

BC26

AT Commands Manual

NB-IoT Module Series

Rev. BC26_AT_Commands_Manual_V1.1

Date: 2018-01-25

Status: Preliminary



Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.

7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local office. For more information, please visit:

<http://quectel.com/support/sales.htm>

For technical support, or to report documentation errors, please visit:

<http://quectel.com/support/technical.htm>

Or email to: support@quectel.com

GENERAL NOTES

QUECTEL OFFERS THE INFORMATION AS A SERVICE TO ITS CUSTOMERS. THE INFORMATION PROVIDED IS BASED UPON CUSTOMERS' REQUIREMENTS. QUECTEL MAKES EVERY EFFORT TO ENSURE THE QUALITY OF THE INFORMATION IT MAKES AVAILABLE. QUECTEL DOES NOT MAKE ANY WARRANTY AS TO THE INFORMATION CONTAINED HEREIN, AND DOES NOT ACCEPT ANY LIABILITY FOR ANY INJURY, LOSS OR DAMAGE OF ANY KIND INCURRED BY USE OF OR RELIANCE UPON THE INFORMATION. ALL INFORMATION SUPPLIED HEREIN IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

COPYRIGHT

THE INFORMATION CONTAINED HERE IS PROPRIETARY TECHNICAL INFORMATION OF QUECTEL WIRELESS SOLUTIONS CO., LTD. TRANSMITTING, REPRODUCTION, DISSEMINATION AND EDITING OF THIS DOCUMENT AS WELL AS UTILIZATION OF THE CONTENT ARE FORBIDDEN WITHOUT PERMISSION. OFFENDERS WILL BE HELD LIABLE FOR PAYMENT OF DAMAGES. ALL RIGHTS ARE RESERVED IN THE EVENT OF A PATENT GRANT OR REGISTRATION OF A UTILITY MODEL OR DESIGN.

Copyright © Quectel Wireless Solutions Co., Ltd. 2018. All rights reserved.

About the Document

History

Revision	Date	Author	Description
1.0	2018-01-05	Randy LI/ Lebron LIU	Initial
1.1	2018-01-25	Lebron LIU	Modified the Description of Some AT Commands

Contents

About the Document	2
Contents	4
Table Index	6
1 Introduction	7
1.1. Scope of the Document	7
1.2. AT Command Syntax	7
1.3. Supported Character Sets	8
2 3GPP Commands (27.007)	9
2.1. ATI Display Product Identification Information	9
2.2. ATE Set Command Echo Mode	10
2.3. AT+CGMI Request Manufacturer Identification	11
2.4. AT+CGMM Request Manufacturer Model	11
2.5. AT+CGMR Request Manufacturer Revision	12
2.6. AT+CESQ Extended Signal Quality	13
2.7. AT+CGSN Request Product Serial Number Identification	15
2.8. AT+CEREG EPS Network Registration Status	16
2.9. AT+CSCON Signalling Connection Status	19
2.10. AT+COPS Operator Selection	21
2.11. AT+CGATT GPRS/Packet Domain Attach/Detach	24
2.12. AT+CGDCONT Define the PDP Context	25
2.13. AT+CGACT PDP Context Activation/Deactivation	29
2.14. AT+CGPADDR Show PDP Addresses	31
2.15. AT+CIMI Request International Mobile Subscriber Identity	32
2.16. AT+CFUN Set Phone Functionality	33
2.17. AT+CMEE Report Mobile Termination Error	34
2.18. AT+CPSMS Power Saving Mode Setting	35
2.19. AT+CEDRXS eDRX Setting	37
2.20. AT+CEDRXRDP eDRX Read Dynamic Parameters	40
2.21. AT+CEER Extended Error Report	42
3 PDN Commands	44
3.1. AT+QGACT Activate/Deactivate a PDN Context	44
4 Network Commands – PING	47
4.1. AT+QPING Test IP Network Connectivity to a Remote Host	47
5 Network Commands – Socket	48
5.1. AT+QSOC Create a TCP/UDP Socket	48
5.2. AT+QSOB Bind Local Address and Local Port	49
5.3. AT+QSOCON Connect Socket to Remote Address and Port	49
5.4. AT+QSOSEND Send Data to Remote via Socket	50
5.5. AT+QSODIS Disconnect Socket	51

5.6.	AT+QSOCL	Close Socket.....	51
5.7.	+QSONMI	Socket Message Arrived Indicator	52
5.8.	+QSOERR	Socket Error Indicator	52
5.9.	Examples	53	
5.9.1.	Example of Creating a TCP Socket (Do Not Support Now).....	53	
5.9.2.	Example of Creating a UDP Socket Example	53	
6	General Commands	55	
6.1.	AT+QBAND	Query Current Operating Band	55
6.2.	AT+QRESET	Reset UE	55
6.3.	AT+QSPCHSC	Set Scrambling Algorithm.....	56
6.4.	AT+QFRCLLCK	Frequency & Cell Lock.....	57
6.5.	AT+QNBIOTRA1	NB-IoT Release Assistance Indication	58
6.6.	AT+QATWAKEUP	Enable Deep Sleep Wakeup Indication.....	58
6.7.	AT+QENGINEFO	Query Current Network Status.....	59
7	OneNET Commands	63	
7.1.	AT+MIPLCREATE	Create OneNET Instance	63
7.2.	AT+MIPLDELETE	Delete OneNET Instance.....	64
7.3.	AT+MIPLADDOBJ	Add LWM2M Object	64
7.4.	AT+MIPLDELOBJ	Delete LWM2M Object.....	65
7.5.	AT+MIPLOPEN	Send OneNET Login Request.....	65
7.6.	AT+MIPLCLOSE	Send OneNET Logout Request.....	66
7.7.	AT+MIPLREADRSP	Respond the Read Request from Application Server/IoT Platform	66
7.8.	AT+MIPLWRITERSP	Respond the Write Request from Application Server/IoT Platform ...	67
7.9.	AT+MIPLEXECUTERSP	Respond the Execute Request from Application Server/IoT Platform	68
7.10.	AT+MIPLOBSERVERSP	Respond the Observe Request from Application Server/IoT Platform	68
7.11.	AT+MIPLNOTIFY	Notify the Data to Application Server or IoT Platform.....	69
7.12.	AT+MIPLUPDATE	Send Update Request	70
7.13.	AT+MIPLVER	Query the OneNET Version.....	71
8	Appendix A Reference.....	72	

Table Index

TABLE 1: TYPES OF AT COMMANDS AND RESPONSES	8
TABLE 2: TERMS AND ABBREVIATIONS	72

1 Introduction

1.1. Scope of the Document

This document gives details of the AT Command Set supported by Quectel NB-IoT BC26 module.

1.2. AT Command Syntax

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

The AT Commands Set implemented by BC26 is a combination of *3GPP TS 27.005*, *3GPP TS 27.007* and *ITU-T recommendation V.250* as well as the AT Commands developed by Quectel.

All these AT commands can be split into three categories syntactically: “**basic**”, “**S parameter**”, and “**extended**”. They are listed as follows:

- **Basic syntax**

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

- **S parameter syntax**

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

- **Extended syntax**

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

Table 1: Types of AT Commands and Responses

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

NOTE

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

1.3. Supported Character Sets

The BC26 AT command interface defaults to the IRA character set. The BC26 supports the following character sets:

- GSM
- UCS2
- HEX
- IRA
- PCCP437
- PCDN
- 8859-1

The character set can be configured and interrogated using the **AT+CSCS** command (3GPP TS 27.007). The character set is defined in 3GPP specification 27.005.

2 3GPP Commands (27.007)

2.1. ATI Display Product Identification Information

ATI Display Product Identification Information

Execution Command

ATI

Response

Quectel_Ltd

<Object Id>

Revision:<revision>

OK

If there is any error, response:

+CME ERROR:<err>

Parameter

<Object Id> Identifier of device type

<revision> Revision of software release

Example

ATI

Quectel_Ltd

Quectel_BC26

Revision: BC26NAR01A01

OK

2.2. ATE Set Command Echo Mode

ATE Set Command Echo Mode

Execution Command

ATE[<value>]

Response

OK

If there is any error, response:

+CME ERROR:<err>

Parameter

<value>	0	Echo mode OFF
	1	Echo mode ON

Example

```
ATE0
```

```
OK
```

```
ATI
```

```
Quectel_Ltd
```

```
Quectel_BC26
```

```
Revision: BC26NAR01A01
```

```
OK
```

```
ATE1
```

```
OK
```

```
ATI
```

```
ATI
```

```
Quectel_Ltd
```

```
Quectel_BC26
```

```
Revision: BC26NAR01A01
```

```
OK
```

2.3. AT+CGMI Request Manufacturer Identification

AT+CGMI Request Manufacturer Identification

Execution Command

AT+CGMI

Response

Quectel_Ltd

<Object Id>

Revision: MTK_2625

OK

If there is any error, response:

+CME ERROR:<err>

Test Command

AT+CGMI=?

Response

OK

Parameter

<Object Id> Identifier of device type

Example

AT+CGMI

Quectel_Ltd

Quectel_BC26

Revision: MTK_2625

OK

2.4. AT+CGMM Request Manufacturer Model

AT+CGMM Request Manufacturer Model

Execution Command

AT+CGMM

Response

<Object Id>

OK

If there is any error, response:

+CME ERROR:<err>

Test Command AT+CGMM=?	Response OK
----------------------------------	-----------------------

Parameter

<Object Id> Identifier of device type

Example

```
AT+CGMM
Quectel_BC26

OK
```

2.5. AT+CGMR Request Manufacturer Revision

AT+CGMR Request Manufacturer Revision

Execution Command AT+CGMR	Response Revision :<revision> OK If there is any error, response: +CME ERROR:<err>
Test Command AT+CGMR=?	Response OK

Parameter

<revision> Revision of software release

Example

```
AT+CGMR
Revision: BC26NAR01A01

OK
```

2.6. AT+CESQ Extended Signal Quality

The execution command returns received signal quality parameters. If the current serving cell is not a GERAN cell, <rssi> and <ber> are set to value 99. If the current serving cell is not a UTRA FDD or UTRA TDD cell, <rscp> is set to 255. If the current serving cell is not a UTRA FDD cell, <ecno> is set to 255. If the current serving cell is not an E-UTRA cell, <rsrq> and <rsrp> are set to 255.

AT+CESQ Extended Signal Quality

Execution Command AT+CESQ	<p>Response</p> <p>+CESQ: <rxlev>,<ber>,<rscp>,<ecno>,<rsrq>,<rsrp></p> <p>OK</p> <p>If there is any error, response:</p> <p>+CME ERROR:<err></p>
Test Command AT+CESQ=?	<p>Response</p> <p>+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)</p> <p>OK</p>

Parameter

<rxlev>	Integer type. Rx signal strength level
0	-110 dBm or less
1	-110 dBm ≤ <rssi> < -109 dBm
2	-109 dBm ≤ <rssi> < -108 dBm
....:	
61	-50dBm ≤ <rssi> < -49 dBm
62	-49dBm ≤ <rssi> < -48 dBm
63	-48dBm ≤ <rssi>
99	not known or not detectable
<ber>	Integer type; channel bit error rate (in percent)
0...7	as RXQUAL values RXQUAL_0...RXQUAL_7 as defined in 45.008.
99	not known or not detectable
<rscp>	Integer type, received signal code power (see 3GPP 25.133 and 3GPP 25.123)
0	-120 dBm or less
1	-120 dBm ≤ <rscp> < -119 dBm
2	-119 dBm ≤ <rscp> < -118 dBm
....: ...	

	94	$-27 \text{ dBm} \leq \langle \text{rsdp} \rangle < -26 \text{ dBm}$
	95	$-26 \text{ dBm} \leq \langle \text{rsdp} \rangle < -25 \text{ dBm}$
	96	$-25 \text{ dBm} \leq \langle \text{rsdp} \rangle$
	255	not known or not detectable
<ecno>	Integer type, Ec/No (see 3GPP 25.133)	
	0	-24 dBm or less
	1	$-24 \text{ dBm} \leq \langle \text{ecno} \rangle < -23.5 \text{ dBm}$
	2	$-23.5 \text{ dBm} \leq \langle \text{ecno} \rangle < -23 \text{ dBm}$

	47	$-1 \text{ dBm} \leq \langle \text{ecno} \rangle < -0.5 \text{ dBm}$
	48	$-0.5 \text{ dBm} \leq \langle \text{ecno} \rangle < 0 \text{ dBm}$
	49	$0 \text{ dBm} \leq \langle \text{ecno} \rangle$
	255	not known or not detectable
<rsrq>	Integer type, reference signal received quality (see 3GPP 36.133)	
	0	-19.5 dB or less
	1	$-19.5 \text{ dB} \leq \langle \text{rsrq} \rangle < -19 \text{ dB}$
	2	$-19 \text{ dB} \leq \langle \text{rsrq} \rangle < -18.5 \text{ dB}$

	32	$-4 \text{ dB} \leq \langle \text{rsrq} \rangle < -3.5 \text{ dB}$
	33	$-3.5 \text{ dB} \leq \langle \text{rsrq} \rangle < -3 \text{ dB}$
	34	$-3 \text{ dB} \leq \langle \text{rsrq} \rangle$
	255	not known or not detectable
<rsrp>	Integer type, reference signal received power (see 3GPP 36.133)	
	0	-140 dBm or less
	1	$-140 \text{ dBm} \leq \langle \text{rsrp} \rangle < -139 \text{ dBm}$
	2	$-139 \text{ dBm} \leq \langle \text{rsrp} \rangle < -138 \text{ dBm}$

	95	$-46 \text{ dBm} \leq \langle \text{rsrp} \rangle < -45 \text{ dBm}$
	96	$-45 \text{ dBm} \leq \langle \text{rsrp} \rangle < -44 \text{ dBm}$
	97	$-44 \text{ dBm} \leq \langle \text{rsrp} \rangle$
	255	not known or not detectable

Example

AT+CESQ

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

OK

2.7. AT+CGSN Request Product Serial Number Identification

AT+CGSN Request Product Serial Number Identification

<p>Execution/Write Command</p> <p>AT+CGSN[=<snt>]</p>	<p>Response</p> <p>When <snt>=0 (or omitted) and command is executed successfully:</p> <p><sn></p> <p>When <snt>=1 and command is executed successfully:</p> <p>+CGSN:<imei></p> <p>When <snt>=2 and command is executed successfully:</p> <p>+CGSN:<imeisv></p> <p>When <snt>=3 and command is executed successfully:</p> <p>+CGSN:<svn></p> <p>OK</p> <p>If there is any error, response:</p> <p>+CME ERROR:<err></p>
<p>Test Command</p> <p>AT+CGSN=?</p>	<p>Response</p> <p>When TE supports <snt> and command is executed successfully:</p> <p>+CGSN:(list of supported <snt>s)</p> <p>OK</p>

Parameter

<snt>	Integer type indicating the serial number type that has been requested
0	Returns <sn>
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>	The 128-bit UUID of the UE. The total number of characters, including line terminators. In the information text shall not exceed 2048 characters, and shall not contain the sequence 0 <CR> or OK<CR>.
<imei>	String type in decimal format indicating the IMEI number
<imeisv>	String type in decimal format indicating the IMEISV
<svn>	String type in decimal format indicating the current SVN which is a part of IMEISV

2.8. AT+CEREG EPS Network Registration Status

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

If the UE requests PSM for reducing its power consumption, the set command controls the presentation of an unsolicited result code: “+CEREG:<stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>],[<reject_cause>],[<Active-Time>],[<Periodic-TAU>]]]”.

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

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

AT+CEREG EPS Network Registration Status	
Write Command AT+CEREG=<n>	<p>Response OK</p> <p>If there is any error, response: +CME ERROR:<err></p>
Read Command AT+CEREG?	<p>Response</p> <p>When <n>=0, 1, 2 or 3 and command is executed successfully: +CEREG:<n>,<stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]]]</p> <p>When <n>=4 or 5 and command is executed successfully: +CEREG:<n>,<stat>[,<tac>],[<ci>],[<AcT>],[<rac>],[<cause_type>],[<reject_cause>],[<Active-Time>],[<Periodic-TAU>]]]</p>

	If there is any error, response: +CME ERROR:<err>
Test Command AT+CEREG=?	Response +CEREG: (list of supported <n>s) OK

Parameter

<n>	Integer type <ul style="list-style-type: none"> 0 Disable network registration unsolicited result code 1 Enable network registration unsolicited result code: “+CEREG:<stat>” 2 Enable network registration and location information unsolicited result code: “+CEREG:<stat>[,<tac>],[<ci>],[<AcT>]” 3 Enable network registration, location information and EMM cause value information unsolicited result code: “+CEREG:<stat>[,<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]” 4 For a UE that requests PSM, enable network registration and location information unsolicited result code: “+CEREG:<stat>[,<tac>],[<ci>],[<AcT>][,<Active-Time>],[<Periodic-TAU>]]]” 5 For a UE that requests PSM, enable network registration, location information and EMM cause value information unsolicited result code: +CEREG:<stat>[,<lac>],[<ci>],[<AcT>],[<rac>][,<cause_type>],[<reject_cause>][,<Active-Time>],[<Periodic-RAU>]]]”
<stat>	Integer type, indicates the EPS registration status <ul style="list-style-type: none"> 0 Not registered, MT is not currently searching an operator to register to 1 Registered, home network 2 Not registered, but MT is currently trying to attach or searching an operator to register to 3 Registration denied 4 Unknown 5 Registered, roaming 6 Registered for “SMS only”, home network (applicable only when <Act> indicates NB-IoT) 7 Registered for “SMS only”, roaming (applicable only when <Act> indicates NB-IoT) 8 Attached for emergency bearer services only 9 Registered for “CSFB not preferred”, home network (not applicable) 10 Registered for “CSFB not preferred”, roaming (not applicable)
<tac>	String type; two bytes tracking area code in hexadecimal format (e.g. “00C3” equals 195 in decimal)
<ci>	String type; four bytes E-UTRAN cell ID in hexadecimal format

<AcT>	Integer type; access technology of the registered network <ul style="list-style-type: none"> 0 GSM (not applicable) 1 GSM Compact (not applicable) 2 UTRAN (not applicable) 3 GSM w/EGPRS (not applicable) 4 UTRAN w/HSDPA (not applicable) 5 UTRAN w/HSUPA (not applicable) 6 UTRAN w/HSDPA and HSUPA (not applicable) 7 E-UTRAN 8 EC-GSM-IoT (A/Gb mode) (see NOTES 5) (not applicable) 9 E-UTRAN (NB-S1 mode) (see NOTES 6)
<cause_type>	Integer type; indicates the type of <reject_cause> <ul style="list-style-type: none"> 0 Indicates that <reject_cause> contains an EMM cause value 1 Indicates that <reject_cause> contains a manufacturer-specific cause value
<reject_cause>	Integer type; contains the cause of the failed registration. 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 <i>GPRS Timer 2 IE in 3GPP TS 24.008 Table 10.5.163/3GPP TS 24.008, 3GPP TS 23.682 and 3GPP TS 23.401</i> . <p>Bits 5 to 1 represent the binary coded timer value.</p> <p>Bits 6 to 8 defines the timer value unit for the GPRS timer as follows:</p> <p>Bits</p> <p>8 7 6</p> <p>0 0 0 value is incremented in multiples of 2 seconds</p> <p>0 0 1 value is incremented in multiples of 1 minute</p> <p>0 1 0 value is incremented in multiples of decihours</p> <p>1 1 1 value indicates that the timer is deactivated.</p>
<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, please refer to the <i>GPRS Timers 3 IE in 3GPP TS 24.008 Table 10.5.163a/3GPP TS 24.008, 3GPP TS 23.682 and 3GPP TS 23.401</i> . <p>Bits 5 to 1 represent the binary coded timer value</p> <p>Bits 6 to 8 define the timer value unit as follows:</p> <p>Bits</p> <p>8 7 6</p> <p>0 0 0 value is incremented in multiples of 10 minutes</p> <p>0 0 1 value is incremented in multiples of 1 hour</p> <p>0 1 0 value is incremented in multiples of 10 hours</p> <p>0 1 1 value is incremented in multiples of 2 seconds</p>

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

NOTES

1. If the EPS MT in GERAN/UTRAN/E-UTRAN also supports circuit mode services and/or GPRS services, the AT+CREG command and AT+CGREG command can be used to query the registration status and location information for those services.
2. 3GPP TS 24.008 and 3GPP TS 24.301 specify the condition when the MS is considered as attached for emergency bearer services.
3. 3GPP TS 44.060 specifies the system information messages which give the information about whether the serving cell supports EGPRS.
4. 3GPP TS 25.331 specifies the system information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.
5. 3GPP TS 44.018 [156] specifies the EC-SCH INFORMATION message which, if present, indicates that the serving cell supports EC-GSM-IoT.
6. 3GPP TS 36.331 [86] specifies the system information blocks which give the information about whether the serving cell supports NB-IoT, which corresponds to E-UTRAN (NB-S1 mode).

Example

```
AT+CEREG=1           //Enable network registration URC.
OK
AT+CEREG?
+CEREG:1,1

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

OK
```

2.9. AT+CSCON Signalling Connection Status

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

quality.

The set command controls the presentation of an unsolicited result code. If $\langle n \rangle = 1$, “+CSCON: $\langle mode \rangle$ ” is sent from the MT when the connection mode of the MT is changed. When the MT is in UTRAN or E-UTRAN, the mode of the MT refers to idle when no PS signaling connection and to connected mode when a PS signalling connection between UE and network is setup.

When the UE is in GERAN, the mode refers to idle when the MT is in either the idle state or the standby state and to connected mode when the MT is in ready state.

The read command returns the status of result code presentation and an integer $\langle mode \rangle$ which shows whether the MT is currently in idle mode or connected mode.

The test command returns supported values as a compound value.

AT+CSCON Signalling Connection Status	
Write command AT+CSCON=[$\langle n \rangle$]	Response OK If there is any error, response: +CME ERROR: $\langle err \rangle$
Read Command AT+CSCON?	Response +CSCON: $\langle n \rangle$, $\langle mode \rangle$ [, $\langle state \rangle$] OK If there is any error, response: +CME ERROR: $\langle err \rangle$
Test Command AT+CSCON=?	Response +CSCON: (list of supported $\langle n \rangle$s) OK

Parameter

$\langle n \rangle$	Integer type 0 Disable unsolicited result code 1 Enable unsolicited result code: “+CSCON: $\langle mode \rangle$ ”
$\langle mode \rangle$	Integer type; indicates the signalling connection status 0 Idle 1 Connected

Example

```
AT+CSCON=0
```

```
OK
```

```
AT+CSCON?
```

```
+CSCON:0,1
```

```
OK
```

```
AT+CSCON=?
```

```
+CSCON:(0-1)
```

```
OK
```

```
AT+CSCON=1
```

```
OK
```

```
AT+CSCON?
```

```
+CSCON:1,1
```

```
OK
```

2.10. AT+COPS Operator Selection

The set command forces an attempt to select and register the GSM/UMTS/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 technology. The selected operator name format shall also apply to further read commands (AT+COPS?). <mode>=2 forces an attempt to deregister from the network. The selected mode affects all further network registration (e.g. after <mode>=2, MT shall be unregistered until <mode>=0 or 1 is selected). This command should be abortable when registration/deregistration attempt is made.

The read command returns the current mode, the currently selected operator and the current access technology. If no operator is selected, <format>, <oper> and <AcT> are omitted.

The test command returns a set of five parameters, each representing an operator present in the network. A set consists of an integer indicating the availability of the operator <stat>, long and short alphanumeric format of the operator's name, numeric format representation of the operator and access technology. Any of the formats may be unavailable and should then be an empty field. The list of operators shall be in order: home network, networks referenced in USIM or active application in the UICC (GSM or USIM) in the following order: HPLMN selector, user controlled PLMN selector, operator controlled PLMN selector and PLMN selector (in the USIM or GSM application), 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	
Write Command AT+COPS=[<mode>[,<format>[,<oper>[,<AcT>]]]]	Response OK If there is any error, response: +CME ERROR:<err>
Read Command AT+COPS?	Response +COPS:<mode>[,<format>,<oper>][,<AcT>] OK If there is any error, response: +CME ERROR:<err>
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, response: +CME ERROR:<err>

Parameter

<mode>	Integer type
	0 Automatic mode; <oper> field is ignored
	1 Manual operator selection; <oper> field shall be present
	2 Manual deregister from network
	3 Set only <format> (for read command AT+COPS?), not shown in Read command response
	4 Manual/automatic selected; if manual selection fails, automatic mode (<mode>=0) is entered
<format>	Integer type
	0 Long format alphanumeric <oper>; can be up to 16 characters long
	1 Short format alphanumeric <oper>

	2	Numeric <oper>; GSM Location Area Identification number			
<oper>	String type; <format> indicates if the format is alphanumeric or numeric; long alphanumeric format can be up to 16 characters long and short format up to 8 characters; numeric format is the GSM location area identification number which consists of a three BCD digit ITU-T country code coded, plus a two or three BCD digit network code, which is administration specific.				
<stat>	0	Unknown	<stat>	Integer ty	<stat>
	1	Operator Available		0	Unknown
	2	Operator Current			
	3	Operator Forbidden			
<AcT>	Integer type; access technology selected				
	0	GSM			
	1	GSM compact			
	2	UTRAN			
	3	GSM w/EGPRS			
	4	UTRAN w/HSDPA			
	5	UTRAN w/HSUPA			
	6	UTRAN w/HSDPA and HSUPA			
	7	E-UTRAN			
	8	EC-GSM-IoT (A/Gb mode) (see NOTES 3)			
	9	E-UTRAN (NB-S1 mode) (see NOTES 4)			

NOTE

1. 3GPP TS 44.060 specifies the system information messages which give the information about whether the serving cell supports EGPRS.
2. 3GPP TS 25.331 specifies the system information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.
3. 3GPP TS 44.018 [156] specifies the EC-SCH INFORMATION message which, if present, indicates that the serving cell supports EC-GSM-IoT.
4. 3GPP TS 36.331 [86] specifies the system information blocks which give the information about whether the serving cell supports NB-IoT, which corresponds to E-UTRAN (NB-S1 mode).
5. <AcT> field is fixed at 9 for NB-IoT product .

Example

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

2.11. AT+CGATT GPRS/Packet Domain Attach/Detach

The execution 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 is ignored and the “OK” response is returned. If the requested state cannot be achieved, an “ERROR” or “+CME ERROR” response is returned.

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

The read command returns the current packet domain service state.

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

AT+CGATT GPRS/Packet Domain Attach/Detach

Write Command
AT+CGATT=<state>

Response
OK

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

Read Command
AT+CGATT?

Response
+CGATT:<state>

OK

Test Command
AT+CGATT=?

Response
+CGATT:(list of supported <state>s)

OK

Parameter

<state>	Integer type; indicates the state of GPRS/Packet Domain attachment 0 Detached 1 Attached Other values are reserved and will result in an ERROR response to the execution command.
----------------------	--

Example

AT+CGATT?
+CGATT:0


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

2.12. AT+CGDCONT Define the PDP Context

The write command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>. 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, +CGDCONT= <cid> causes the values for context number <cid> to become undefined.

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

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

The feature "initial PDP context" may be supported and is a manufacturer specific option. For this option, the context with <cid>=0 (context number 0) is defined upon startup and does not need to be created with the +CGDCONT command. The initial PDP context has particular manufacturer specific default settings disassociated with any other default settings of +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. This is manufacturer specific and depends on the current RAT as well as how the active contexts are deactivated.

AT+CGDCONT Define the PDP Context

Write Command	Response
+CGDCONT=[<cid>],[<PDP_type>],[<APN>],[<PDP_addr>],[<d_comp>],[<h_comp>],[<IPv4AddrAlloc>],[<request_type>],[<P-CSCF_discovery>],[<IM_CN_Signalling_Flag_Ind>],[<NSLPI>],[<secur	OK
	If there is any error, response: +CME ERROR:<err>

ePCO>[,<IPv4_MTU_discovery>]]]]]]]]]]]]]	
Read Command AT+CGDCONT?	<p>Response</p> <p>[+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<request_type>[,<P-CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>]]]]]]]]]] [<CR><LF>+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<request_type>[,<P-CSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discovery>]]]]]]]]]] [...]]</p> <p>OK</p>
Test Command AT+CGDCONT=?	<p>Response</p> <p>+CGDCONT:(range of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s),(list of supported <IPv4AddrAlloc>s),(list of supported <request_type>s),(list of supported <P-CSCF_discovery>s),(list of supported <IM_CN_Signalling_Flag_Ind>s),(list of supported <NSLPI>s),(list of supported <securePCO>s),(list of supported <IPv4_MTU_discovery>s)</p> <p>[<CR><LF>+CGDCONT: (range of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s),(list of supported <IPv4AddrAlloc>s),(list of supported <request_type>s),(list of supported <P-CSCF_discovery>s),(list of supported <IM_CN_Signalling_Flag_Ind>s),(list of supported <NSLPI>s),(list of supported <securePCO>s),(list of supported <IPv4_MTU_discovery>s)[...]]</p> <p>OK</p>

Parameter

<cid>	Integer type; a numeric parameter that specifies a particular PDP context definition. The parameter is local to the UE-TE interface and is used in other PDP context-related commands. The range of permitted values (minimum value=1 or if the initial PDP context is supported, minimum value=0) is returned by the test form of the command.
-------	---

<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 (IETF RFC 2460)
IPv4v6	Virtual <PDP_type> introduced to handle dual IP stack UE capability
Non-IP	Transfer of Non-IP data to external packet data Network
<APN>	String type; a logical name that is used to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested.
<PDP_addr>	String type; a string parameter that identifies the UE in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. The read form of the command will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the +CGPADDR command.
<d_comp>	Integer type; controls PDP data compression
0	Off
1	On (manufacturer preferred compression)
2	V.42bis
<h_comp>	Integer type; controls PDP header compression
0	Off (default if value is omitted)
1	On (manufacturer preferred compression)
2	RFC 1144 (applicable for SNDTCP only)
3	RFC 2507
4	RFC 3095[ROHC] (applicable for PDCP only)
<IPv4AddrAlloc>	Integer type; controls how the MT/TA requests to get the IPv4 address information
0	IPv4 address allocation through NAS signalling
1	IPv4 address allocated through DHCP
<request_type>	Integer type; indicates the type of PDP context activation request for the PDP context. Please refer to <i>3GPP TS 24.301 (subclause 6.5.1.2)</i> and <i>3GPP TS 24.008 (subclause 10.5.6.17)</i> . If the initial PDP context is supported it is not allowed to assign <cid>=0 for emergency bearer services. According to <i>3GPP TS 24.008 (subclause 4.2.4.2.2 and subclause 4.2.5.1.4)</i> and <i>3GPP TS 24.301 (subclause 5.2.2.3.3 and subclause 5.2.3.2.2)</i> , a separate PDP context must be established for emergency bearer services. If the PDP context for emergency bearer services is the only activated context, only emergency calls are allowed, refer to <i>3GPP TS 23.401 subclause 4.3.12.9</i> .
0	PDP context is for new PDP context establishment or for handover from a non-3GPP access network (how the MT decides whether the PDP context is for new PDP context establishment or for handover is implementation specific).
1	PDP context is for emergency bearer services
2	PDP context is for new PDP context establishment
3	PDP context is for handover from a non-3GPP access network
<P-CSCF_discovery>	Integer type; influences how the MT/TA requests to get the P-CSCF address, refer to <i>3GPP TS 24.229 [89] annex B and annex L</i> .

	<u>0</u>	Preference of P-CSCF address discovery not influenced by AT+CGDCONT
	1	Preference of P-CSCF address discovery through NAS signalling
	2	Preference of P-CSCF address discovery through DHCP
<IM_CN_Signalling_Flag_Ind> Integer type; indicates to the network whether the PDP context is for IM CN subsystem related signalling only or not.		
	<u>0</u>	UE indicates that the PDP context is not for IM CN subsystem-related signalling only
	1	UE indicates that the PDP context is for IM CN subsystem-related signalling only
<NSLPI> Integer type; indicates the NAS signalling priority requested for this PDP context		
	<u>0</u>	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 signalling low priority". The MT utilizes the provided NSLPI information as specified in <i>3GPP TS 24.301 [83]</i> and <i>3GPP TS 24.008</i> .
<securePCO> Integer type; specifies if security protected transmission of PCO is requested or not (applicable for EPS only).		
	<u>0</u>	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, refer to <i>3GPP TS 24.008 subclause 10.5.6.3</i> .		
	<u>0</u>	Preference of IPv4 MTU size discovery not influenced by AT+CGDCONT
	1	Preference of IPv4 MTU size discovery through NAS signalling

Example

```

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

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

OK

```

2.13. AT+CGACT PDP Context Activation/Deactivation

The execution command is used to activate or deactivate the specified PDP context (s). After the command has completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context remains unchanged.

If the UE is not PS attached when the activation form of the command is executed, the UE first performs a PS attach and then attempts to activate the specified contexts.

Note that in the 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.

This applies when use of CID0 is enabled for the PDN connection activated during attach. In fact, entering AT+CGACT=<0 or 1>,0 will generate ERROR response.

If CID0 mode is not enabled then it is possible to enter the AT+CGACT command to deactivate the last PDN connection from the point of view of the middleware. When the user uses AT+CGACT to disconnect the last PDN connection the following occurs:

- The PDN connection is preserved in the protocol stack
- The PDN connection is disconnected at the middleware, so the <cid> for the PDN connection is marked as deactivated
- OK response is returned rather than 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 in to established state.

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

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

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

AT+CGACT PDP Context Activation/Deactivation

Write Command

AT+CGACT=[<state>[,<cid>[,<cid>[,...]]]]

Response

OK

If there is any error, response:

+CME ERROR:<err>

Read Command AT+CGACT?	Response +CGACT:<cid>,<state> [<CR><LF>+CGACT: <cid>,<state> [...]] OK
Test Command AT+CGACT=?	Response +CGACT:(list of supported <state>s) OK

Parameter

<state>	Integer type; indicates the state of PDP context activation. 0 Deactivated 1 Activated Other values are reserved and will result in an ERROR response to the execution command.
<cid>	Integer type; a numeric parameter which specifies a particular PDP context definition (see +CGDCONT command).

NOTES

1. If context is deactivated successfully, NO CARRIER is returned
2. If CID0 for PDN activated during attach is enabled, then AT+CGACT=<0 or 1>,0 will cause ERROR response.

Example

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

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

OK
```

2.14. AT+CGPADDR Show PDP Addresses

The command returns the IP address of the device.

The execution command returns a list of PDP addresses for the specified context identifiers. If no <cid> is specified, the addresses for all defined contexts are returned.

The test command returns a list of defined <cid>s. These are <cid>s that have been activated and may or may not have an IP address associated with them.

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

Parameter

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

Example

```
AT+CGPADDR=0
+CGPADDR:0,101.43.5.1
```

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

2.15. AT+CIMI Request International Mobile Subscriber Identity

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

Execution command causes the TA to return <IMSI>, which is intended to permit the TE to identify the individual USIM card or active application in the UICC (GSM or USIM) which is attached to MT.

AT+CIMI Request International Mobile Subscriber Identity

Execution Command AT+CIMI	Response +CIMI: <IMSI> OK If there is any error, response: +CME ERROR:<err>
Test Command AT+CIMI=?	Response OK

Parameter

<IMSI>	International Mobile Subscriber Identity (string without double quotes)
---------------------	---

Example

```
AT+CIMI
460001357924680
OK
```


2.16. AT+CFUN Set Phone Functionality

The set 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. Level of functionality between these may also be specified by manufacturers. When supported by manufacturers, MT resetting with <rst> parameter may be utilized.

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

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

AT+CFUN Set Phone Functionality	
Write Command AT+CFUN=[<fun>[,<rst>]]	Response OK If there is any error, response: +CME ERROR:<err>
Read Command AT+CFUN?	Response +CFUN:<fun> OK If there is any error, response: +CME ERROR:<err>
Test Command AT+CFUN=?	Response +CFUN:(list of supported <fun>s), (list of supported <rst>s) OK If there is any error, response: +CME ERROR:<err>

Parameter

<fun>	Integer type
	0 Minimum functionality
	1 Full functionality
	4 Disable phone both transmit and receive RF circuits
<rst>	7 Disable phone SIM only. Transmit and receive circuits still active
	Integer type; MT resetting
	0 Do not reset the MT before setting it to <fun> power level.
	1 Only set to <fun> power level after MT has been reset, and for all subsequent resets.

- 2 Do not reset MT before setting it to <fun> power level and save <fun> value in NVRAM for all subsequent resets.

Example

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

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

OK
```

2.17. AT+CMEE Report Mobile Termination Error

The set command disables or enables the use of final result code “+CME ERROR:<err>” as an indication of an error relating to the functionality of the MT. When enabled, MT related errors cause “+CME ERROR:<err>” final result code instead of the regular “ERROR” final result code. “ERROR” is returned normally when error is related to syntax, invalid parameters or TA functionality.

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

The test command returns values supported as a compound value.

AT+CMEE Report Mobile Termination Error

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
Read Command AT+CMEE?	Response +CMEE:<n> OK
Test Command AT+CMEE=?	Response +CMEE:(list of supported <n>s)

OK

Parameter

<n>	Integer type
0	Disable result code
1	Enable result code and use numeric values
2	Enable result code and use verbose values

2.18. AT+CPSMS Power Saving Mode Setting

The write command controls the setting of the UEs power saving mode (PSM) parameters. The command 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 commands +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 +CPSMS=2. In this form the use of PSM will be disabled and data for all parameters in the command +CPSMS will be removed or, if available, set to the manufacturer specific default values.

The read command returns the current parameter values.

The test command returns the supported <mode>s and the value ranges for the requested extended periodic TAU value in E-UTRAN and the requested Active Time value as compound values.

AT+CPSMS Power Saving Mode Setting

Write Command AT+CPSMS=[<mode>[,<Requested_Periodic-RAU>[,<Requested_GPRS-READY-timer>[,<Requested_Periodic-TAU>[,<Requested_Active-Time>]]]]]	Response OK If there is any error, response: +CME ERROR:<err>
Read Command AT+CPSMS?	Response +CPSMS:<mode>[,<Requested_Periodic-RAU>[,<Requested_GPRS-READY-timer>[,<Requested_Periodic-TAU>[,<Requested_Active-Time>]]]] OK If there is any error, response: +CME ERROR:<err>

Test Command AT+CPSMS=?	Response +CPSMS: (list of supported <mode> s),(list of supported <Requested_Periodic-RAU> s),(list of supported <Requested_GPRS-READY-timer> s),(list of supported <Requested_Periodic-TAU> s),(list of supported <Requested_Active-Time> s) OK
-----------------------------------	--

Parameter

<mode>	Integer type, indicates to 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 manufacturer specific default values.
<Requested_Periodic-RAU>	String type; N/A for NB-IoT
<Requested_GPRS-READY-timer>	String type; N/A for NB-IoT
<Requested_Periodic-TAU>	String type; one byte in an 8-bit format. Requested extended periodic TAU value (T3412) to be allocated to the UE in E-UTRAN. (e.g. "01000111" equals 70 hours). Bits 5 to 1 represent the binary coded timer value Bits 6 to 8 define the timer value unit as follows: Bits 8 7 6 0 0 0 value is incremented in multiples of 10 minutes 0 0 1 value is incremented in multiples of 1 hour 0 1 0 value is incremented in multiples of 10 hours 0 1 1 value is incremented in multiples of 2 seconds 1 0 0 value is incremented in multiples of 30 seconds 1 0 1 value is incremented in multiples of 1 minute 1 1 0 value is incremented in multiples of 320 hours 1 1 1 value indicates that the timer is deactivated
<Requested_Active-Time>	String type; one byte in an 8-bit format. Requested Active Time value (T3324) to be allocated to the UE. (e.g. "00100100" equals 4 minutes). Bits 5 to 1 represent the binary coded timer value. Bits 6 to 8 defines the timer value unit for the GPRS timer as follows: Bits 8 7 6 0 0 0 value is incremented in multiples of 2 seconds 0 0 1 value is incremented in multiples of 1 minute 0 1 0 value is incremented in multiples of decihours

1 1 1 value indicates that the timer is deactivated<Requested_Active-Time> String type; one byte in an 8 bit format. Requested Active Time value (T3324) to be allocated to the UE. The requested Active Time value is coded as one byte (octet 3) of the GPRS Timer 2 information element coded as bit format (e.g. "00100100" equals 4 minutes). For the coding and the value range, see the GPRS Timer 2 IE in 3GPP TS 24.008 [8] Table 10.5.163/3GPP TS 24.008. See also 3GPP TS 23.682 [149], 3GPP TS 23.060 [47] and 3GPP TS 23.401 [82]. The default value, if available, is manufacturer specific.

Example

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

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

OK
```

2.19. AT+CEDRXS eDRX Setting

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

The write command also controls the presentation of an unsolicited result code +CEDRXP: <AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]] when <n>=2 and there is a change in the eDRX parameters provided by the network.

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

AT+CEDRXS eDRX Setting

Write Command	Response
AT+CEDRXS=[<mode>],[,<AcT-type>],	OK

<Requested_eDRX_value>]]]	If there is any error, response: +CME ERROR:<err>
Read Command AT+CEDRXS?	Response +CEDRXS:<AcT-type>,<Requested_eDRX_value> [<CR><LF>+CEDRXS:<AcT-type>,<Requested_eDRX_value> [...]]] OK
Test Command AT+CEDRXS=?	Response +CEDRXS:(list of supported <mode>s),(list of supported <AcT-type>s),(list of supported <Requested_eDRX_value>s) OK

Parameter

<mode>	Integer type, indicates to 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>.
0	Disable the use of eDRX
1	Enable the use of eDRX
2	Enable the use of eDRX and enable the unsolicited result code +CEDRXP:<AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]]
3	Disable the use of eDRX and discard all parameters for eDRX or, if available, reset to the manufacturer specific default values.
<AcT-type>	Integer type; indicates the type of access technology. AT+CEDRXS? is used to specify the relationship between the type of access technology and the requested eDRX value.
0	Access technology is not using eDRX. This parameter value is only used in the unsolicited result code.
1	EC-GSM-IoT (A/Gb mode)
2	GSM (A/Gb mode)
3	UTRAN (Iu mode)
4	E-UTRAN (WB-S1 mode)
5	E-UTRAN (NB-S1 mode)
<Requested_eDRX_value>	String type; half a byte in a 4-bit format. NB-S1 mode.
	bit
	4 3 2 1 E-UTRAN eDRX cycle length duration
	0 0 1 0 20.48 seconds

<Requested_eDRX_value> String type; half a byte in a 4 bit format. The eDRX value refers to bit 4 to 1 of octet 3 of the extended DRX parameters information element (see *subclause 10.5.5.32 of 3GPP TS 24.008 [8]*). For the coding and the value range, see extended DRX parameters information element in *3GPP TS 24.008 [8] Table 10.5.5.32/3GPP TS 24.008*. The default value, if available, is manufacturer specific.

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

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

1	0	1	1	30.72 seconds
1	1	0	0	33.28 seconds
1	1	0	1	35.84 seconds
1	1	1	0	38.4 seconds
1	1	1	1	40.96 seconds

Example

```
AT+CEDRXS=1,4,"0101"
```

```
OK
```

```
AT+CEDRXS?
```

```
+CEDRXS:4,"0101"
```

```
OK
```

```
AT+CEDRXS=?
```

```
+CEDRXS:(0-3),(4),("0000"-"1111")
```

```
OK
```

2.20. AT+CEDRXRDP eDRX Read Dynamic Parameters

The execution command returns <AcT-type> and <Requested_eDRX_value>, <NW-provided_eDRX_value> and <Paging_time_window> if eDRX is used for the cell that the MS is currently registered to.

If the cell that the MS is currently registered to is not using eDRX, AcT-type=0 is returned.

AT+CEDRXRDP eDRX Read Dynamic Parameters

Execution Command AT+CEDRXRDP	Response +CEDRXRDP:<AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]] OK
Test Command AT+CEDRXRDP=?	Response OK
Read Command AT+CEDRXRDP?	Response OK If there is any error, response: +CME ERROR:<err>

Parameter

<AcT-type>	Integer type; indicates the type of access technology. AT+CEDRXS? is used to specify the relationship between the type of access technology and the requested eDRX value.			
0	Access technology is not using eDRX. This parameter value is only used in the unsolicited result code			
1	EC-GSM-IoT (A/Gb mode)			
2	GSM (A/Gb mode)			
3	UTRAN (Iu mode)			
4	E-UTRAN (WB-S1 mode)			
5	E-UTRAN (NB-S1 mode)			
<Requested_eDRX_value>	String type; half a byte in a 4-bit format.			
	bit			
	4	3	2	1
	E-UTRAN eDRX cycle length duration			
	0	0	1	0
	20.48 seconds			
	0	0	1	1
	40.96 seconds			
	0	1	0	1
	81.92 seconds			
	1	0	0	1
	163.84 seconds			
	1	0	1	0
	327.68 seconds			
	1	0	1	1
	655.36 seconds			
	1	1	0	0
	1310.72 seconds			
	1	1	0	1
	2621.44 seconds			
	1	1	1	0
	5242.88 seconds			
	1	1	1	1
	10485.76 seconds			
<Requested_eDRX_value>	String type; half a byte in a 4 bit format. The eDRX value refers to bit 4 to 1 of octet 3 of the extended DRX parameters information element (see <i>subclause 10.5.5.32 of 3GPP TS 24.008 [8]</i>). For the coding and the value range, see extended DRX parameters information element in <i>3GPP TS 24.008 [8] Table 10.5.5.32/3GPP TS 24.008</i> . The default value, if available, is manufacturer specific.			
<NW-provided_eDRX_value>	String type; half a byte in a 4-bit format.			
	bit			
	4	3	2	1
	E-UTRAN eDRX cycle length duration			
	0	0	1	0
	20.48 seconds			
	0	0	1	1
	40.96 seconds			
	0	1	0	1
	81.92 seconds			
	1	0	0	1
	163.84 seconds			
	1	0	1	0
	327.68 seconds			
	1	0	1	1
	655.36 seconds			
	1	1	0	0
	1310.72 seconds			
	1	1	0	1
	2621.44 seconds			
	1	1	1	0
	5242.88 seconds			
	1	1	1	1
	10485.76 seconds			

<Paging_time_window>	String type; half a byte in a 4-bit format.			
	bit			
4	3	2	1	Paging Time Window length
0	0	0	0	2.56 seconds
0	0	0	1	5.12 seconds
0	0	1	0	7.68 seconds
0	0	1	1	10.24 seconds
0	1	0	0	12.8 seconds
0	1	0	1	15.36 seconds
0	1	1	0	17.92 seconds
0	1	1	1	20.48 seconds
1	0	0	0	23.04 seconds
1	0	0	1	25.6 seconds
1	0	1	0	28.16 seconds
1	0	1	1	30.72 seconds
1	1	0	0	33.28 seconds
1	1	0	1	35.84 seconds
1	1	1	0	38.4 seconds
<Paging_time_window>	String type; half a byte in a 4 bit format. The paging time window refers to bit 8 to 5 of octet 3 of the extended DRX parameters information element (see <i>subclause 10.5.5.32 of 3GPP TS 24.008 [8]</i>). For the coding and the value range, see the extended DRX parameters information element in <i>3GPP TS 24.008 [8] Table 10.5.5.32/ 3GPP TS 24.008</i> .			

Example

```
AT+CEDRXRDP
+CEDRXRDP:4,2,2,2

OK
AT+CEDRXRDP=?
OK
```

2.21. AT+CEER Extended Error Report

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

- The failure in the last unsuccessful call setup (originating or answering) or in call modification;
- The failure in the last call release;
- The failure in the last unsuccessful GPRS attach or unsuccessful PDP context activation;

- The failure in the last GPRS detach or PDP context deactivation.

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

AT+CEER Extended Error Report

Execution Command AT+CEER	Response +CEER <report> OK
Test Command AT+CEER=?	Response OK

Parameter

<report>	The total number of characters, including line terminators, in the information, text shall not exceed 2041 characters. 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
```

3 PDN Commands

3.1. AT+QGACT Activate/Deactivate a PDN Context

Activate or deactivate a specified PDN context.

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

Besides, URC “+QGACT=<cid>,<type>” is reported when passive deactivation occurs.

For the activation requirement, the format of the QGACT is “+QGACT=<op>,<pdp_type>,<apn>,<user_name>,<pwd>[,<bearer_type>[,<sim_id>]]”, while for the deactivation requirement, the format is “+QGACT=<op>,<cid>”. For the purpose of normalization, the format of QGACT is:

“+QGACT=<op>,<pdp_type/cid>[,<apn>,<user_name>,<pwd>[,<bearer_type>[,<sim_id>]]]”.

AT+QGACT Activate/Deactivate A PDN Context

Write Command	Response
AT+QGACT=<op>,<pdp_type/cid>[,<apn>,<user_name>,<pwd>[,<bearer_type>[,<sim_id>]]]	+QGACT=<cid>,<type>,<result>[,<activated_pdp_type>] OK +QGACT=<cid> OK
	If there is any error, response: ERROR
	+QGACT=<cid>,<type>,<result>[,<activated_pdp_type>]

Parameter

<op>	Integer type;
------	---------------

	0	Deactivation requirement
	1	Activation requirement
<pdp_type/cid>	Integer type; If <op> is 0, it is pdp_type. Otherwise, it is cid.	
pdp_type:	It is the pdp_type wanted to activate.	
	1	IPv4
	2	IPv6
	3	IPv4v6
	4	Non-IP
cid:	It is a numeric parameter specifying a particular PDP context. Here it should be equal to the <cid> returned by the activation response.	
<apn>	It is the access point name which is mandatory for the activation requirement and should be omitted for the deactivation requirement.	
<user_name>	It is the user name for access to the IP network which is mandatory for the activation requirement and should be omitted for the deactivation requirement.	
<pwd>	It is the password for access to the IP network which is mandatory for the activation requirement and should be omitted for the deactivation requirement.	
<bearer_type>	It is the type of bearer wanted to activate which is optional for the activation requirement and should be omitted for the deactivation requirement.	
	1	NBIOT (Only NBIOT is supported currently)
<sim_id>	It is the id of the SIM Card wanted to use which is optional for the activation requirement and should be omitted for the deactivation requirement.	
	1	SIM Card 1 (Only SIM Card 1 is supported currently).
<cid>	It is a numeric parameter specifying a particular PDP context.	
<type>	0	Result/URC for deactivation requirement
	1	Result/URC for activation requirement
	2	URC for passive deactivation
<result>	0	failure
	1	success
<activated_pdp_type>	It is the pdp_type actually activated.	
	1	IPv4
	2	IPv6
	3	IPv4v6
	4	Non-IP

NOTES

This command name is temporary and may be changed in the future release.

Example

```
AT+QGACTION=1,1,"apn_example","username_example","password_example"  
// Activate a PDN context  
+QGACTION=1  
OK //Return OK immediately for no error  
  
+QGACTION=1,1,1,1 //Notify activation result via URC  
  
AT+QGACTION=0,1 //Deactivate a PDN context  
+QGACTION=1  
OK //Return OK immediately for no error  
  
+QGACTION=1,0,1 //Notify deactivation result via URC
```

4 Network Commands – PING

4.1. AT+QPING Test IP Network Connectivity to a Remote Host

This command sends an ICMP packet to the specified host address.

AT+QPING initiates the sending of a PING packet to the specified address. This will either cause a packet to be returned if the remote system is connected and responding to PING packets, or no response will be received. A maximum of 1 ping attempts will be tried. If none of the packets receive a response within the timeout period, an error will be raised.

AT+QPING Test IP Network Connectivity to a Remote Host

Write Command	Response
AT+QPING=<remote addr> [-l p_size>] [-n count]	OK
	If there is any error, response: ERROR

Parameter

<remote addr>	Address of system sending the message IPv4: A dot notation IP address
<p_size>	Size in bytes of echo packet payload. Range of 8-1460 Default 64
<count>	Number of packet to send. Default 3

Example

```
AT+QPING=192.168.1.1
OK
```

5 Network Commands – Socket

The AT command names listed below are temporary, and may be changed in the future release.

5.1. AT+QSOC Create a TCP/UDP Socket

This command creates a TCP or UDP socket.

AT+QSOC Create a TCP/UDP Socket

Write Command AT+QSOC=<domain>,<type>,<protocol>,<cid>]	Response +QSOC=<socket_id> OK If there is any error, response: ERROR
Test Command AT+QSOC=?	Response +QSOC=(list of supported <domain>s),(list of supported <type>s),(list of supported <protocol>s)[,(list of supported <cid>s)] OK

Parameter

<domain>	Integer type; 1 IPv4 2 IPv6
<type>	Integer type; 1 TCP 2 UDP 3 RAW
<protocol>	Integer type; 1 IP 2 ICMP
<cid>	Integer type; PDP context ID, AT+QGACT response.

5.2. AT+QSOB Bind Local Address and Local Port

This command is used to bind local address and local port. Used chiefly set local port.

AT+QSOB Bind Local Address and Local Port

Write Command AT+QSOB=<socket_id>,<local_port>[,<local_address>]	Response OK If there is any error, response: ERROR
Test Command AT+QSOB=?	Response +QSOB=(list of supported <socket_id>s),(list of supported <local_port>s)[,<local_address>] OK

Parameter

<socket_id>	Integer, socket id, AT+QSOC's response. Range: 0-4
<local_port>	Integer, local port. Range: 0-65535
<local_address>	String, local address.

5.3. AT+QSOCON Connect Socket to Remote Address and Port

This command is used to connect socket to remote address and port.

If the socket is TCP, it will start to send TCP SYN packet; if the socket is UDP, there is no packet being sent.

AT+QSOCON Connect Socket to Remote Address and Port

Write Command AT+QSOCON=<socket_id>,<remote_port>,<remote_address>	Response OK If there is any error, response: ERROR
Test Command AT+QSOCON=?	Response +QSOCON=(list of supported <socket_id>s),(list of supported <remote_port>s),<remote_address> OK

Parameter

<socket_id>	Integer, socket id, AT+QSOC's response. Range: 0-4
<remote_port>	Integer, remote port. Range: 0-65535
<remote_address>	String, remote address.

5.4. AT+QSOSEND Send Data to Remote via Socket

This command is used to send data to network.

The response "OK" just mean the ATCMD format is right and data have been put to socket, waiting for send.

AT+QSOSEND Send Data to Remote via Socket

Write Command AT+QSOSEND=<socket_id>,<data_len>,<data>[,<flag>]	Response OK If there is any error, response: ERROR
Test Command AT+QSOSEND=?	Response +QSOSEND=(list of supported <socket_id>s),<data_length>, <data>[(list of supported <flag>s)] OK

Parameter

<socket_id>	Integer, socket id, AT+QSOC's response. Range: 0-4
<data_len>	Integer, length of data.
<data>	Raw data, data context. Hex string
<flag>	Integer, send flag. 1 ack no delay. 2 no nagle.

5.5. AT+QSODIS Disconnect Socket

This command is used to disconnect socket.

If the socket is TCP, it will start to send TCP FIN packet; if the socket is UDP, there is no packet being sent.

AT+QSODIS Disconnect Socket

Write Command

AT+QSODIS=<socket_id>

Response

OK

If there is any error, response:

ERROR

Test Command

AT+QSODIS=?

Response

+QSODIS=(list of supported <socket_id>s)

OK

Parameter

<socket_id> Integer, socket id, AT+QSOC's response. Range: 0-4

5.6. AT+QSOCL Close Socket

This command is used to close socket.

AT+QSOCL Close Socket

Write Command

AT+QSOCL=<socket_id>

Response

OK

If there is any error, response:

ERROR

Test Command

AT+QSOCL=?

Response

+QSOCL=(list of supported <socket_id>s)

OK

Parameter

<socket_id> Integer, socket id, AT+QSOC's response. Range: 0-4

5.7. +QSONMI Socket Message Arrived Indicator

Indicated there is received some data from network.

+QSONMI Socket Message Arrived Indicator

URC

+QSONMI:

Possible Response

+QSOCL=<socket_id>,<data_len>,<data>

Parameter

<socket_id> Integer, socket id, AT+QSOC's response.

<data_len> Integer, length of data.

<data> Raw data.

5.8. +QSOERR Socket Error Indicator

Indicated there is some error.

+QSOERR Socket Error Indicator

URC

+QSOERR:

Response

+QSOERR=<socket_id>,<error_code>

Parameter

<socket_id> Integer, socket id, AT+QSOC's response.

<error_code> Integer, error code.

1 - Reset by peer point.

2 - Network disconnect.

5.9. Examples

5.9.1. Example of Creating a TCP Socket (Do Not Support Now)

```
AT+QPING=192.168.1.1
OK

AT+QGACT=1,1,"apn","user_name","pwd"           //Activate APN
+QGACT=<cid>,1,1,1
OK

AT+QSOC=1,1,1                                     //Create socket
+QSOC=0
OK

AT+QSOCON=0,1026, "220.180.239.212"             //Connection socket
OK

AT+QSOSEND=0,10,1234562112                       //Send data
OK
+QSONMI=0,3,3BX                                  //Receive data

AT+QSODIS=0                                       //Disconnect socket
OK

AT+QSOCL=0                                         //Close socket
OK
```

5.9.2. Example of Creating a UDP Socket Example

```
AT+QGACT=1,1,"apn","user_name","pwd"           //Activate APN
+QGACT=<cid>,1,1,1
OK

AT+QSOC=1,2,1                                     //Create socket
+QSOC=0
OK

AT+QSOCON=0,1026, "220.180.239.212"             //Connection socket
OK

AT+QSOSEND=0,10,1234562112                       //Send data
```

```
OK
+QSONMI=0,3,3BX //Receive data

AT+QSODIS=0 //Disconnect socket
OK

AT+QSOCL=0 //Close socket
OK
```

6 General Commands

The AT command names listed below are temporary, and may be changed in the future release.

6.1. AT+QBAND Query Current Operating Band

This command is used to query current modem NB-IoT operating band.

AT+QBAND Query Current Operating Band

Read Command
AT+QBAND?

Response
+QBAND: <Current Band>

OK

If there is any error, response:
ERROR

Test Command
AT+QBAND=?

Response
+QBAND=(list of supported <Current Bands>s)

OK

Parameter

<Current Band> Integer, valid values : 1, 2, 3, 5, 8, 12, 13, 17, 18, 19, 20, 26, 28, 66

6.2. AT+QRESET Reset UE

This command is used to reset the module immediately.

AT+QRESET Reset UE

Write Command
AT+QRESET=<mode>

Response

OK

	<p>If there is any error, response: ERROR</p>
<p>Test Command AT+QRESET=?</p>	<p>Response +QRESET: (list of supported <mode>s)</p> <p>OK</p> <p>If there is any error, response: ERROR</p>

Parameter

<mode> 1 Reset the UE

6.3. AT+QSPCHSC Set Scrambling Algorithm

This command is used to select new or old scrambling code. This is because code has been updated by 3GPP, and UE needs to select correct code for network.

AT+QSPCHSC Set Scrambling Algorithm	
<p>Execution Command AT+QSPCHSC=<mode></p>	<p>Response OK</p> <p>Otherwise response: ERROR</p>
<p>Test Command AT+QSPCHSC=?</p>	<p>Response +QSPCHSC: (list of supported <mode>s)</p> <p>OK</p> <p>Otherwise response: ERROR</p>
<p>Read Command AT+QSPCHSC?</p>	<p>Response +QSPCHSC: <mode></p> <p>OK</p> <p>Otherwise response: ERROR</p>

Parameter

<mode>	Integer
	0: New algorithm (default)
	1: Old algorithm

6.4. AT+QFRCLLCK Frequency & Cell Lock

This command is used to lock UE to specific frequency and optionally Cell ID.

AT+QFRCLLCK Frequency & Cell Lock

Execution Command AT+QFRCLLCK=<lock>[,<earfcn>,<earfcn_offset>[,<pci>]]	Response OK Otherwise response: ERROR
Test Command AT+QFRCLLCK=?	Response OK
Read command AT+QFRCLLCK?	Response OK

Parameter

<lock>	Integer value indicating whether to activate lock, or remove lock: 0 Remove lock 1 Activate lock
<earfcn>	Integer value indicating requested EARFCN on which to lock. Range 0- 262143. Value of 0 indicates to remove any lock for EARFCN and Cell
<earfcn_offset>	Integer value indicating 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 value: Physical cell ID. Range: 0-503

6.5. AT+QNBIOTRAI NB-IoT Release Assistance Indication

This command is used to set the NB-IoT release assistance indication as follows:

- No information available
- TE will send only 1 UL packet and no DL packet is expected
- TE will send only 1 UL packet and only 1 DL packet is expected

AT+QNBIOTRAI NB-IoT Release Assistance Indication

Test Command AT+QNBIOTRAI=?	Response +QNBIOTRAI: (list of supported <rai>s) OK
Execution command AT+QNBIOTRAI=<rai>	Response OK Otherwise response: ERROR
Read Command AT+QNBIOTRAI?	Response +QNBIOTRAI: <rai> OK

Parameter

<rai>	Integer type. Specifies release assistance information:
0	No information available (or none of the other options apply) (default)
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

6.6. AT+QATWAKEUP Enable Deep Sleep Wakeup Indication

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

AT+QATWAKEUP Enable Deep Sleep Wakeup Indication

Test Command AT+QATWAKEUP=?	Response +QATWAKEUP: (list of supported <enable>s) OK
---------------------------------------	---

Execution Command AT+QATWAKEUP=<enable>	Response OK Otherwise response: ERROR
Read Command AT+QATWAKEUP?	Response +QATWAKEUP: <enable> OK

Parameter

<enable>	Integer; <u>0</u> Disable indication on this channel when modem wakes up from deep sleep 1 Enable indication on this channel when modem wakes up from deep sleep
-----------------------	---

Example

AT+QATWAKEUP=1 //Enable wakeup indication

OK

(Modem goes into deep sleep mode)

(Modem is woken up from deep sleep mode)

+QATWAKEUP //Modem fully woken up and ready to receive AT commands/data

6.7. AT+QENGINEFO Query Current Network Status

This command is used to query current modem status information for serving cell and current network status.

AT+QENGINEFO Query Current Network Status

Write Command AT+QENGINEFO=<mode>	When <mode>=0: Response +QENGINEFOSC:<sc_earfcn>,<sc_earfcn_offset>,<sc_pci>,<sc_cellid>,<sc_rsrp>,<sc_rsrq>,<sc_rssi>,<sc_snr>,<sc_band>,<sc_tac>,<sc_ecl>,<sc_tx_pwr> [*MENGINEFONC:<nc_earfcn>,<nc_earfcn_offset>,<nc_pci>,<nc_rsrp>,...]
---	---

	<p>OK</p> <p>When <mode>=1: Response +QENGINEFODT: <RLC_UL_BLER>,<RLC_DL_BLER>,<MAC_UL_BLER>,<MAC_DL_BLER>,<MAC_UL_total_bytes>,<MAC_DL_total_bytes>,<MAC_UL_total_HARQ_TX>,<MAC_DL_total_HARQ_TX>,<MAC_UL_HARQ_re_TX>,<MAC_DL_HARQ_re_TX>,<RLC_UL_tput>,<RLC_DL_tput>,<MAC_UL_tput>,<MAC_DL_tput></p> <p>OK</p> <p>If there is any error, response: ERROR</p>
	<p>Test Command AT+QENGINEFO=?</p> <p>Response +QENGINEFO=(list of supported <mode>s)</p> <p>OK</p>

Parameter

<mode>	Integer value indicating requested engineering information. 0 display Radio information for serving and neighbor cells 1 display data transfer information only if modem in RRC-CONNECTED state
<sc_earfcn>	Integer value indicating the EARFCN for serving cell. Range 0-262143
<sc_earfcn_offset>	Integer value indicating the EARFCN offset for serving cell: 0 Offset of -2 1 Offset of -1 2 Offset of -0.5 3 Offset of 0 4 Offset of 1
<sc_pci>	Integer value indicating the serving cell physical cell ID. Range 0 – 503.
<sc_cellid>	String type; four byte (28 bit) cell ID in hexadecimal format for serving cell.
<sc_rsrp>	Signed integer indicating serving cell RSRP value in units of dBm (can be negative value). Available only in RRC-IDLE state.
<sc_rsrq>	Signed integer indicating serving cell RSRQ value in units of dB (can be negative value). Available only in RRC-IDLE state.
<sc_rssi>	Signed integer indicating serving cell RSSI value in units of dBm (can be negative value). Available only in RRC-IDLE state.
<sc_snr>	Signed integer value. Last SNR value for serving cell in units of dB. Available only in RRC-IDLE state.

<sc_band>	Integer value; 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 value. Last Enhanced Coverage Level (ECL) value for serving cell. Range 0-2.
<sc_tx_pwr>	Signed integer value indicating current UE transmit power. Units of cBm Centibels relative to one milliwatt (can be negative value).
<nc_earfcn >	Integer value indicating the EARFCN for neighbor cell. Range 0-262143
<nc_earfcn_offset >	Integer value indicating the EARFCN offset for neighbor cell: 0 Offset of -2 1 Offset of -1 2 Offset of -0.5 3 Offset of 0 4 Offset of 1
<nc_pci >	Integer value indicating the neighbor cell physical cell ID. Range 0-503.
<nc_rsrp>	Signed integer indicating neighbor cell RSRP value in units of dBm (can be negative value).
<RLC_UL_BLER >	Integer value. Represented in % value (range 0 to 100). UL block error rate (as per IRQ) in RLC. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established/resumed RRC connection or since previous AT*MENGINFO query with <mode>=1, whichever is later. Only valid in RRC-CONNECTED state.
<RLC_DL_BLER >	Integer value Represented in % value (range 0 to 100). DL block error rate (as per ARQ) in RLC. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established / resumed RRC connection, or since previous AT*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state.
<MAC_UL_BLER >	Integer value. Represented in % value (range 0 to 100). UL block error rate (as per HARQ) in MAC for UL-SCH. Calculated from the beginning of successfully established /resumed / re-established RRC connection, or since previous AT*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state.
<MAC_DL_BLER>	Integer value. Represented in % value (range 0 to 100). DL block error rate (as per HARQ) in MAC for DL-SCH, excluding BCCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state.
<MAC_UL_total_bytes>	Integer value. 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*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: bytes
<MAC_DL_total_bytes>	Integer value. 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*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: bytes
<MAC_UL_total_HARQ_TX>	Integer value. 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*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: (re)transmissions
<MAC_DL_total_HARQ_TX>	Integer value. 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*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: (re)transmissions
<MAC_UL_HARQ_re_TX>	Integer value. 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*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: retransmissions
<MAC_DL_HARQ_re_TX>	Integer value. 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*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: retransmissions.
<RLC_UL_tput>	Integer value. 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*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: kbits / s
<RLC_DL_tput>	Integer value. 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*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: kbits / s
<MAC_UL_tput>	Integer value. UL throughput in MAC for UL-SCH. Calculated from the beginning of successfully established / resumed / re-established RRC connection, or since previous AT*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: kbits / s
<MAC_DL_tput>	Integer value. 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*MENGINFO query with <mode>=1, whichever is later. Available only in RRC-CONNECTED state. Unit: kbits / s

7 OneNET Commands

7.1. AT+MIPLCREATE Create OneNET Instance

The command is used to create an instance of communication to NB-IoT OneNET platform.

AT+MIPLCREATE Create OneNET Instance

Write Command	Response
AT+MIPLCREATE=<totalsize>,<config>,<index>,<currentsize>,<flag>	If the flag and index equal to 0, and the format is right, respond: Ref: id
	OK Else if the flag and index not equal to 0, and the format is right, respond:
	OK Until the configure bin input is successful, respond: Ref: id
	OK Otherwise response: ERROR

Parameter

<totalsize>	Integer. The length of complete configure bin. The range is 1-500.
<config>	The current configure bin, in hex string format.
<index>	Integer. The index number of the data. If the configure bin is too long, and more than the AT command length, should split the configure bin. If split into N part, The order number of <index> is N-1 to 0 in descending order, and the AT command is called in the order from the largest to the small sequence number, If the <index> is 0, means this is the last message of the configure bin.
<currentsize>	Integer. The length of current configure bin. The current size must equal to the length of current configure bin.

<flag>	Integer. The message indication. The range is 0-2. If <flag>=1, means the first message of the configure bin. If <flag>=2, means the middle message of the configure bin. If <flag>=0, means the last message of the configure bin.
<Ref>	If configure the ONENET complete, will return a <Ref: id>.

7.2. AT+MIPLDELETE Delete OneNET Instance

The command is used to delete an OneNET communication instance.

AT+MIPLDELETE Delete OneNET Instance

Write Command
AT+MIPLDELETE=<Ref>

Response
OK

If there is an error related to ME functionality:
ERROR

Parameter

<Ref>	Reference ID of OneNET communication instance.
--------------------	--

7.3. AT+MIPLADDOBJ Add LWM2M Object

The command is used to add LWM2M object.

AT+MIPLADDOBJ Add LWM2M Object

Execution Command
AT+MIPLADDOBJ=<Ref>,<objId>,<insCount>,<insBitmap>,<attrCount>,<actCount>

Response
OK

If there is an error related to ME functionality:
ERROR

Parameter

<Ref>	Reference ID of OneNET communication instance.
<objId>	Integer. Object identifier. If the object ID is not existed, the module will return ERROR.
<insCount>	Integer. Instance count.
<insBitmap>	Instance bitmap. For example, if <insCount>=3, and the <insBitmap>=101, means the

	instance id 0/2 will registered, and the instance id 1 will deregistered.
<attrCount>	Integer. Attribute count
<actCount>	Integer. Action count.

7.4. AT+MIPLDELOBJ Delete LWM2M Object

The command is used to delete LWM2M object.

AT+MIPLDELOBJ Delete LWM2M Object

Write Command AT+MIPLDELOBJ=<Ref>,<objId>	Response OK
	If there is an error related to ME functionality: ERROR

Parameter

<Ref>	Reference ID of OneNET communication instance.
<objId>	Integer.Object identifier. If the object ID is not existed, the module will return ERROR.

7.5. AT+MIPLOPEN Send OneNET Login Request

The command is used to send login request to OneNET.

AT+MIPLOPEN Send OneNET Login Request

Write Command AT+MIPLOPEN =<Ref>	Response If format is right, respond: OK
	If there is an error related to ME functionality: ERROR

Parameter

<Ref>	Reference ID of OneNET communication instance.
-------	--

7.6. AT+MIPLCLOSE Send OneNET Logout Request

The command is used to send OneNET Logout Request.

AT+MIPLCLOSE Send OneNET Logout Request

Write Command
AT+MIPLCLOSE=<Ref>

Response
OK

If there is an error related to ME functionality:
ERROR

Parameter

<Ref> Reference ID of OneNET communication instance.

7.7. AT+MIPLREADRSP Respond the Read Request from Application Server/IoT Platform

The command is used to respond the read request from Application Server or IoT platform.

AT+MIPLREADRSP Respond the Read request from Application Server/IoT platform

Write Command
AT+MIPLREADRSP=<Ref>,<msgID>,<objID>,<insID>,<resID>,<valuetype>,<len>,<value>,<index>,<flag>

Response
OK

If there is an error related to ME functionality:
ERROR

Parameter

<Ref> Reference ID of OneNET communication instance.
<msgID> Integer. The message identifier, which from the URC "+MIPLREAD:"
<objID> Integer. Object identifier.
<insID> Integer. The instance identifier, which from the URC "+MIPLREAD:"
<resID> Integer. The resource identifier, which from the URC "+MIPLREAD:".
<valuetype> Integer. The value type.
 1 String
 2 Opaque
 3 Integer

	4.Float 5.Bool
<len>	Integer. The value length. When <valuetype> is String,<len> is the string length of <value>; When <valuetype> is Opaque,<len> is the hex string length of <value>; When <valuetype> is Integer/Float/Bool,<len> is 1;
<value>	The value. When <valuetype> is String, <value> is in string format; The string should be marked with double quotation marks. When <valuetype> is Opaque, <value> is in hex string format; When <valuetype> is Integer/Float/Bool, <value> is Integer/Float/Bool type text.
<index>	The index number of the data. If the data is too long, and more than the AT command length, should split the configure bin. If split into N part, The order number of <index> is N-1 to 0 in descending order, and the AT command is called in the order from the largest to the small sequence number, If the <index> is 0, means this is the last message of the data.
<flag>	The message indication. The range is 0-2. If <flag>=1, means the first message of the configure bin. If <flag>=2, means the middle message of the data. If <flag>=0, means the last message of the data.

7.8. AT+MIPLWRITERSP Respond the Write Request from Application Server/IoT Platform

The command is used to respond the write request from the Application Server or IoT platform.

AT+MIPLWRITERSP Respond the Write Request from Application Server/IoT Platform

Write Command AT+MIPLWRITERSP=<Ref>,<msgID>,<result>,<index>	Response OK If there is an error related to ME functionality: ERROR
--	--

Parameter

<Ref>	Reference ID of OneNET communication instance.
<msgID>	Integer. The message identifier, which from the URC "+MIPLREAD:"
<result>	The process result. 0 FAIL 1 SUCCESS

<index>	The index number of the data. If the data is too long, and more than the AT command length, should split the configure bin. If split into N part, The order number of <index> is N-1 to 0 in descending order, and the AT command is called in the order from the largest to the small sequence number, If the <index> is 0, means this is the last message of the data.
----------------------	--

7.9. AT+MIPLEXECUTERSP Respond the Execute Request from Application Server/IoT Platform

The command is used to respond the execute request from Application Server. or IoT platform.

AT+MIPLEXECUTERSP Respond the Execute Request from Application Server/IoT Platform

Write Command AT+MIPLEXECUTERSP=<Ref>,<msgID>,<result>	Response OK If there is an error related to ME functionality: ERROR
--	--

Parameter

<Ref>	Reference ID of OneNET communication instance.
<msgID>	Integer. The message identifier, which from the URC "+MIPLREAD:"
<result>	The process result. 0 FAIL 1 SUCCESS

7.10. AT+MIPLOBSERVERSP Respond the Observe Request from Application Server/IoT Platform

The command is used to respond the observe request from Application Server or IoT platform.

AT+MIPLOBSERVERSP Respond the Observe Request from Application Server/IoT Platform

Write Command AT+MIPLOBSERVERSP=<Ref>,<msgID>,<result>	Response OK If there is an error related to ME functionality:
--	--

ERROR

Parameter

<Ref>	Reference ID of OneNET communication instance.
<msgID>	Integer. The message identifier, which from the URC "+MIPLREAD:"
<result>	The process result.
0	FAIL
1	SUCCESS

7.11. AT+MIPLNOTIFY Notify the Data to Application Server or IoT Platform

The command is used to notify the data to Application Server or IoT platform.

AT+MIPLNOTIFY Notify the Data to Application Server or IoT Platform

Write Command	Response
AT+MIPLNOTIFY=<Ref>,<msgID>,<objID>,<insID>,<resID>,<valuetype>,<len>,<value>,<index>,<flag>	OK
	If there is an error related to ME functionality: ERROR

Parameter

<Ref>	Reference ID of OneNET communication instance.
<msgID>	Integer. The message identifier, which from the URC "+MIPLREAD:"
<objID>	Integer. Object identifier.
<insID>	Integer. The instance identifier, which from the URC "+MIPLREAD:"
<resID>	Integer. The resource identifier, which from the URC "+MIPLREAD:"
<valuetype>	Integer. The value type.
	1 String
	2 Opaque
	3 Integer
	4 Float
	5 Bool
<len>	Integer. The value length.
	When <valuetype> is String,<len> is the string length of <value>;
	When <valuetype> is Opaque,<len> is the hex string length of <value>;

<value>	When <valuetype> is Integer/Float/Bool,<len> is 1; The value. When <valuetype> is String, <value> is in string format; The string should be marked with double quotation marks. When <valuetype> is Opaque, <value> is in hex string format; When <valuetype> is Integer/Float/Bool, <value> is Integer/Float/Bool type text.
<index>	The index number of the data. If the data is too long, and more than the AT command length, should split the configure bin. If split into N part, The order number of <index> is N-1 to 0 in descending order, and the AT command is called in the order from the largest to the small sequence number, If the <index> is 0, means this is the last message of the data.
<flag>	The message indication. The range is 0-2. If <flag>=1, means the first message of the configure bin. If <flag>=2, means the middle message of the data. If <flag>=0, means the last message of the data.

7.12. AT+MIPLUPDATE Send Update Request

The command is used to send Update Request to update lifetime and objects.

AT+MIPLUPDATE Send Update Request

Write Command

AT+MIPLUPDATE=<ref>,<lifetime>,<withObjectFlag>

Response

OK

If there is an error related to ME functionality:

ERROR

Parameter

<Ref>	Reference ID of OneNET communication instance.
<lifetime>	Update lifetime value, unit is millisecond. The value of 0 means not to update lifetime.
<withObjectFlag>	Update with objects list flag. 0 Update not with objects list. 1 Update with objects list.

7.13. AT+MIPLVER Query the OneNET Version

The command is used to query the current OneNET protocol version.

AT+MIPLVER Query the OneNET Version

Read Command
AT+MIPLVER?

Response
+MIPLVER: <version>

OK

Parameter

<version>	The OneNET protocol version.
------------------------	------------------------------

8 Appendix A Reference

Table 2: Terms and Abbreviations

Abbreviation	Description
APN	Access Point Name
CDP	Connected Device Platform
CS	Circuit Switched
DCE	Data Communication Equipment
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
eDRX	Extended Discontinuous Reception
EGPRS	Enhanced General Packet Radio Service
GERAN	GSM/EDGE Radio Access Network
GMT	Greenwich Mean Time
GPRS	General Packet Radio Service
HPLMN	Home Public Land Mobile Network
HSDPA	High Speed Downlink Packet Access
HSUPA	High-Speed Uplink Packet Access
ICMP	Internet Control Messages Protocol
IMEI	International Mobile Equipment Identity
IMEISV	International Mobile Equipment Identity and Software Version
MS	Mobile Station
NB-IoT	Narrow Band Internet of Thing

PDP	Packet Data Protocol
RRC	Radio Resource Control
RTC	Real Time Clock
SVN	Software Version Number
TA	Terminal Adapter
TCP	Transmission Control Protocol
TE	Terminal Equipment
TTL	Time To Live
UDP	User Datagram Protocol
UE	User Equipment
UICC	Universal Integrated Circuit Card
URC	Unsolicited Result Code
UUID	Universally Unique Identifier