>]** **[...]]** **OK** If there is any error:

	ERROR Or **+CME ERROR: \<err>**
Write Command **AT+CPOL=\<index>**	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

\<index>	Integer type. The order number of operators in the USIM preferred operator list. Range: 1–85.
\<oper>	String type. Operator name.
\<format>	Integer type. Format of **\<oper>**. 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
\<err>	Integer type. Error codes. See *Chapter 12* for details.

NOTE

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**.

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

AT+CPWD Change Password	
Test Command **AT+CPWD=?**	Response **+CPWD:** list of supported **(<fac>,<pwdlength>)**s **OK** 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 (see *3GPP TS 22.022*)
	"PU"	Network subset personalization (see *3GPP TS 22.022*)
	"PP"	Service provider personalization (see *3GPP TS 22.022*)
	"PC"	Corporate personalization (see *3GPP TS 22.022*)
<oldpwd>,<newpwd>	String type. Old password/new password. The maximum length of password can be determined with **<pwdlength>**. Old password **<oldpwd>** shall be the same as the password specified for the facility from the MT user interface or with that set in **AT+CPWD**. **<newpwd>** is the new password.	
<pwdlength>	Integer type. The maximum length of the password for the facility. Unit: Byte.	
<err>	Integer type. Error codes. See *Chapter 12* for details.	

7.8. AT+CRSM   Restricted USIM Access

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

AT+CRSM Restricted USIM 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\>	Integer 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 *3GPP TS 51.011*.
\<data\>	String type. Information (in hexadecimal character format) which shall be written to the USIM.
\<pathID\>	String type. It contains the path of an elementary file on the UICC in hexadecimal format.
\<sw1\>,\<sw2\>	Integer type. Information from the (U)SIM about the execution of the actual command. These parameters are delivered to the TE in both cases of successful or failed execution of the command.
\<response\>	String type. Response of a successful completion of the command previously issued in HEX format. STATUS and GET RESPONSE return data, which gives information about the current elementary datafield. This information includes the type of file and its size (see *3GPP TS 51.011/102.221/31.102*). After READ BINARY or READ RECORD command the requested data will be returned. **\<response\>** is not returned after a successful UPDATE BINARY or UPDATE RECORD command.
\<err\>	Integer type. Error codes. See **Chapter 12** for details.

Example

```
AT+CRSM=176,28512,0,0,0
+CRSM:
144,0,"FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFF
FFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000F
FFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF000
0FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0
000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFF
F0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFF
FFF0000FFFFFF0000FFFFFF0000FFFFFF0000FFFFFF0000FF"

OK
```

7.9. AT+QCCID   USIM Card Identification

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

AT+QCCID USIM Card Identification	
Execution Command **AT+QCCID**	Response **+QCCID: <ICCID>** **OK**
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

This Write Command controls the setting of the UE's eDRX parameters. This 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.

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

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

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

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

AT+CEDRXS eDRX Setting	
Test Command **AT+CEDRXS=?**	Response **+CEDRXS: (**range of supported **<mode>**s**),(**list of supported **<AcT_type>**s**),(**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	Response

AT+CEDRXS=<mode>[,<AcT_type>[, <requested_eDRX_value>]]	**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 1 Enable the use of eDRX 2 Enable the use of eDRX and enable URC **+CEDRXP: <A cT_type>[,<requested_eDRX_value>[,<NW_provided_eDR X_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 URC. 5 E-UTRAN (NB-S1 mode)
<requested_eDRX_value>	String type. Half a byte in a 4-bit format. NB-S1 mode.

Bits

4	3	2	1	E-UTRAN eDRX cycle length duration
0	0	1	0	20.48 seconds
0	0	1	1	40.96 seconds
0	1	0	1	81.92 seconds
1	0	0	1	163.84 seconds
1	0	1	0	327.68 seconds
1	0	1	1	655.36 seconds
1	1	0	0	1310.72 seconds
1	1	0	1	2621.44 seconds
1	1	1	0	5242.88 seconds
1	1	1	1	10485.76 seconds

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

Bits

4	3	2	1	E-UTRAN eDRX cycle length duration
0	0	1	0	20.48 seconds
0	0	1	1	40.96 seconds
0	1	0	1	81.92 seconds
1	0	0	1	163.84 seconds
1	0	1	0	327.68 seconds
1	0	1	1	655.36 seconds
1	1	0	0	1310.72 seconds
1	1	0	1	2621.44 seconds
1	1	1	0	5242.88 seconds
1	1	1	1	10485.76 seconds

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

Bits

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

<err>	Integer type. Error codes. See **Chapter 12** for details.

Example

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

AT+CEDRXS?
+CEDRXS: 5,"0101"

OK

8.2. AT+CEDRXRDP   eDRX Read Dynamic Parameters

This 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 register ed to.

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

AT+CEDRXRDP eDRX Read Dynamic Parameters	
Test Command **AT+CEDRXRDP=?**	Response **OK**
Execution Command **AT+CEDRXRDP**	Response **+CEDRXRDP: <AcT_type>[,<requested_eDRX_value>[,< NW_provided_eDRX_value>[,<paging_time_window>]]]** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	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. 5 E-UTRAN (NB-S1 mode)
<requested_eDRX_value>	String type. Half a byte in a 4-bit format. Bits 4 3 2 1 E-UTRAN eDRX cycle length duration 0 0 1 0 20.48 seconds

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

<NW_provided_eDRX_value>	String type. Half a byte in a 4-bit format.			
	Bits			
	4	3	2	1	E-UTRAN eDRX cycle length duration
	0	0	1	0	20.48 seconds
	0	0	1	1	40.96 seconds
	0	1	0	1	81.92 seconds
	1	0	0	1	163.84 seconds
	1	0	1	0	327.68 seconds
	1	0	1	1	655.36 seconds
	1	1	0	0	1310.72 seconds
	1	1	0	1	2621.44 seconds
	1	1	1	0	5242.88 seconds
	1	1	1	1	10485.76 seconds

<paging_time_window>	String type. Half a byte in a 4-bit format.			
	Bits			
	4	3	2	1	Paging Time Window length
	0	0	0	0	2.56 seconds
	0	0	0	1	5.12 seconds
	0	0	1	0	7.68 seconds
	0	0	1	1	10.24 seconds
	0	1	0	0	12.8 seconds
	0	1	0	1	15.36 seconds
	0	1	1	0	17.92 seconds
	0	1	1	1	20.48 seconds
	1	0	0	0	23.04 seconds
	1	0	0	1	25.6 seconds
	1	0	1	0	28.16 seconds
	1	0	1	1	30.72 seconds
	1	1	0	0	33.28 seconds
	1	1	0	1	35.84 seconds
	1	1	1	0	38.4 seconds
	1	1	1	1	40.96 seconds

<err>	Integer type. Error codes. See *Chapter 12* for details.

Example

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

OK

AT+CEDRXRDP=?
OK

8.3. AT+CFUN   Set UE Functionality

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

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

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

AT+CFUN Set UE Functionality	
Test Command **AT+CFUN=?**	Response **+CFUN: (**list of supported **<fun>**s),(list of supported **<rst>**s**)** **OK**
Read Command **AT+CFUN?**	Response **+CFUN: <fun>** **OK**
Write Command **AT+CFUN=<fun>[,<rst>]**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	85 s, determined by network.
Characteristics	See parameters description.

Parameter

<fun>   Integer type. UE functionality level.

	0	Minimum functionality
	<u>1</u>	Full functionality
	4	Disable RF transmitting and receiving
	7	Disable USIM only. RF transmitting and receiving circuits are still active.
\<rst\>	Integer type. UE resetting.	
	<u>0</u>	The command takes effect immediately and remains valid after deep-sleep wakeup without saving configurations to NVRAM.
	1	The command takes effect after resetting and remains valid after deep-sleep wakeup, and the configurations will be saved to NVRAM automatically.
	2	The command takes effect immediately and remains valid after deep-sleep wakeup, and the configurations will be saved to NVRAM automatically.
\<err\>	Integer type. Error codes. See *Chapter 12* for details.	

Example

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

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

OK
```

8.4. AT+CPSMS   Power Saving Mode Setting

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

This Read Command returns the current parameter values.

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

AT+CPSMS Power Saving Mode Setting

Test Command AT+CPSMS=?	Response **+CPSMS: (**range of supported **<mode>**s)**,,,(**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 represents the binary coded timer value. Bits 8 to 6 defines 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 8 to 6 defines the timer value unit for the GPRS timer as follows: Bits	
	8 7 6	
	0 0 0	value is incremented in multiples of 2 seconds
	0 0 1	value is incremented in multiples of 1 minute
	0 1 0	value is incremented in multiples of 6 minutes
	1 1 1	value indicates that the timer is deactivated
<err>	Integer type. Error codes. See *Chapter 12* for details.	

NOTE

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

Example

```
AT+CPSMS=1,,,"01000011","01000011"
OK

AT+CPSMS?
+CPSMS: 1,,,"01000011","01000011"

OK

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

OK

8.5. AT+QEDRXCFG   Configure eDRX and PTW

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

AT+QEDRXCFG Configure eDRX	
Test Command **AT+QEDRXCFG=?**	Response **+QEDRXCFG: (**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) **OK**
Read Command **AT+QEDRXCFG?**	Response **+QEDRXCFG: <AcT_type>,<requested_eDRX_value>,<requested_paging_time_window_value>** **OK**
Write Command **AT+QEDRXCFG=<mode>[,<AcT_type>[,<requested_eDRX_value>[,<requested_paging_time_window_value>]]]**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	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

	1				Enable the use of eDRX
	2				Enable the use of eDRX and enable URC **+CE DRXP: <AcT_type>[,<requested_eDRX_value>[, <NW_provided_eDRX_value>[,<paging_time_wi ndow>]]]**
	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.

Bits

4	3	2	1	E-UTRAN eDRX cycle length duration
0	0	1	0	20.48 seconds
0	0	1	1	40.96 seconds
0	1	0	1	81.92 seconds
1	0	0	1	163.84 seconds
1	0	1	0	327.68 seconds
1	0	1	1	655.36 seconds
1	1	0	0	1310.72 seconds
1	1	0	1	2621.44 seconds
1	1	1	0	5242.88 seconds
1	1	1	1	10485.76 seconds

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

Bits

4	3	2	1	Paging Time Window 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.
	Bits
	4 3 2 1 E-UTRAN eDRX cycle length duration
	0 0 1 0 20.48 seconds
	0 0 1 1 40.96 seconds
	0 1 0 1 81.92 seconds
	1 0 0 1 163.84 seconds
	1 0 1 0 327.68 seconds
	1 0 1 1 655.36 seconds
	1 1 0 0 1310.72 seconds
	1 1 0 1 2621.44 seconds
	1 1 1 0 5242.88 seconds
	1 1 1 1 10485.76 seconds
<paging_time_window>	String type. Half a byte in a 4-bit format. NB-S1 mode.
	Bits
	4 3 2 1 Paging Time Window length
	0 0 0 0 2.56 seconds
	0 0 0 1 5.12 seconds
	0 0 1 0 7.68 seconds
	0 0 1 1 10.24 seconds
	0 1 0 0 12.8 seconds
	0 1 0 1 15.36 seconds
	0 1 1 0 17.92 seconds
	0 1 1 1 20.48 seconds
	1 0 0 0 23.04 seconds
	1 0 0 1 25.6 seconds
	1 0 1 0 28.16 seconds
	1 0 1 1 30.72 seconds
	1 1 0 0 33.28 seconds
	1 1 0 1 35.84 seconds
	1 1 1 0 38.4 seconds
	1 1 1 1 40.96 seconds
<err>	Integer type. Error codes. See **Chapter 12** for details.

Example

```
AT+QEDRXCFG=1,5,"0101","0001"
OK
AT+QEDRXCFG?
+QEDRXCFG: 5,"0101"

OK
```

8.6. AT+QNBIOTRAI   NB-IoT Release Assistance Indication

This command sets the NB-IoT release assistance indications.

AT+QNBIOTRAI NB-IoT Release Assistance Indication	
Test Command **AT+QNBIOTRAI=?**	Response **+QNBIOTRAI: (**range of supported **<rai_mode>**s) **OK**
Read Command **AT+QNBIOTRAI?**	Response **+QNBIOTRAI: <rai_mode>** **OK**
Write Command **AT+QNBIOTRAI=<rai_mode>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<rai_mode>	Integer type. Specifies release assistance information.
	0 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
<err>	Integer type. Error codes. See *Chapter 12* for details.

> **NOTE**
>
> This command only takes effects on the next uplink data.

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

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

AT+QNBIOTEVENT Enable/Disable NB-IoT Related Event Report	
Test Command **AT+QNBIOTEVENT=?**	Response **OK**
Read Command **AT+QNBIOTEVENT?**	Response **+QNBIOTEVENT: <enable>,<event>** **OK**
Write Command **AT+QNBIOTEVENT=<enable>,<event>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	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 the specific event 1 Enable the indication of the specific event by URC **+QNBIOTEVENT: <event_value>**
<event>	Integer type. The reported event. 1 PSM state
<event_value>	String type. When the reported event is PSM: ENTER PSM EXIT PSM
<err>	Integer type. Error codes. See *Chapter 12* for details.

8.8. AT+QRELLOCK   Release Sleep Lock of AT Commands

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

This Execution Command releases 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+QRELLOCK Release Sleep Lock of AT Commands	
Execution Command **AT+QRELLOCK**	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+QRELLOCK
OK

8.9. AT+QSCLK   Configure Sleep Mode

This command configures the TE's sleep modes.

AT+QSCLK Configure Sleep Mode	
Test Command **AT+QSCLK=?**	Response **+QSCLK: (**range of supported **<n>**s**)** **OK**
Read Command **AT+QSCLK?**	Response **+QSCLK: <n>** **OK**
Write Command **AT+QSCLK=<n>**	Response **OK** If there is any error: **ERROR**

	Or
	+CME ERROR: <err>
Maximum Response Time	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.
	0 Disable sleep modes
	1 Enable light sleep and deep sleep, wakeup by PSM_EINT (falling edge)
	2 Enable light sleep only, wakeup by the Main UART
<err>	Integer type. Error codes. See *Chapter 12* for details.

NOTE

1. UART does not work during the light sleep mode. Therefore, when **AT+QSCLK=1** or **AT+QSCLK=2**, send **AT** before each command to make sure the UART is woken up first.
2. When **AT+QSCLK=0**, UART is always working. To make the module enter sleep, please resend **AT+QSCLK=1** or **AT+QSCLK=2**.
3. During data communication, it is recommended to execute **AT+QSCLK=0** to disable the module from entering sleep. After data communication is completed, it is recommended to execute **AT+QSCLK=1** to enable sleep mode again to save power.
4. When the module is woken up from light sleep mode by PSM_EINT, the module will enter the light sleep mode again immediately. It is recommended to wake up the module through sending AT commands and then follow the suggestion in *Note 3*.

Example

AT+QSCLK=1
OK

9 Platform Related Commands

9.1. AT&W   Save Current Parameters to NVRAM

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

AT&W Save 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 save current parameters

9.2. AT+CBC   Query Power Supply Voltage

This command queries the voltage value of power supply.

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

	OK
	If there is any error: **ERROR** Or **+CME ERROR: \<err\>**
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\>	Integer type. Battery voltage. Unit: mV.	
\<err\>	Integer type. Error codes. See *Chapter 12* for details.	

NOTE

As CC660D-LS do not support battery charging, **\<bcs\>** and **\<bcl\>** are invalid (always 0) while the **\<voltage\>** still represents the correct voltage of the power supply.

Example

AT+CBC
+CBC: 0,0,3368

OK

9.3. AT+CEER* Extended Error Report

This 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

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

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

The Test Command returns values supported as a compound value.

AT+CMEE　Report Mobile Termination Error	
Test Command AT+CMEE=?	Response +CMEE: (range of supported <n>s) OK
Read Command AT+CMEE?	Response +CMEE: <n> OK
Write Command AT+CMEE=<n>	Response 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>**.
	0　　Disable result code
	1　　Enable result code and use numeric values
	2　　Enable result code and use verbose values
<err>	Integer type. Error codes. See *Chapter 12* for details.

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 queries the input voltage of a dedicated ADC channel.

AT+QADC Query the Input Voltage of Dedicated ADC Channel	
Test Command **AT+QADC=?**	Response **+QADC: (**list of supported **<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 the average value of sampling voltages. Range: 0–1400. Unit: millivolt.
<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. Time of ADC sampling interval. Range: 0–100. The value is an integer multiple of 10. Default value: 0. Unit: millisecond.

> **NOTE**
>
> **AT+QADC?** queries the output voltage value of the ADC0 channel.

Example

AT+QADC?
+QADC: 2,796
OK

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

This command enables/disables a URC **+QATWAKEUP** on a channel that indicates when the modem is fully woken up after a deep sleep.

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.
<err>	Integer type. Error codes. See **Chapter 12** for details.

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 is ready to receive AT commands or data.

9.7. AT+QCFG   Configure System Setting

This command configures some configurable settings of the system.

AT+QCFG Configure System Setting	
Test Command **AT+QCFG=?**	Response **+QCFG: (**list of supported **<function>**s**),(**list of supported **<value>**s**)** **OK**
Read Command **AT+QCFG?**	Response **+QCFG: <function>,<value>** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Write Command **AT+QCFG=<function>[,<value>]**	Response If the optional parameter is omitted, query the current system setting: **+QCFG: <function>,<value>** **OK** If the optional parameter is specified, configure the system setting: **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 or not.
	"upopt"	Configure whether to enable user plane optimization or not.
	"multidrb"	Configure whether to enable multi-DRB or not.
	"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 or not.
	"atlocktime"	Configure the sleep lock duration by AT command
	"urc/ri/mask"	Configure whether to trigger RI pin behavior when URC is reported or not.
	"vbattimes"	Configure the voltage detection cycle for **AT+QVBATT** command
	"activetimer"	Configure whether to use the value of active timer or not.
	"elsms"	Configure whether to enable long SMS or not.

<value>	Integer type/ String type.		
	<function >	**<value>**	**Description**
	"epco"	0	Disable EPCO.
		1	Enable EPCO.
	"combinedattach"	0	Disable combined attach.
		1	Enable combined attach.
	"up"	0	Disable user plane function.
		1	Enable user plane function.
	"upopt"	0	Disable user plane optimization.
		1	Enable user plane optimization.
	"multidrb"	0	Disable user multi-DRB.
		1	Enable user multi-DRB.
	"autopdn"	0	Disable PDN auto activation.
		1	Enable PDN auto activation.
	"ripin"	0	Default output level is high for the RI pin.
		1	Default output level is low for the RI pin.

"initlocktime"	1–30	Configure the initial sleep lock duration. Unit: s.
"dsevent"	0	Disable the URC for the deep sleep event.
	1	Enable the URC for the deep sleep event.
"atlocktime"	0–10	Configure the sleep lock duration by AT commands. Unit: s.
"urc/ri/mask"	0,**\<URC\>**	Re-enable the disabled RI pin behaviors when the specified URC is reported.
	1,**\<URC\>**	Disable RI pin behaviors when the specified URC is reported.
	2	Enable RI pin behaviors when any URC is reported
"vbattimes"	1–600	Configure the voltage detection cycle for **AT+QVBATT**. Unit: s.
"activetimer"	0	Set the value of active timer to 0.
	1	Use the value of active timer received from core network.
"elsms"	0	Disable long SMS
	1	Enable long SMS
\<err\>		Integer type. Error codes. See *Chapter 12* for details.

NOTE

1. For some special requirements from mobile network operators, for example, operators require to always activate "combinedattach, the configuration set by this command may not take effect.
2. Only when "up" is enabled, "upopt" and "multidrb" can be enabled; and only when both "upopt" and "multidrb" are disabled, "up" can be disabled.

9.8. AT+QPOWD   Power off the Module

This command powers off the module.

AT+QPOWD Power off the Module	
Test Command **AT+QPOWD=?**	Response **+QPOWD: (**Range 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.
	0 Normal power-off
	1 Forced power-off
	2 Reset the module without power-off after the response **OK**
<err>	Integer type. Error codes. See *Chapter 12* for details.

Example

AT+QPOWD=0
OK

9.9. AT+QRST   Automatically Reset

This command resets the module immediately.

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.
\<err>	Integer type. Error codes. See *Chapter 12* for details.

9.10. AT+QVBATT   Configure the Voltage Threshold

This command configures 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.	

NOTE

The following URCs are reported corresponding to different situations when the battery voltage reaches the set threshold:

- **UNDER VOLTAGE WARNING**
- **UNDER VOLTAGE POWER DOWN**
- **OVER VOLTAGE WARNING**
- **OVER VOLTAGE POWER DOWN**

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

RTC is automatically synchronized once UE received EMM INFORMATION signaling.

This Read Command returns the current setting of the clock.

AT+CCLK Set and Get Current Date and Time	
Test Command **AT+CCLK=?**	Response **OK**
Read Command **AT+CCLK?**	Response **+CCLK: <time>** **OK**
Write Command **AT+CCLK=<time>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	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 respectively indicate year, month, day, hour, minute, second and time zone. (Time zone indicates the difference between the local time and GMT expressed by hour; and its range is from -12 to +12.) For example, 6th of May 2019, 22:10:00 GMT +2 hours equals "2019/05/06,22:10:00GMT+02".
<err>	Integer type. Error codes. See *Chapter 12* for details.

> **NOTE**
>
> Differ from the Write Command, after the Read Command **AT+CCLK?** is executed, the **<time>** will be returned in the format of "yyyy/mm/dd,hh:mm:ss±zz".

Example

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

OK

10.2. AT+CTZR   Time Zone Reporting

This Write Command enables/disables reporting the time zone change event. If such reporting is enabled, MT returns URC **+CTZV: <tz>** or **+CTZE: <tz>,<dst>,[<time>]** whenever the time zone is changed.

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 URC **+CTZV: <tz>.**
	2 Enable extended time zone and local time reporting by URC **+CTZE: <tz>,<ds t>,[<time>]**.
<tz>	String type. Represent the sum of the local time zone (difference between the local time and GMT expressed by quarter) plus daylight saving time. The format of **<tz>** is "±zz" and is expressed by two digits integer with the range from -47 to +48. To maintain a fixed width, numbers in the range from -9 to +9 are expressed with a leading zero, e.g. "-09", "+00", and "+09".
<dst>	Integer type. Whether **<tz>** includes daylight savings adjustment or not.
	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.
<err>	Integer type. Error codes. See *Chapter 12* for details.

NOTE

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

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

This Write Command sets the real‑time clock of MT. If such setting fails, an MT error **+CME ERROR: <err>** is returned.

This Read Command returns the current date and UTC (Universal Time Coordinated) of the clock.

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 respectively. (Time zone indicates the difference between the local time and GMT expressed by quarter; and its range is from -47 to +48). For example, 6th of May 2019, 22:10:00 GMT+2 hours equals "19/05/06,22:10:00+08".
<err>	Integer type. Error codes. See **Chapter 12** for details.

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, see *Quectel_CC660D-LS_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

12 Summary of Error Codes

This chapter introduces the **<err>** codes related to CC660D-LS module.

The error codes listed in the following tables are compliant with the 3GPP specifications. See *3GPP TS 27.007 V13.5.0, subclause 9.2* for all possible **<err>** values.

Table 3: 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 CC660D-LS modules.

Table 4: 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
577	PSD - activation rejected by GGSN
578	PSD - unspecified activation rejection
582	Profile (**<cid>**) currently unavailable
583	A profile (**<cid>**) is currently active
584	Combined service not allowed
585	Conditional IE error
588	Feature not supported
589	Service not available
590	Unknown IE from network
591	Implicitly detached
592	Insufficient resources
593	Invalid activation state (0-1)
596	PSD – invalid **<cid>** value
598	Mode value not in range
599	Invalid MAND information
601	Invalid TI value

605	LLC or SNDCP failure
606	Lower layer failure
607	Missing or unknown APN
608	Mobile not ready
609	MS identity not in network
610	MSC temporarily not reachable
611	Message incompatible with state
612	Message type incompatible with state
613	Unknown message from network
615	Network failure
618	Processing of multiple **<cid>**s not supported
619	No PDP context activated
621	NSAPI already used
622	Address element out of range
624	GPRS - PDP context w/o TFT already activated
625	PSD - PDP type not supported
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
738	Character set type not found
742	Incorrect **<oper>** format
743	**<oper>** length too long
744	SIM full
745	Unable to change PLMN list
746	Network operator not recognized
747	Access technology missing
748	Access technology not supported
749	Invalid command length
750	Invalid input string
752	Invalid <pathID> parameter
753	Missing required command parameter
754	Invalid SIM command
755	Invalid File ID
757	Invalid P1/2/3 parameter
758	Missing required command data
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+CMEE=<n>** disables (**<n>**=0) or enables (**<n>**=1) the use of the final result code **+CME ERROR: <err>**. When **<n>**=1, a limited set of error codes will be returned.

13 Appendix A References

Table 5: References

Document Name
[1]   Quectel_CC660D-LS_TCP(IP)_Application_Note

Table 6: Terms and Abbreviations

Abbreviation	Description
3GPP	3rd 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
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
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
GPIO	General-Purpose Input/Output
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
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
LLC	Logical Link Control
MS	Mobile Station
MSC	Mobile Switching Center
MT	Mobile Termination (typically the module)
MTU	Maximum Transfer Unit
NB-IoT	Narrow Band Internet of Thing
NSLPI	NAS Signaling Low Priority Indication
NSAPI	Network Service Access Point Identifier
NVRAM	Non-Volatile Random-Access Memory

OOSA	Out Of Service Area
PAD	Packet Assember/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
PLMN	Public Land Mobile Network
PSM	Power Saving Mode
PSD	Packet Switch Domain
PSK	Pre-Shared key
QoS	Quality of Service
RAI	Release Assistance Indication
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
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)
TFT	Traffic Flow Template
TTL	Time to Live

UDP	User Datagram Protocol
UE	User Equipment (typically the module)
UICC	Universal Integrated Circuit Card
UL	Uplink
UL-SCH	Uplink Shared Channel
URC	Unsolicited Result Code
UTC	Universal Time Coordinated
UUID	Universally Unique Identifier