BC92

AT Commands Manual

NB-IoT Module Series

Rev. BC92_AT_Commands_Manual_V1.0

Date: 2019-10-15

Status: Released

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

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Tel: +86 21 5108 6236
Email: info@quectel.com

Or our local office. For more information, please visit:
http://www.quectel.com/support/sales.htm

For technical support, or to report documentation errors, please visit:
http://www.quectel.com/support/technical.htm
Or email to: support@quectel.com

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

About the Document

History

Revision	Date	Author	Description
1.0	2019-10-15	Claire ZHANG/ Theo QIN	Initial

Contents

Table Index

1 Introduction

This document offers details of the AT Command Set supported by Quectel BC92.

By default, the module supports a baud rate of 9600bps. When powering on the module, the command **AT+IPR=<rate>** can be sent by the MCU to configure the communication baud rate afterwards. The settings with this command will be automatically saved to NVM.

1.1. Definitions

- **<CR>**: Carriage return character
- **<LF>**: Line feed character
- **<..>**: Parameter name. Angle brackets do not appear on command line
- **[..]**: Optional parameter. Square brackets do not appear on the command line

1.2. AT Command Syntax

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

AT commands implemented by BC92 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.

- **Extended syntax**

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

A single AT command is executed at a time. Only when the execution of previous AT command is finished, the next one will be executed.

1.3. 3GPP Compliance

3GPP commands are compliant with the *3GPP TS 27.007*, *3GPP TS 27.005* and *ITU V.250* specifications.

2 Implementation Status

Table 2: Types of AT Commands and Implementation Status

AT Command	Description	Implementation Status
3GPP Commands (27.007)		
ATI	Display Product Identification Information	RBR01A01 or later
ATE	Set Command Echo Mode	RBR01A01 or later
AT&W	Store Current Parameters to User Defined Profile	RBR01A01 or later
AT+IPR	Set TE-TA Fixed Local Rate	RBR01A01 or later
AT+CGMI	Request Manufacturer Identification	RBR01A01 or later
AT+CGMM	Request Model Identification	RBR01A01 or later
AT+CGMR	Request Manufacturer Revision	RBR01A01 or later
AT+CSQ	Signal Quality Report	RBR01A01 or later
AT+CESQ	Extended Signal Quality	RBR01A01 or later
AT+CGSN	Request Product Serial Number	RBR01A01 or later
AT+CREG	GSM Network Registration Status	RBR01A01 or later
AT+CGREG	GPRS Network Registration Status	RBR01A01 or later
AT+CPIN	Enter PIN	RBR01A01 or later
AT+CEREG	EPS Network Registration Status	RBR01A01 or later
AT+CSCON	Signaling Connection Status	RBR01A01 or later
AT+COPS	Operator Selection	RBR01A01 or later
AT+CGATT	PS Attach or Detach	RBR01A01 or later

AT+CGDCONT	Define a PDP Context	RBR01A01 or later
AT+CGACT	PDP Context Activation or Deactivation	RBR01A01 or later
AT+CGPADDR	Show PDP Addresses	RBR01A01 or later
AT+CIMI	Request International Mobile Subscriber Identity	RBR01A01 or later
AT+CFUN	Set UE Functionality	RBR01A01 or later
AT+CMEE	Report Mobile Termination Error	RBR01A01 or later
AT+CCLK	Return Current Date and Time	RBR01A01 or later
AT+CBC	Query Power Supply Voltage	RBR01A01 or later
AT+CPSMS	Power Saving Mode Setting	RBR01A01 or later
AT+CEDRXS	eDRX Setting	RBR01A01 or later
AT+CEDRXRDP	eDRX Read Dynamic Parameters	RBR01A01 or later
AT+CTZR	Time Zone Reporting	RBR01A01 or later
AT+CCIOTOPT	CIoT Optimization Configuration	RBR01A01 or later
AT+CGAPNRC	APN Rate Control	RBR01A01 or later
AT+CEER	Extended Error Report	RBR01A01 or later
General Commands		
AT+QBAND	Get and Set Mobile Operation Band	RBR01A01 or later
AT+QICSGP	Configure Parameters of a TCP/IP Context	RBR01A01 or later
AT+QRST	Automatically Rest	RBR01A01 or later
AT+QSPCHSC	Set Scrambling Algorithm	RBR01A01 or later
AT+QLOCKF	Lock NB-IoT Frequency	RBR01A01 or later
AT+QCGDEFCONT	Set Default PSD Connection Settings	RBR01A01 or later
AT+QATWAKEUP	Enable/Disable Deep Sleep Wakeup Indication	RBR01A01 or later
AT+QENG	Engineering Mode	RBR01A01 or later
AT+QNBIOTEVENT	Enable/Disable NB-IoT Related Event Report	RBR01A01 or later

AT+QCCID	USIM Card Identification	RBR01A01 or later
AT+QPOWD	Power off the Module	RBR01A01 or later
AT+QSCLK	Configure Sleep Mode	RBR01A01 or later
AT+QLEDMODE	Configure Network-Status-Indication Light	RBR01A01 or later
AT+QCSEARFCN	Clear NB-IoT/GSM Stored EARFCN List	RBR01A01 or later
AT+QCFG	Extended Configuration Setting	RBR01A01 or later

3 3GPP Commands (27.007)

3.1. ATI   Display Product Identification Information

The execution command returns product identification information.

ATI Display Product Identification Information	
Execution Command **ATI**	Response **Quectel_Ltd** **<Object Id>** **Revision: <revision>** **OK**
Maximum Response Time	300ms

Parameter

<Object Id>	Identifier of device type
<revision>	Revision of software release

Example

```
ATI
Quectel_Ltd
Quectel_BC92
Revision: BC92RBR01A01

OK
```

3.2. ATE   Set Command Echo Mode

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

ATE Set Command Echo Mode	
Execution Command **ATE\<value\>**	Response **OK**
Maximum Response Time	300ms

Parameter

\<value\>	0	Echo mode OFF
	<u>1</u>	Echo mode ON

    NOTE

The setting can be stored in NVM by executing **AT&W**.

Example

```
ATE0
OK
ATI
Quectel_Ltd
Quectel_BC92
Revision: BC92RBR01A01

OK
ATE1
OK
ATI
ATI
Quectel _Ltd
Quectel_BC92
Revision: BC92RBR01A01

OK
```

3.3. AT&W   Store Current Parameters to User Defined Profile

The command stores the current parameter settings to a user defined profile in NVM.

AT&W Store Current Parameters to User Defined Profile	
Execution Command **AT&W[<n>]**	Response **OK**
Maximum Response Time	300ms

Parameter

<n>   0   Profile number to store current parameters

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+IPR Set TE-TA Fixed Local Rate	
Test Command **AT+IPR=?**	Response **+IPR: (**list of supported fixed-only **<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	300ms

Parameter

<rate>	Baud rate per second
	2400
	4800
	<u>9600</u>
	14400
	19200
	28800
	33600
	38400
	57600

NOTES

1. The setting will apply to all channels routed through one connection level for UART.
2. Settings of this command will be automatically saved to NVM.

Example

AT+IPR=9600   //Set the fixed baud rate to 9600bps.
OK
AT+IPR?
+IPR: 9600

OK
AT+IPR=?
+IPR: (2400,4800,9600,14400,19200,28800,33600,38400,57600)

OK

3.5. AT+CGMI   Request Manufacturer Identification

The execution command returns manufacturer information.

AT+CGMI Request Manufacturer Identification	
Test Command **AT+CGMI=?**	Response **OK**
Execution Command **AT+CGMI**	Response **Quectel_Ltd** **<Object Id>**

	Revision: RDA_8909B
	OK
Maximum Response Time	300ms

Parameter

<Object Id>   Identifier of device type

Example

AT+CGMI
Quectel_Ltd
Quectel_BC92
Revision: RDA_8909B

OK

3.6. AT+CGMM   Request Model Identification

The execution command returns the model information of the product.

AT+CGMM Request Model Identification	
Test Command **AT+CGMM=?**	Response **OK**
Execution Command **AT+CGMM**	Response **<Object Id>** **OK**
Maximum Response Time	300ms

Parameter

<Object Id>   Identifier of device type

Example

AT+CGMM
Quectel_BC92

OK

3.7. AT+CGMR   Request Manufacturer Revision

The execution command returns the manufacturer revision. The text is human-readable and is not intended for microcontroller parsing. By default, it will return the firmware revision.

The execution command returns one line of information text **<revision>**.

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

Parameter

<revision>   Revision of software release

Example

AT+CGMR
Revision: BC92RBR01A01

OK

3.8. AT+CSQ   Signal Quality Report

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

The test command returns supported values as a compound value.
Please refer to *Chapter 6* for possible **<err>** values.

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	300ms

Parameter

<rssi>	Integer type. Received signal strength level	
	0	-113dBm or less
	1	-111dBm
	2…30	-109…-53dBm
	31	-51dBm or greater
	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 *3GPP TS 45.008*
	99	Not known or not detectable

Example

```
AT+CSQ
+CSQ: 22,99

OK
```

3.9. AT+CESQ   Extended Signal Quality

The execution command returns received signal quality parameters.

The terminal will provide a current signal strength indicator of 0 to 99 where larger is generally better. This information is based on a single measurement, so the information can be expected to change greatly over short periods of time, and may never use all (or even the majority) of the entire possible range or codes.

The test command returns supported values as a compound value.

Please refer to *Chapter 6* for possible **<err>** values.

AT+CESQ Extended Signal Quality	
Test Command **AT+CESQ=?**	Response **+CESQ:** **(**list of supported **<rxlev>**s)**,(**list of supported **<ber>**s)**,(**list of supported **<rscp>**s)**,(**list of supported **<ecno>**s)**,(**list of supported **<rsrq>**s)**,(**list of supported **<rsrp>**s) **OK**
Execution Command **AT+CESQ**	Response **+CESQ: <rxlev>,<ber>,<rscp>,<ecno>,<rsrq>,<rsrp>** **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<rxlev>	Integer type. Received signal strength level	
	0	**<rssi>** < -110dBm
	1	-110dBm ≤ **<rssi>** < -109dBm
	2	-109dBm ≤ **<rssi>** < -108dBm
	…	
	61	-50dBm ≤ **<rssi>** < -49dBm
	62	-49dBm ≤ **<rssi>** < -48dBm
	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\> [1]	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 dBm ≤ **\<rscp\>** < -26 dBm
	95	-26 dBm ≤ **\<rscp\>** < -25 dBm
	96	-25 dBm ≤ **\<rscp\>**
	255	Not known or not detectable
\<ecno\> [1]	Integer type, Ec/No (see *3GPP 25.133*)	
	0	-24 dBm or less
	1	-24dBm ≤ **\<ecno\>** < -23.5 dBm
	2	-23.5dBm ≤ **\<ecno\>** < -23 dBm
	…	
	47	-1dBm ≤ **\<ecno\>** < -0.5 dBm
	48	-0.5dBm ≤ **\<ecno\>** < 0 dBm
	49	0 dBm ≤ **\<ecno\>**
	255	Not known or not detectable
\<rsrq\>	Integer type. Reference signal received quality (see *3GPP 36.133*)	
	0	-19.5dB or less
	1	-19.5dB ≤ **\<rsrq\>** < -19dB
	2	-19dB ≤ **\<rsrq\>** < -18.5dB
	…	
	32	-4dB ≤ **\<rsrq\>** < -3.5dB
	33	-3.5dB ≤ **\<rsrq\>** < -3dB
	34	-3dB ≤ **\<rsrq\>**
	255	Not known or not detectable
\<rsrp\>	Integer type. Reference signal received power (see *3GPP 36.133*)	
	0	-140 dBm or less
	1	-140dBm ≤ **\<rsrp\>** < -139 dBm
	2	-139dBm ≤ **\<rsrp\>** < -138 dBm
	…	
	95	-46dBm ≤ **\<rsrp\>** < -45 dBm
	96	-45dBm ≤ **\<rsrp\>** < -44 dBm
	97	-44dBm ≤ **\<rsrp\>**
	255	Not known or not detectable

Example

AT+CESQ
+CESQ: 15,99,255,255,25,30

OK

[1] **<rscp>** and **<ecno>** are not applicable for BC92 now, so their value will be 255 ("not known or not detectable").

3.10. AT+CGSN   Request Product Serial Number

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+CGSN Request Product Serial Number	
Test Command **AT+CGSN=?**	Response When TE supports **<snt>** and the command is executed successfully: **+CGSN: (**list of supported **<snt>**s**)** **OK**
Write Command **AT+CGSN=<snt>**	Response When **<snt>=0**: **<sn>** **OK** When **<snt>=1**: **+CGSN: <imei>** **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	300ms

Parameter

\<snt>	Integer type indicating the serial number type that has been requested
	0 Returns the 128-bit UUID
	1 Returns the IMEI number
\<sn>	The 128-bit UUID of the UE. The total number of characters, including line terminators. The information text shall not exceed 37 characters, and shall not contain the sequence **0 \<CR>** or **OK\<CR>**.
\<imei>	String type in decimal format indicating the IMEI number.

Example

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

3.11. AT+CPIN   Enter PIN

Please refer to *Chapter 6* for possible **\<err>** values.

AT+CPIN Enter PIN	
Test Command **AT+CPIN=?**	Response **OK**
Read Command **AT+CPIN?**	Response TA returns an alphanumeric string indicating whether or not some password is required. **+CPIN: \<code>** **OK**
Write Command **AT+CPIN=\<pin>[,\<new pin>]**	Response TA stores a password, such as USIM PIN, USIM 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**, is returned to TE.
	If the PIN required is USIM PUK or USIM PUK2, the second pin is required. This second pin, **<new pin>**, is used to replace the old pin in the USIM. **OK**
	If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	5s

Parameter

<code>	READY	No further entry needed
	SIM PIN	MT is waiting for USIM PIN
	SIM PUK	MT is waiting for USIM PUK
	PH_SP PIN	Service provider personalization password is required.
	SIM PIN2	MT is waiting for USIM PIN 2 to be given. Possible only if the preceding command was acknowledged with "**+CME ERROR:17**"
	SIM PUK2	MT is waiting for USIM PUK 2 to be given. Possible only if the preceding command was acknowledged with error "**+CME ERROR: 18**"
	NO SIM	No SIM card is inserted in
<pin>	String type. Password	
<new pin>	String type. If the PIN required is USIM PUK or USIM PUK2, it is the new password.	

Example

AT+CPIN?
+CPIN: READY

OK

3.12. AT+CREG   GSM Network Registration Status

This command is used to configure the URC of GSM network registration status.

AT+CREG GSM Network Registration Status	
Test Command **AT+CREG=?**	Response **+CREG: (**list of supported **<n>**s) **OK**
Read Command **AT+CREG?**	Response **+CREG: <n>,<stat>[,<lac>,<ci>]** **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Write Command **AT+CREG=<n>**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms
Reference GSM 07.07	

Parameter

<n>	0	Disable network registration unsolicited result code (URC)
	1	Enable network registration URC "**+CREG: <stat>**"
	2	Enable network registration URC with location information (**<lac>** and **<ci>**)
<stat>	0	Not registered, ME is not currently searching a new network to register on
	1	Registered, home network
	2	Not registered, but ME is currently searching a new network to register on
	3	Registration denied
	4	Unknown
	5	Registered, roaming
<lac>		String type. Two-byte location area code in hexadecimal format
<ci>		String type. Two-byte cell ID in hexadecimal format

NOTES

1. URC

    If **<n>=1** and there is a change in the ME network registration status: "**+CREG: <stat>**"

    If **<n>=2** and there is a change in the ME network registration status or a change of the network cell:

    "**+CREG: <stat>[,<lac>,<ci>]**"

2. The setting can be stored in non-volatile memory by executing **AT&W**.

3. This command is only valid under GSM network. The network can be queried by the parameter **<AcT>** in the return value of **AT+COPS?**, 0 means registration under GSM network, 9 means registration under NB-IoT network, other values mean not currently registered to the network.

Example

AT+CREG=1	//Enable the URC of GSM network registration
OK	
+CREG: 1	//URC reports that the module is registered to home network
AT+CREG=2	//Activates extended URC mode
OK	
+CREG: 1,"1878","0873"	//URC reports that operator has been found with location area code and cell ID

3.13. AT+CGREG   GPRS Network Registration Status

This command is used to configure the URC of GPRS network registration status.

AT+CGREG GPRS Network Registration Status	
Test Command **AT+CGREG=?**	Response **+CGREG:** (list of supported **<n>**s) **OK**
Read Command **AT+CGREG?**	Response **+CGREG: <n>,<stat>[,<lac>,<ci>]** **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**

Write Command **AT+CGREG=\<n>**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: \<err>**
Maximum Response Time	300ms
Reference GSM 07.07	

Parameter

\<n>	<u>0</u>	Disable network registration URC
	1	Enable network registration URC "**+CGREG: \<stat>**"
	2	Enable network registration URC with location information (**\<lac>** and **\<ci>**)
\<stat>	0	Not registered, ME is not currently searching a new network to register on
	1	Registered, home network
	2	Not registered, but ME is currently searching a new network to register on
	3	Registration denied
	4	Unknown
	5	Registered, roaming
\<lac>		String type. Two-byte location area code in hexadecimal format
\<ci>		String type. Two-byte cell ID in hexadecimal format

Example

AT+CGREG=1	//Enable the URC of GPRS network registration
OK	
+CGREG: 1	//URC reports that the module is registered to home network
AT+CGREG?	//Query current configuration
+CGREG: 1,1	
OK	
AT+CGREG=?	
+CGREG: (0,1,2)	
OK	

3.14. AT+CEREG EPS Network Registration Status

The write command controls the presentation of an URC (URC) "**+CEREG: <stat>**" when **<n>=1** and there is a change in the MT's EPS network registration status in E-UTRAN, or URC "**+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 URC with "**[,<cause_type>,<reject_cause>]**", when available, when the value of **<stat>** changes.

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

When **<n>=4**, the URC 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 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.

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

The test command returns supported parameter values.

Please refer to *Chapter 6* for possible **<err>** values.

AT+CEREG EPS Network Registration Status	
Test Command **AT+CEREG=?**	Response **+CEREG: (**list 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	Response
AT+CEREG=<n>	**OK**
	If there is any error:
	ERROR
	or
	+CME ERROR: <err>
Maximum Response Time	300ms

Parameter

<n>	Integer type
	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. The 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 bytes E-UTRAN cell ID in hexadecimal format.

\<AcT\>	Integer type. Access technology of the registered network.
	0 GSM
	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[8] Annex G*).
	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 *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 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 deci-hours
	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, please 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 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

NOTES

1. The setting can be stored in NVM by executing **AT&W**.
2. This command only valid under NB-IoT network. The network can be queried by the parameter **<AcT>** in the return value of **AT+COPS?**, 0 means registration under GSM network, 9 means registration under NB-IoT network, other values mean not currently registered to the network.

Example

AT+CEREG=1	//Enable network registration URC.
OK	
AT+CEREG?	
+CEREG: 1,1	
OK	
AT+CEREG=?	
+CEREG: (0-5)	
OK	

3.15. AT+CSCON   Signaling Connection Status

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

The write command controls the presentation of an URC. If **<n>=1**, "**+CSCON: <mode>**" is sent from the MT when the connection mode of the MT is changed.

The read command returns the status of result code presentation and an integer **<mode>** which shows whether the MT is currently in idle mode or connected mode.

The test command returns supported values as a compound value.

Please refer to *Chapter 6* for possible **<err>** values.

AT+CSCON Signaling Connection Status	
Test Command	Response
AT+CSCON=?	**+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	300ms

Parameter

<n>	Integer type. Enable/disable URC.	
	0	Disable URC
	1	Enable URC: "**+CSCON: <mode>**"
<mode>	Integer type. The signaling connection status.	
	0	Idle
	1	Connected

NOTE

The setting can be stored in NVM by executing **AT&W**.

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
```

3.16. AT+COPS　Operator Selection

The write command forces an attempt to select and register the EPS network operator using the USIM card installed in the currently selected card slot. **<mode>** is used to select whether the selection is done automatically by the MT or is forced by this command to operator **<oper>** (it shall be given in format **<format>**) to a certain access technology, indicated in **<AcT>**. If the selected operator is not available, no other operator shall be selected (except **<mode>=4**). If the selected access technology is not available, then the same operator shall be selected in other access 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 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 of registering to more than one access technology. Selection of **<AcT>** does not limit the capability of cell reselections, even though an attempt is made to select an access technology, the phone may still re-select a cell in another access technology.

Please refer to *Chapter 6* for possible **<err>** values.

AT+COPS Operator Selection	
Test Command **AT+COPS=?**	Response **+COPS: [**list of supported **(<stat>**,long alphanumeric,**<op er>**,short alphanumeric**<oper>**,numeric **<oper>)**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>[,<AcT>]]**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	630s

Parameter

<mode>	Integer type	
	<u>0</u>	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. **<oper>** format configuration.	
	0	Long

	1	Short
	<u>2</u>	Numeric
<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 coded, 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 Current
	3	Operator Forbidden
<AcT>	Integer type. Access technology selected	
	0	GSM
	7	E-UTRAN
	9	E-UTRAN (NB-S1 mode)

NOTES

1. The test command can only be executed in idle state, otherwise an error will be returned.
2. The parameter **<AcT>** returned by **AT+COPS?** can query the current registration network's format, 0 means registration under GSM network, 9 means registration under NB-IoT network, other values mean not currently registered to the network.

Example

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

OK
```

3.17. AT+CGATT   PS Attach or Detach

The write command is used to attach the MT to, or detach the MT from, the packet domain service. After the command has completed, the MT remains in V.250 command state. If the MT is already in the requested state, the command is ignored and the "**OK**" response is returned. If the requested state cannot be achieved, an "**ERROR**" or "**+CME ERROR**" response is returned. Please refer to *Chapter 6* for possible **<err>** values.

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

detached.

The read command returns the current packet domain service state.

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

AT+CGATT PS Attach or Detach	
Test Command **AT+CGATT=?**	Response **+CGATT: (**list of supported **<state>**s) **OK**
Read Command **AT+CGATT?**	Response **+CGATT: <state>** **OK**
Write Command **AT+CGATT=<state>**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	75s, determined by network.

Parameter

<state>	Integer type. Indicates the state of PDP context activation. 0 Detached 1 Attached

---

NOTES

1. If the initial PDP context is supported, the context with **<cid>=1** is automatically defined at startup.
2. If any further **AT+CGATT** command is executed when an **AT+CGATT** command is being processed, an error will be returned.
3. Execute **AT+CGATT=0** to detach, and then the module will automatically re-attach.

Example

AT+CGATT?
+CGATT: 0

```
OK
AT+CGATT=1
+CGATT: 1

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

OK
```

3.18. AT+CGDCONT   Define a PDP Context

The write command specifies PDP context parameters for a PDP context identified by the (local) context identification parameter, **<cid>**. It also allows the TE to specify whether security protected transmission of ESM information is requested, because the PCO can include information that requires ciphering. There can be other reasons for the UE to use security protected transmission of ESM information, e.g. if the UE needs to transfer an APN. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the test command. Please refer to *Chapter 6* for possible **<err>** values. For EPS the PDN connection and its associated EPS default bearer is identified herewith. For EPS the **<PDP_addr>** shall be omitted.

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

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

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

By default, the context with **<cid>=1** (context number 1) is defined upon startup and does not need to be created with the **AT+CGDCONT** command. The initial PDP context has particular manufacturer specific default settings disassociated with any other default settings of **AT+CGDCONT**. When in E-UTRAN, the initial PDP context is automatically activated by the MT following a successful registration to the network.

AT+CGDCONT Define a PDP Context	
Test Command **AT+CGDCONT=?**	Response **+CGDCONT**: **(**list of supported **<cid>**s**),(**list of supported **<PDP_type>**s**),,,(**list of supported **<d_comp>**s**),(**list of supported **<h_comp>**s**) **OK**

Read Command	Response
AT+CGDCONT?	**[+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d _comp>,<h_comp>]**
	[+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d _comp>,<h_comp>]
	[...]
	OK
Write Command	Response
AT+CGDCONT=<cid>,[<PDP_type>[,< APN>[,<PDP_addr>[,<d_comp>[,<h_c omp>	**OK**
	If there is any error:
	ERROR
	+CME ERROR: <err>
Maximum Response Time	300ms

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 1-7.

<PDP_type> String type. A string parameter which specifies the type of packet data protocol.

         IP   Internet Protocol (*IETF STD 5 [103]*)

         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. If the value is null or omitted, then the subscription value will be requested.

<PDP_addr> String type. A string parameter that identifies the UE in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. The read form of the command will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the AT+CGPADDR command.

<d_comp>   Integer type. Controls PDP data compression

         0   Off

         1   On

         2   V.42bis

         3   V.44bis

<h_comp>   Integer type. Controls PDP header compression

         0   Off (default if value is omitted)

         1   On

         2   RFC 1144 (applicable for SNDCP only)

	3	RFC 2507
	4	RFC 3095[ROHC] (applicable for PDCP only)

NOTES

1. For EPS, **<PDP_addr>** is omitted.
2. **AT+CGDCONT=<cid>** is used to clear the packet data protocol used by the specified **<cid>**.
3. Activated **<cid>** does not allow configuration and cleanup operations.
4. For NB-IoT mode, **<cid>=1** is the default one-way PDP context, which is not allowed to be configured and cleared by **AT+CGDCONT**. You can configure **<cid>=1** by using the **AT+QCGDEFCONT** command.

Example

```
AT+CGDCONT=?
+CGDCONT: (1-7),("IP","IPV6","IPV4V6","Non-IP"),,,(0-3),(0-4)

OK
AT+CGDCONT=2,"IP","CMNBIOT"
OK
AT+CGDCONT?
+CGDCONT: 2,"IP","CMNBIOT","0.0.0.0",0,0

OK
```

3.19. AT+CGACT   PDP Context Activation/Deactivation

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

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. If the attach fails, then the MT responds with an error or, if extended error responses are enabled, with the appropriate failure-to-attach error message.

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

For EPS, if an attempt is made to disconnect the last PDN connection, then the UE responds with

"**ERROR**" or, if extended error responses are enabled, a "**+CME ERROR**".

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

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

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

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

Please refer to *Chapter 6* for possible **<err>** values.

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>[,<cid>[,...]]]	Response If context is activated successfully: **OK** If context is deactivated successfully: **NO CARRIER** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	150s, determined by network.

Parameter

<state>	Integer type. The state of PDP context activation.
	0 Deactivated

	1	Activated

\<cid\>   Integer type. A numeric parameter which specifies a particular PDP context definition (see **AT+CGDCONT** command).

NOTES

1. For NB-IoT mode, If the initial PDP context is supported, the context with **\<cid\>=1** is automatically defined at startup.
2. For NB-IoT mode, the last activated **\<cid\>** not allowed to deactivated.
3. Currently, only 2 active PDP contexts are allowed to exist simultaneity.
4. Before activating, make sure already attach to the network with **AT+CGATT?**.

Example

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

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

OK
```

3.20. 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 will be returned.

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

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

Read Command	Response
AT+CGPADDR?	**+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]**
	[+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]]
	[...]
	OK
	IPV4: The string is given as a dot-separated numeric (0-255) parameter of the form:
	a1.a2.a3.a4
	IPV6: The string is given as colon-separated hexadecimal parameter.
Write Command	Response
AT+CGPADDR[=<cid>[,<cid>[,...]]]	**[+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]]**
	[+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]]]
	[...]
	OK
	If there is any error:
	ERROR
	or
	+CME ERROR: <err>
	IPV4: The string is given as a dot-separated numeric (0-255) parameter of the form:
	a1.a2.a3.a4
	IPV6: The string is given as colon-separated hexadecimal parameter.
Maximum Response Time	300ms

Parameter

<cid>	Integer type. A numeric parameter which specifies a particular PDP context definition (see **AT+CGDCONT** command). If no **<cid>** is specified, the addresses for all defined contexts are returned.
<PDP_addr_1> and **<PDP_addr_2>**	
	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 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.

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.

The string is given as a dot-separated numeric (0-255) parameter of 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. When AT+CGPIAF is supported, its settings can influence the format of the IPv6 address in parameter **<PDP_addr_1>** or **<PDP_addr_2>** returned with the write form of **AT+CGPADDR**.

NOTES

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

Example

```
AT+CGPADDR=1
+CGPADDR: 1,"101.43.5.1"

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

OK
```

3.21. AT+CIMI   Request International Mobile Subscriber Identity

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

The 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 (USIM) which is attached to MT.

Please refer to *Chapter 6* for possible **<err>** values.

AT+CIMI Request International Mobile Subscriber Identity	
Test Command **AT+CIMI=?**	Response **OK**
Execution Command **AT+CIMI**	Response **<IMSI>**

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

Parameter

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

Example

AT+CIMI
460001357924680

OK

3.22. AT+CFUN   Set UE Functionality

The write command selects the level of functionality in the MT. Level "full functionality" is where the highest level of power is drawn. "Minimum functionality" is where minimum power is drawn.

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

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+CFUN Set UE Functionality	
Test Command **AT+CFUN=?**	Response **+CFUN:** (list of supported **<fun>**s),(list of supported **<rst>**s) **OK**
Read Command **AT+CFUN?**	Response **+CFUN: <fun>** **OK**

Write Command	Response
AT+CFUN=<fun>[,<rst>]	**OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	15s, determined by network.

Parameter

<fun>	Integer type. UE functionality level	
	0	Minimum functionality
	<u>1</u>	Full functionality
<rst>	Integer type. UE resetting	
	<u>0</u>	Do not reset the UE after setting it to **<fun>** power level
	1	Reset the UE after setting it to <fun> power level

Example

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

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

OK
```

3.23. AT+CMEE   Report Mobile Termination Error

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

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

The test command returns values supported as a compound value.

Please refer to *Chapter 6* for possible **<err>** values.

AT+CMEE Report Mobile Termination Error	
Test Command AT+CMEE=?	Response **+CMEE:** (list 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	300ms

Parameter

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

NOTE

The setting can be stored in NVM by executing **AT&W**.

Example

```
AT+CMEE?
+CMEE: 0

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

OK
```

3.24. AT+CCLK   Return Current Date and Time

The clock will be set automatically once the UE has connected to the network.

The read command returns the current setting of the clock.

AT+CCLK Return Current Date and Time	
Test Command **AT+CCLK=?**	Response **OK**
Read Command **AT+CCLK?**	Response **+CCLK: <time>** **OK**
Maximum Response Time	300ms

Parameter

<time>	String type. The format is "**yy/MM/dd,hh:mm:ss**", where characters indicate year (two last digits), month, day, hour, minute and second .

Example

```
AT+CCLK=?
OK
```

3.25. AT+CBC   Query Power Supply Voltage

The command is used to query the voltage value of power supply.

Please refer to *Chapter 6* for possible **<err>** values.

AT+CBC Query Power Supply Voltage	
Test Command **AT+CBC=?**	Response **+CBC: (**list of supported **<bcs>**s),(list 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	300ms

Parameter

<bcs>	Battery charge status	
	0	ME is not charging
	1	ME is charging
	2	Charging has been finished
	3	Charging adapter is connected, charging has finished
	4	Charging error, charging is interrupted
	5	False charging temperature, charging is interrupted while the temperature is beyond the allowed range
<bcl>	Battery charge level	
	0...100	Battery has 0-100 percent of capacity remaining vent
<voltage>	Battery voltage (mV)	

NOTE

As BC92 does not support battery charging, **<bcs>** and **<bcl>** are invalid while the **<voltage>** still indicates the correct voltage of power supply.

Example

AT+CBC
+CBC: 0,0, 3856

OK

3.26. AT+CPSMS   Power Saving Mode Setting

The write command controls the setting of the UE's power saving mode (PSM) parameters. It controls whether the UE wants to apply PSM or not, as well as the requested extended periodic TAU value in E-UTRAN and the requested Active Time value. See the URCs provided by **AT+CEREG** for the Active Time value, and the extended periodic TAU value that are allocated to the UE by the network in E-UTRAN.

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

The read command returns the current parameter values.

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+CPSMS Power Saving Mode Setting	
Test Command **AT+CPSMS=?**	Response **+CPSMS:** **(**list 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	300ms

Parameter

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

NOTES

1. This timer value unit is only applicable to the T3412 extended value IE. If it is received in an integrity protected message, value shall be interpreted as multiples of 320 hours. Otherwise value shall be interpreted as multiples of 1 hour.
2. **AT+CPSMS?** read command could only get mode value 0 and 1.

3. Settings of this command will be automatically saved to NVM.

Example

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

3.27. AT+CEDRXS   eDRX Setting

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

The write command also controls the presentation of the URC:
"**+CEDRXP: <AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time _window>]]]**"
when **<n>=2** and there is a change in the eDRX parameters provided by the network.

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

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

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+CEDRXS eDRX Setting	
Test Command **AT+CEDRXS=?**	Response **+CEDRXS: (**list of supported **<mode>**s)**,(**list of supported **<AcT-type>**s)**,(**list of supported **<Requested_eDRX_valu e>**s)**

	OK
Read Command **AT+CEDRXS?**	Response **+CEDRXS: <mode>,<AcT-type>,<Requested_eDRX_value>** **[+CEDRXS:<mode>, <AcT-type>,<Requested_eDRX_value>]** **[...]** **OK**
Write Command **AT+CEDRXS=<mode>[,<AcT-type>[,<Requested_eDRX_value>]]**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<mode>	Integer type. Disable or enable the use of eDRX in the UE. This parameter is applicable to all specified types of access technology, i.e. the most recent setting of **<mode>** will take effect for all specified values of **<AcT-type>**.
	0 Disable the use of eDRX
	<u>1</u> Enable the use of eDRX
	2 Enable the use of eDRX and enable the URC: "**+CEDRXP: <AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]]**"
	3 Disable the use of eDRX and discard all parameters for eDRX or, if available, reset to default values.
<AcT-type>	Integer type. 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 URC.
	5 E-UTRAN (NB-S1 mode)
<Requested_eDRX_value>	String type. Half a byte in a 4-bit format. NB-S1 mode.

bit

4	3	2	1	E-UTRAN eDRX cycle length duration
0	0	1	0	20.48 seconds

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

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

bit

4	3	2	1	E-UTRAN eDRX cycle length duration
0	0	1	0	20.48 seconds
0	0	1	1	40.96 seconds
0	1	0	1	81.,92 seconds
1	0	0	1	163.84 seconds
1	0	1	0	327.68 seconds
1	0	1	1	655.36 seconds
1	1	0	0	1310.72 seconds
1	1	0	1	2621.44 seconds
1	1	1	0	5242.88 seconds
1	1	1	1	10485.76 seconds

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

bit

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

> **NOTE**
>
> Settings of this command will be automatically saved to NVM.

Example

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

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

OK
```

3.28. AT+CEDRXRDP   eDRX Read Dynamic Parameters

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

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

Please refer to *Chapter 6* for possible **<err>** values.

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

Maximum Response Time	300ms

Parameter

<AcT-type>	Integer type. 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 URC
	5	E-UTRAN (NB-S1 mode)

<Requested_eDRX_value>   String type. Half a byte in a 4-bit format.

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

<NW-provided_eDRX_value>   String type. Half a byte in a 4-bit format.

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

<Paging_time_window>   String type. Half a byte in a 4-bit format.

bit				
4	3	2	1	Paging Time Window length
0	0	0	0	2.56 seconds
0	0	0	1	5.12 seconds
0	0	1	0	7.68 seconds
0	0	1	1	10.24 seconds
0	1	0	0	12.8 seconds

0	1	0	1	15.36 seconds
0	1	1	0	17.92 seconds
0	1	1	1	20.48 seconds
1	0	0	0	23.04 seconds
1	0	0	1	25.6 seconds
1	0	1	0	28.16 seconds
1	0	1	1	30.72 seconds
1	1	0	0	33.28 seconds
1	1	0	1	35.84 seconds
1	1	1	0	38.4 seconds
1	1	1	1	40.96 seconds

Example

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

OK
AT+CEDRXRDP=?
OK

3.29. AT+CTZR   Time Zone Reporting

The write command enables/disables the reporting of time zone change event. If the reporting is enabled, the MT will return the URC "**+CTZV: <tz>**" whenever the time zone is changed. Please refer to *Chapter 6* for possible **<err>** values.

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

Write Command	Response
AT+CTZR=\<onoff\>	**OK**
	If there is any error:
	ERROR
	Or
	+CME ERROR: \<err\>
Maximum Response Time	300ms

Parameter

\<onoff\>	0	Disable time zone change event reporting
	1	Enable time zone change event reporting by URC "**+CTZV: \<tz\>**".
\<tz\>		String type. Represents the sum of the local time zone (difference between the local time and GMT expressed in quarters of an hour) plus daylight saving time. The format is "±zz", expressed as a fixed width, two digits integer with the range -48 ~ +56. To maintain a fixed width, numbers in the range -9 ~ +9 are expressed with a leading zero, e.g. "-09", "+00" and "+09".

NOTE

The setting can be stored in NVM by executing AT&W.

Example

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

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

OK
```

3.30. AT+CCIOTOPT   CIoT Optimization Configuration

The write command controls which CIoT EPS optimizations that 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, sub-clause 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, sub-clause 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, sub-clause 9.9.3.12A*).

The write command is used also to control the URC "**+CCIOTOPTI**". An URC "**+CCIOTOPTI: <supported_Network_opt>**" is used to indicate the supported CIoT EPS optimization by the network.

The read command returns the current settings for supported and preferred CIoT EPS optimization and the current status of URC "**+CCIOTOPTI**".

Please refer to *Chapter 6* for possible **<err>** values.

AT+CCIOTOPT CIoT Optimization Configuration	
Test Command **AT+CCIOTOPT=?**	Response +CCIOTOPT: (list of supported **<n>**s),(list of supported **<supported_UE_opt>**s),(list 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 When **<n>=0** or **2**: **OK** When **<n>=1**: **OK** **+CCIOTOPTI: <supported_Network_opt>** If there is any error:

	ERROR
	or
	+CME ERROR: <err>
Maximum Response Time	300ms

Parameter

<n>	Integer type. Enable/disable reporting of URC "**+CCIOTOPTI**".
	<u>0</u> Disable reporting
	1 Enable reporting
	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.
	0 CP and up Ciot are not supported (because Nbiot must support CP CIoT, configuring this value will be ignored)
	<u>1</u> Support control plane CIoT EPS optimization
	2 Support user 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.
	1 Preference for control plane CIoT EPS optimization
	2 Preference for user plane CIoT EPS optimization
<supported_Network_opt>	Integer type. Range: 0-3, reporting the CI of the network.

NOTE

Settings of this command will be automatically saved to NVM.

3.31. AT+CGAPNRC   Query APN Rate Control

The write command returns the APN rate control parameters (see *3GPP TS 24.008 [8]*) associated with the provided context identifier **<cid>**, while the execute command will return the APN rate control parameters of all active PDP contexts.

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+CGAPNRC   Query 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>**
Execute Command **AT+CGAPNRC**	Response **+CGAPNRC: <cid>[,<Additional_exception_reports>[,<Uplink_time_unit>[,<Maximum_uplink_rate>]]]** **[+CGAPNRC: <cid>[,<Additional_exception_reports>[,<Uplink_time_unit>[,<Maximum_uplink_rate>]]]]** **[...]** **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<cid>	Integer type. Specifies a particular PDP context definition (see **AT+CGDCONT** command).
<Additional_exception_reports>	Integer type. Indicates whether or not additional exception reports are allowed to be sent when the maximum uplink rate is reached. This refers to bit 4 of octet 1 of the APN rate control parameters IE as specified in *3GPP TS 24.008 [8] subclause 10.5.6.3.2*. 0 Additional exception reports at maximum rate reached are not allowed to be sent. 1 Additional exception reports at maximum rate reached are

	allowed to be sent.
<Uplink_time_unit>	Integer type. Specifies 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 [8] subclause 10.5.6.3.2.* 0 Unrestricted 1 Minute 2 Hour 3 Day 4 Week
<Maximum_uplink_rate>	Integer type. Specifies the maximum number of messages the UE is restricted to send per uplink time unit. This refers to octet 2 to 4 of the APN rate control parameters IE as specified in *3GPP TS 24.008 [8] subclause 10.5.6.3.2.*

3.32. 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 call release;
● The failure in the last unsuccessful PDP context activation;
● The failure in the PDP context deactivation.

Typically, the text consists 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	300ms

Parameter

<report>	Extended error report. The total number of characters in the information text, including line terminators, 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
```

4 General Commands

4.1. AT+QBAND   Get and Set Mobile Operation Band

The command is used to get the currently registered band or set the bands to be locked. Please refer to *Chapter 6* for possible **<err>** values.

AT+QBAND Get and Set Mobile Operation Band	
Test Command **AT+QBAND=?**	Response **+QBAND: (**list of supported **<band number>**s)**[,(**list of supported **<Operating Bands>**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>[,<ban d>[,<band>[,…]]]**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<band number>	Integer value indicating preferred band number to be searched
	0 All bands

	1-5	Number of bands to be locked
\<band\>		Integer value indicating currently preferred NB-IoT band to be searched. Valid values: 3, 5, 8, 20, 28.
\<Operating Band\>		Integer value indicating the band(s) being used. Valid values: 3, 5, 8, 20, 28.

NOTES

1. Settings of this command will be automatically saved to NVM.
2. Only valid under NB-IoT network.

Example

```
AT+QBAND=?              //Query the list of supported bands
+QBAND: (0-5),(3,5,8,20,28)

OK
AT+QBAND=1,20           //Set the band to be used
OK

AT+QBAND?               //Query the band being used
+QBAND: 20

OK
```

4.2. AT+QICSGP Configure Parameters of a TCP/IP Context

The command can be used to configure the **\<APN\>**, **\<username\>**, **\<password\>** and other parameters of a TCP/IP context.

AT+QICSGP Configure Parameters of a TCP/IP Context	
Test Command **AT+QICSGP=?**	Response **+QICSGP:** **((1-7)[,(1,2),\<apn\>[,\<username\>,\<password\>[,(0-2)]]]** **OK**
Write Command Query the configuration of a context **AT+QICSGP=\<contextID\>**	Response **+QICSGP:** **\<context_type\>,\<APN\>,\<username\>,\<password\>,\<authent ication\>** **OK**

Write Command	Response
Configure the context	**OK**
AT+QICSGP=<contextID>[,<context_type>,<APN>[,<username>,<password>)[,<authentication>]]]	**ERROR**

Parameter

<contextID>	Integer type. The context ID. The range is 1-7.
<context_type>	Integer type. The protocol type
	<u>1</u> IPV4
	2 IPV4V6
<APN>	String type. The access point name.
<username>	String type. The username.
<password>	String type. The password.
<authentication>	Integer type. The authentication methods
	0 NONE
	1 PAP
	2 CHAP

Example

AT+QICSGP=1,1,"UNINET",,,1	//Configure context 1. APN is "UNINET" for China Unicom.
OKOK	
AT+QICSGP=1	//Query the configuration of context 1.
+QICSGP: 1,1,"UNINET",,,1	
OK	

NOTES

1. If the PDP context is not configured by **AT+QICSGP**, we cannot use this AT command to read it.
2. This command is only used when APN username and password need to be configured. Otherwise, please use the command **AT+CGDCONT** to configure the PDP context.
3. This command only works under GSM network.

4.3. AT+QRST   Reset

This command is used to reset the module immediately.

Please refer to *Chapter 6* for possible **<err>** values.

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

Parameter

<mode>	1	Reset the module immediately.

4.4. AT+QSPCHSC   Set Scrambling Algorithm

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+QSPCHSC Set Scrambling Algorithm	
Test Command **AT+QSPCHSC=?**	Response **+QSPCHSC: (**list of supported **<mode>**s**)** **OK**
Read Command **AT+QSPCHSC?**	Response **+QSPCHSC: <mode>**

	OK
Write Command **AT+QSPCHSC=<mode>**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<mode>	Integer
	0 Old algorithm
	<u>1</u> New algorithm

NOTE

Settings of this command will be automatically saved to NVM.

4.5. AT+QLOCKF　Lock NB-IoT Frequency

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+QLOCKF　Lock NB-IoT Frequency	
Test Command **AT+QLOCKF=?**	Response **+QLOCKF: (0,1)[,,(0-38)[,]]** **OK**
Read command **AT+QLOCKF?**	Response **+QLOCKF: <mode>[,<earfcn>,<earfcn_offset>[,<pci>]]** **OK**
Write Command **AT+QLOCKF=<mode>[,<earfcn>,<ear fcn_offset>[,<pci>]]**	Response **OK**

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

Parameter

<mode>	Integer value indicating activate/remove lock
	<u>0</u> Remove lock
	1 Activate lock
<earfcn>	Integer value indicating requested EARFCN on which to lock. Range: 0-262143. Value 0 indicates to remove any lock for EARFCN and Cell.
<earfcn_offset>	Integer value indicating requested EARFCN offset
	0 Offset of -20
	1 Offset of -19
	…
	<u>19</u> Offset of -1
	…
	37 Offset of 17
	38 Offset of 18
<pci>	Integer value indicating the physical cell ID. Range: 0-503.

NOTE

1. Settings of this command will be automatically saved to NVM.
2. Only valid under NB-IoT network

4.6. AT+QCGDEFCONT   Set Default PSD Connection Settings

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

Please refer to *Chapter 6* for possible **<err>** values.

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

	OK
Read Command **AT+QCGDEFCONT?**	Response **+QCGDEFCONT: <PDP_type>[,<APN>]** **OK**
Write Command **AT+QCGDEFCONT=<PDP_type>[,<APN>**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<PDP_type>	String type. Specifies the type of packet data protocol:
	IP Internet Protocol (IETF STD 5)
	IPV6 Internet Protocol version 6 (IETF RFC 2460)
	IPV4V6 Dual IP stack, UE capability (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. If the value is null or omitted, then the subscription value will be requested.

NOTES

1. New settings for the default PDN connection will take effect after the module reboots.
2. Settings of this command will be automatically saved to NVM.
3. Only valid under NB-IoT network

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

This command is used to enable/disable an URC on a channel that indicates when the modem is fully woken up after a deep sleep or enters the deep sleep mode.

Please refer to *Chapter 6* for possible **<err>** values.

AT+QATWAKEUP Enable/Disable Deep Sleep Wakeup Indication	
Test Command **AT+QATWAKEUP=?**	Response **+QATWAKEUP: (**list of supported **<enable>**s**)**

	OK
Read Command **AT+QATWAKEUP?**	Response **+QATWAKEUP: <enable>** **OK**
Write Command **AT+QATWAKEUP=<enable>**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<enable>	Integer type.	
	0	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

NOTES

1. The setting can be stored in NVM by executing **AT&W**.
2. Only valid under NB-IoT network.

Example

AT+QATWAKEUP=1   //Enable wakeup indication

OK
//The module goes into deep sleep mode.
+QATSLEEP   //When the module succeeds in entering deep sleep mode (PM3 state), this
                                 URC will be reported.

//The module goes into deep sleep mode.
+QATSLEEPFAIL   //When the module fails to enter deep sleep mode (PM3 state), this URC will
                                 be reported.

//The module is woken up from deep sleep mode
+QATWAKEUP   //The module has been fully woken up and is ready to receive AT commands/
                                 data

4.8. AT+QENG   Engineering Mode

This command is used to query current modem status information for serving cell and current network status in Engineering Mode. Please refer to **Chapter 6** for possible **<err>** values.

AT+QENG Engineering Mode	
Test Command **AT+QENG=?**	Response **+QENG:** (list 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_snr>],< sc_band>,<sc_tac>,[<sc_ecl>], [<sc_tx_pwr>]** **[+QENG: 1,<nc_earfcn>,<nc_earfcn_offset>,<nc_pci>,<n c_rsrp>,[…]]** **OK** When **<mode>=1**: **+QENG: 2,<RLC_UL_BLER>,<RLC_DL_BLER>,<MAC_U L_BLER>,<MAC_DL_BLER>,<MAC_UL_total_bytes>,<M AC_DL_total_bytes>,<MAC_UL_total_HARQ_TX>,<MAC_ DL_total_HARQ_TX>,<MAC_UL_HARQ_re_TX>,<MAC_D L_HARQ_re_TX>,<RLC_UL_tput>,<RLC_DL_tput>,<MAC _UL_tput>,<MAC_DL_tput>** **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<mode>	Integer value, indicating the requested engineering information.
	0 Display radio information for serving and neighbor cells
	1 Display data transfer information only if the modem is 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 -20
	1 Offset of -19
	…
	20 Offset of 0
	…
	37 Offset of 17
	38 Offset of 18
<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.
<nc_rsrp>	Signed integer indicating neighbor cell RSRP value in units of dBm (can be negative value).
<RLC_UL_BLER>	Integer value representing percentage (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+QENG query with **<mode>=1**, whichever is later. Only valid in RRC-CONNECTED state.
<RLC_DL_BLER>	Integer value representing percentage (range 0 to 100). DL block error rate (as per ARQ) in RLC. Calculated over all established RLC AM radio bearers. Calculated from the beginning of successfully established/resumed RRC connection, or since previous **AT+QENG** query with **<mode>=1**, whichever is later. Available only in RRC-CONNECTED state.
<MAC_UL_BLER>	Integer value representing percentage (range 0 to 100). UL block error rate (as per HARQ) in MAC for UL-SCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since previous **AT+QENG** query with **<mode>=1**, whichever is later. Available only in RRC-CONNECTED state.
<MAC_DL_BLER>	Integer value representing percentage (range 0 to 100). DL block error rate (as per HARQ) in MAC for DL-SCH, excluding BCCH. Calculated from the beginning of successfully established/resumed/re-established RRC connection, or since

previous **AT+QENG** query with **<mode>=1**, whichever is later. 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+QENG 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+QENG 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+QENG** query with **<mode>=1**, whichever is later. Available only in RRC-CONNECTED state. Unit: Number of retransmissions.

<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+QENG** query with **<mode>=1**, whichever is later. Available only in RRCCONNECTED state.   Number of retransmissions.

<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+QENG** query with **<mode>=1**, whichever is later. Available only in RRC-CONNECTED state. Unit: Number of 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+QENG** query with **<mode>=1**, whichever is later. Available only in RRCCONNECTED state. Unit: Number of 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+QENG** 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+QENG** 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+QENG** 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+QENG** query with **<mode>=1**, whichever is later. Available only in RRC-CONNECTED state. Unit: kbits/s.

NOTE

Only valid under NB-IoT network.

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

This command is used to enable and disable the specific event report.

Please refer to *Chapter 6* for possible **<err>** values.

AT+QNBIOTEVENT Enable/Disable NB-IoT Related Event Report	
Test Command **AT+QNBIOTEVENT=?**	Response **+QNBIOTEVENT: (**list of supported **<enable>**s)**,(**list of supported **<event>)** **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	300ms

Parameter

<enable>	Integer type.

	0	Disable the indication of specific event
	1	Enable the indication of specific event by URC:
		"**+QNBIOTEVENT: <event_value>**"
<event>		Integer type. Indicate the report event
	1	PSM state
<event_value>		String type. When **<event>=1**, **<event_value>** is "ENTER PSM" or "EXIT PSM".

NOTES

1. The setting can be stored in NVM by executing **AT&W**.
2. Only valid under NB-IoT network.

4.10. AT+QCCID   USIM Card Identification

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+QICCID USIM Card Identification	
Execution Command **AT+QCCID**	Response **+QCCID: <ICCID>** **OK**
Maximum Response Time	300ms

Parameter

<ICCID>   USIM card identification number

Example

AT+QCCID
+QCCID: 89860317482035195410

OK

4.11. AT+QPOWD   Power off the Module

The command is used to power off or reset the module.

Please refer to *Chapter 6* for possible **<err>** values.

AT+QPOWD Power off the Module	
Test Command **AT+QPOWD=?**	Response **+QPOWD: (0-2)** **OK**
Write Command **AT+QPOWD=<op>**	Response When **<op>=0**: **OK** When **<op>=1**: **NORMAL POWER DOWN** When **<op>=2**: **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	1s

Parameter

<op>	0	Urgent power off (without URC "NORMAL POWER DOWN" returned)
	1	Normal power off (with URC "NORMAL POWER DOWN" returned)
	2	Reset the UE

Example

AT+QPOWD=0
OK

4.12. AT+QSCLK   Configure Sleep Mode

The command is used to configure sleep mode of UE.

Please refer to *Chapter 6* for possible **<err>** values.

AT+QSCLK Configure Sleep Mode	
Test Command AT+QSCLK=?	Response **+QSCLK: (0-2)** **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	300ms

Parameter

<n>	0	Disable sleep mode
	1	Enable light sleep and deep sleep, wakeup by driving PSM_EINT pin low
	2	Enable light sleep only, wakeup by Main UART

NOTES

1. UART does not work during `deep` sleep mode. Therefore, when **AT+QSCLK=1** or **2**, please send **AT** before each command to make sure the UART has been woken up first.
2. When **AT+QSCLK=0**, UART is always working. If it is intended to make the module enter sleep mode, please resend **AT+QSCLK=1** or **2**.
3. Settings of this command will be automatically saved to NVM.

Example

AT+QSCLK=1
OK

4.13. AT+QNWCFG   Configure Networking Mode

The command is used to configure the dual-mode UE to work in NB-IoT-priority or GSM-priority mode when the module is powered on, and is only valid for dual-mode UE.

AT+QNWCFG Configure Networking Mode	
Test Command **AT+QNWCFG=?**	Response **+QNWCFG: (**list of supported **<mode>**s)**[,(**list of supported **<priority>**s)]** **OK**
Write Command **AT+QNWCFG =<mode>[,<priority>]**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Read Command **AT+QNWCFG?**	Response **+QNWCFG: <mode>[,<priority>]** **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Reference	

Parameter

<mode>	Networking mode when the UE is powered on
	0 The GSM or NB-IoT network is controlled by priority
	<u>1</u> Force the module to register on NB-IoT network and omit <priority>
<priority>	Networking priority when the UE is powered on
	0 Priority to registration on NB-IoT network
	1 Priority to registration on GSM network

Example

```
AT+QNWCFG=?
+QNWCFG: (0,1)[,(0,1)]
```

OK

AT+QNWCFG=0,0   //NB-IoT network priority
OK

AT+QNWCFG?   //Read the mode
+QNWCFG: 0,0

OK

NOTES

1. When the mode changes, that is, when MODE 0/1 is switched, the module needs to be restarted.
2. When the module is searching the network, the configuration priority will fail. When MODE0 changes the network priority, it is recommended to perform **AT+CFUN=0**, then **AT+QNWCFG=0,<priority>** and **AT+CFUN=1** to switch the network.

4.14. AT+QLEDMODE   Configure Network-Status-Indication Light

This command is used to enable or disable network-status-indication light.

AT+QLEDMODE Configure Network-Status-Indication Light	
Test Command **AT+QLEDMODE=?**	Response **+QLEDMODE: (0-1)** **OK**
Read Command **AT+QLEDMODE?**	Response **+QLEDMODE: <n>** **OK**
Write Command **AT+QLEDMODE=<n>**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<n>	0	Disable network-status-indication light
	1	Enable network-status-indication light

NOTE

Settings of this command will be automatically saved to NVM.

Example

AT+QLEDMODE=1
OK

4.15. AT+QCSEARFCN　Clear Stored NB-IoT/GSM EARFCN List

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

Please refer to *Chapter 6* for possible **<err>** values.

AT+QCSEARFCN　Clear Stored NB-IoT/GSM EARFCN List	
Test Command **AT+QCSEARFCN=?**	Response **+QCSEARFCN: (0,1)** **OK**
Write Command **AT+QCSEARFCN=<MODE>**	Response **OK** If there is any error: **ERROR** or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<MODE>	Integer value indicating the clearing of stored NB-IoT or GSM EARFCN list
	0 Clear stored NB-IoT EARFCN list
	1 Clear stored GSM EARFCN list

Example

AT+QCSEARFCN=0
OK

4.16. AT+QCFG   Extended Configuration Settings

This command is used to configure settings of the UE.

AT+QCFG Extended Configuration Settings	
Test Command **AT+QCFG=?**	Response **+QCFG: "EPCO",(**list of supported **<epco_mode>**s**)** **OK**
Write Command **AT+QCFG="EPCO"[,<epco_mode>]**	Response If **<epco_mode>** is omitted, query the current configuration: **+QCFG: "EPCO",<epco_mode>** **OK** If **<epco_mode>** is specified, configure the EPCO state: **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300ms

Parameter

<epco_mode>	Integer value. EPCO state.
	0 Disable EPCO
	<u>1</u> Enable EPCO

Example

AT+QCFG="EPCO"
+QCFG: 0

OK

AT+QCFG="EPCO",1
OK

NOTES

1. Settings of this command will be automatically saved to NVM and will remain effective after reboot.
2. If the network does not support EPCO, EPCO will be disabled after the module attaches network even if **<epco_mode>** is set to 1 (Enable EPCO).

---

5 Examples

5.1. Network Attachment

Currently, the module only supports automatic registration on network after powered on.

5.1.1. Automatic Network Attachment with Manual Query of Network Attachment State

The following shows a simple example of the module automatically attaching to network. During the process, it is only needed to query settings and confirm whether the module has attached to network with the following commands:

```
//Power on
RDY

+CFUN: 1

+CPIN: READY

AT
OK                       //Successfully synchronized

AT+CFUN?                 //Query functionality level of the UE
+CFUN: 1                 //UE is in full functionality

OK

AT+CIMI                  //Query the IMSI number
460012345678969

OK

AT+CESQ                  //Query the signal strength
+CESQ: 36,99,255,255,25,53

OK

AT+QENG=0                //Query the module's current network status
```

+QENG: 0,3734,,105,"82e76b2",-71,22,-56,22,8,"4c10",1,-6

OK

AT+CGATT?   //Query whether the network is activated: 1 means attached to network successfully, while 0 means has not been attached to network
+CGATT: 1

OK

AT+CEREG?   //Query the network registration status
+CEREG: 0,1   //0 indicates that URC is disabled and 1 indicates the module is registered on network

OK

AT+CSCON?   //Query the signal connection status
+CSCON: 0,1   //0 indicates that URC is disabled and 1 indicates the signaling connection status is "Connected"

OK

5.1.2. Automatic Network Attachment with URC State Report

The following shows a simple example of the module automatically attaching to network with URC state reports. During the process, there is no need to query settings and confirm whether the module has attached to network manually, the network attachment state will be reported via URC:

//Power on
RDY

+CFUN: 1

+CPIN: READY

//Configure the APN for initial attachment
//Once set, the configuration will be saved to NVM
//The setting takes effect after restart or re-registration

AT+QCGDEFCONT="IP","CMNBIOT"
OK

AT+QRST=1   //Reset the module immediately
OK

RDY

+CFUN: 1

+CPIN: READY

AT+CFUN?   //Query functionality level of the UE
+CFUN: 1   //UE is in full functionality

OK

AT+CIMI   //Query the IMSI number.
460012345678969

OK
AT+CEREG=1   //Set to automatically report network registration status, that is, when the module is
                          registered on the network, a URC will be reported.
OK
AT+CSCON=1   //Set to automatically report signaling connection status, that is, when the module
                          is in connected or idle state, a URC will be reported.
OK

+CSCON: 1   //Report the URC that the MT is connected.

+CEREG: 1   //Report the URC that the MT is registered.

AT+CESQ   //Query the signal strength.
+CESQ: 36,99,255,255,25,53

OK

AT+QENG=0   //Query the module's status.
+QENG: 0,3734,,105,"82e76b2",-71,22,-56,22,8,"4c10",1,-6

OK

AT+CGATT?   //Query whether the network is activated
+CGATT: 1   //The value 1 indicates that the network is activated

OK

AT+CEREG?   //Query the network registration status
+CEREG: 1,1   //The first 1 indicates that the URC is enabled and the second 1 indicates that the
                          module is registered on network

OK

AT+CSCON? //Query the signal connection status

+CSCON: 1,1 //The first 1 indicates that the URC is enabled and the second 1 indicates that the

signaling connection status is "Connected"

OK

5.1.3. Attach to Network with Specified PLMN

The following shows a simple example for automatic network attachment with specified PLMN:

//Power on
RDY

+CFUN: 1

+CPIN: READY

//Configure the APN for initial attachment
//Once set, the parameters will be saved to NVM
//The setting takes effect after restart or re-registration

AT+QCGDEFCONT="IP","CMNBIOT"
OK

AT+QRST=1
OK

RDY

+CFUN: 1

+CPIN: READY

AT+CFUN? //Query functionality level of the UE
+CFUN: 1 //UE is in full functionality

OK

AT+CIMI //Query the IMSI number.
460012345678969

OK

AT+COPS=1,2,"46000"   //Specify PLMN
OK

AT+CESQ   //Query the signal strength.
+CESQ: 36,99,255,255,25,53

OK

AT+QENG=0   //Query the module status.
+QENG: 0,3734,,105,"82e76b2",-71,22,-56,22,8,"4c10",1,-6

OK

AT+CGATT?   //Query whether the network is activated: 1 means attached to network
                                 successfully, while 0 means has not been attached to network.
+CGATT: 1

OK

AT+CEREG?   //Query the network registration status
+CEREG: 0,1   //0 indicates that URC is disabled and 1 indicates the module is registered on
                                 network

OK

AT+CSCON?   //Query the signal connection status
+CSCON: 0,1   //0 indicates that URC is disabled and 1 indicates the signaling connection
                                 status is "Connected"

OK

5.1.4. Attach to Network with Specified EARFCN/PCI

//Power on
RDY

+CFUN: 1

+CPIN: READY

//Configure the APN for initial attachment
//Once set, the parameters will be saved to NVM
//The setting takes effect after restart or re-registration

AT+QCGDEFCONT="IP","CMNBIOT"
OK

AT+QRST=1
OK

RDY

+CFUN: 1

+CPIN: READY

AT+CFUN?   //Query functionality level of the UE
+CFUN: 1   //UE is in full functionality

OK

AT+CIMI   //Query the IMSI number.
460012345678969

OK
AT+QLOCKF=1,3734,19,105   //Specify the EARFCN, offset and PCI.
OK

AT+CESQ   //Query the signal strength.
+CESQ: 36,99,255,255,25,53

OK

AT+QENG=0   //Query the module status.
+QENG: 0,3734,,105,"82e76b2",-71,22,-56,22,8,"4c10",1,-6

OK

AT+CGATT?   //Query whether the network is activated: 1 means attached to network successfully, while 0 means has not been attached to network.
+CGATT: 1

OK

AT+CEREG?   //Query the network registration status
+CEREG: 0,1   //0 indicates that URC is disabled and 1 indicates the module is registered on network

OK

AT+CSCON? //Query the signal connection status
+CSCON: 0,1 //0 indicates that URC is disabled and 1 indicates the signaling connection
    status is "Connected"

OK

5.1.5. Attach to Network with Specified Band

//Power on
RDY

+CFUN: 1

+CPIN: READY

//Configure the APN for initial attachment
//Once set, the parameters will be saved to NVM
//The setting takes effect after restart or re-registration

AT+QCGDEFCONT="IP","CMNBIOT"
OK

AT+QRST=1 //Reset the module immediately
OK

RDY

+CFUN: 1

+CPIN: READY

AT+CFUN? //Query functionality level of the UE
+CFUN: 1 //UE is in full functionality

OK

AT+QBAND=? //Query supported bands
+QBAND: (0-5),(3,5,8,20,28)

OK

AT+QBAND=1,5 //Sets the band to be used

OK

AT+QBAND?   //Query the band being used   **page 88 / 96**
+QBAND: 5

OK

5.1.6. Priority to Attach GSM Network

//Power on
RDY

+CFUN: 1

+CPIN: READY

//The module will register on NB-IoT network if it is not configured to GSM priority
//The setting takes effect after restart

AT+QNWCFG?
+QNWCFG: 1   //The module will register on NB-IoT network and omit the value of <priority>

OK

AT+QNWCFG=0,1   //Configure the priority to GSM network

OK

AT+QRST=1   //Restart the module for the configuration to take effect

OK

RDY

+CFUN: 1

+CPIN: READY

AT+CGACT?
+CGACT: 1

OK

AT+QNWCFG?   //Query the current priority

+QNWCFG: 0,1   //The priority is configured to GSM network

OK   89 / 96

AT+COPS?
+COPS: 0,2,"46000",0 //Query resident information, the last 0 indicates GSM network

OK

5.1.7. Priority to Attach NB-IoT Network

//Power on
RDY

+CFUN: 1

+CPIN: READY

//Configure the network work mode and priority
//The module will register on NB-IoT network if it is not configured to GSM priority
//The setting takes effect after restart

AT+QNWCFG?
+QNWCFG: 0,1   //The current configuration is GSM priority

OK

AT+QNWCFG=0,0   //Configure the priority to NB-IoT network (**AT+QNWCFG=1** can also be used)

OK

AT+QRST=1   //Restart the module for the configuration to take effect

OK

RDY

+CFUN: 1

+CPIN: READY

AT+CGACT?
+CGACT: 1

OK

AT+QNWCFG?

+QNWCFG: 0,0   //The priority is configured to NB-IoT network

OK

AT+COPS?

+COPS: 0,2,"46000",9 //Query resident information, the 9 indicates NB-IoT network

OK

6 Summary of <err> Codes

This chapter introduces the **<err>** codes related to BC92 module.

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

Table 3: General <err> Codes (27.007)

Code of <err>	Description
3	Operation not allowed
4	Operation not supported
10	USIM not inserted
13	USIM failure
14	USIM busy
22	Not found
24	Text overlong
49	Execution not supported
50	Execution failed
51	AT command no memory
52	Option not supported
53	Parameter invalid
58	Invalid command line

The following error codes are specific ones for BC92 module.

Table 4: Specific <err> Codes

Code of <err>	Description
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
160	AT command cannot actioned
264	USIM verification failed
265	USIM unblock failed
301	SMS service reserved
302	Operation not allowed
304	Invalid PDU parameter
305	Invalid TXT parameter
310	USIM not inserted
311	USIM pin required
312	PH USIM pin required
313	USIM failed
314	USIM busy
315	USIM wrong
332	Network timeout
517	Invalid PDU character

NOTE

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

7 Appendix A Reference

Table 5: Terms and Abbreviations

Abbreviation	Description
3GPP	3rd Generation Partnership Project
APN	Access Point Name
BCD	Binary Coded Decimal
CHAP	Challenge-Handshake Authentication Protocol
CIoT	Cellular Internet of Things
DCE	Data Communication Equipment
IMSI	International Mobile Subscriber Identity
EARFCN	E-UTRAN Absolute Radio Frequency Channel Number
ECL	Enhanced Coverage Level
eDRX	extended Discontinuous Reception
ePCO	extended Protocol Configuration Option
EPS	Evolved Packet System
ESM	EPS Session Management
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
GMT	Greenwich Mean Time
GPRS	General Packet Radio Service
HPLMN	Home Public Land Mobile Network
ICCID	Integrated Circuit Card Identifier

ID	Identifier
IMEI	International Mobile Equipment Identity
IMEISV	International Mobile Equipment Identity and Software Version
IP	Internet Protocol
MS	Mobile Station
NB-IoT	Narrow Band Internet of Thing
NVM	Non-Volatile Memory
PCI	Physical Cell Identity
PCO	Protocol Configuration Options
PDP	Packet Data Protocol
PDU	Packet Data Unit
PLMN	Public Land Mobile Network
PS	Packet Switch
PSM	Power Saving Mode
RRC	Radio Resource Control
SMS	Short Message Service
SNR	Signal-to-Noise Ratio
SVN	Software Version Number
TA	Terminal Adapter
TAU	Tracking Area Update
TE	Terminal Equipment
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UE	User Equipment
UICC	Universal Integrated Circuit Card

URC	Unsolicited Result Code	
UUID	Universally Unique Identifier	