

BC95

AT Commands Manual

NB-IoT Module Series

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About the Document

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-
3. Updated description of parameters for CGSN/CEREG/CGDCONT/NUESTATS/NEARFCN/NCONFIG/NCHIPINFO
 4. Added unsolicited information of MCU update state in Table 1
 5. Updated error values in Chapter 7
 6. Added reset reasons in Chapter 8
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1 Introduction

This document gives details of the AT Command Set supported by Quectel NB-IoT BC95 module.

The following string will be output after booting the module:

```
<CR><LF>Neul<CR><LF>OK<CR><LF>
```

After this string has been received, the AT command processor is ready to accept AT commands.

If BC95 module is rebooted or restarted for any reason that is not a normal power-on sequence, a message would be output before the <CR><LF>Neul<CR><LF>OK<CR><LF> string. Please refer to **Chapter 8** for more details.

In case that an external MCU intervenes in the process of update, unsolicited information will inform the external MCU update state.

Table 1: Unsolicited Information of MCU Update State

| Unsolicited Information | Description |
|--|--|
| <CR><LF>FIRMWARE DOWNLOADING<CR><LF> | Indicates that UE is downloading update package. |
| <CR><LF>FIRMWARE DOWNLOAD FAILED<CR><LF> | Indicates that the download failed. |
| <CR><LF>FIRMWARE DOWNLOADED<CR><LF> | Indicates that the download finished. |
| <CR><LF>FIRMWARE UPDATING<CR><LF> | Indicates that the UE is updating. |
| <CR><LF>FIRMWARE UPDATE SUCCESS<CR><LF> | Indicates that the update successful, but do not report update state to firmware package server yet. |
| <CR><LF>FIRMWARE UPDATE FAILED<CR><LF> | Indicates that the update failed. |
| <CR><LF>FIRMWARE UPDATE OVER<CR><LF> | Indicates that update is reported state to firmware package server. |

NOTE

During updating procedure, the module should not be operated until "FIRMWARE UPDATE OVER" is reported. E.g., executing AT+NRB to power off the module are not permitted; otherwise, an error will be made.

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

Table 2: AT Command Syntax

| | | |
|--------------------------|---|-------------------------------------|
| Test Command | AT+<cmd>=? | Check possible sub-parameter values |
| Read Command | AT+<cmd>? | Check current sub-parameter values |
| Set Command | AT+<cmd>=p1[,p2[,p3[.....]]] | Set command |
| Execution Command | AT+<cmd> | Execution command |

Multiple commands can be placed on a single line using a semi-colon (";") between commands. Only the first command should have AT prefix. Commands can be in upper or lower case.

When entering AT commands spaces are ignored except in the following cases:

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

They can be used to make the input more human-readable. On input, at least a carriage return is required. A newline character is ignored so it is permissible to use carriage return/line feed pairs on the input. For B600, the AT command processor uses carriage return/line feed pairs (\r\n, 0x0D0A) to end lines on its output.

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

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

1.3. AT Command Responses

When the AT Command processor has finished processing a line, it will output either "OK" or "ERROR" indicating that it is ready to accept a new command. Solicited informational responses are sent before the final "OK" or "ERROR". Unsolicited information responses will never occur between a solicited informational response and the final "OK" or "ERROR".

Responses will be of the format:

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

Or

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

1.4. 3GPP Compliance

3GPP commands are complied with the 3GPP TS 27.007 v14.3.0 (2017-03).

2 Implementation Status

Table 3: Types of AT Commands and Implementation Status

| AT Command | Description | Implementation Status |
|-------------------------------|--|-----------------------|
| 3GPP Commands (27.007) | | |
| AT+CGMI | Request Manufacturer Identification | B350 or later |
| AT+CGMM | Request Manufacturer Model | B350 or later |
| AT +CGMR | Request Manufacturer Revision | B350 or later |
| AT+CGSN | Request Product Serial Number | B350 or later |
| AT+CEREG | EPS Network Registration Status | B350 or later |
| AT+CSCON | Signalling Connection Status | B350 or later |
| AT+CLAC | List Available Commands | B350 or later |
| AT+CSQ | Get Signal Strength Indicator | B350 or later |
| AT+CGPADDR | Show PDP Addresses | B350 or later |
| AT+COPS | PLMN Selection | B350 or later |
| AT+CGATT | PS Attach or Detach | B350 or later |
| AT+CGACT | Activate or Deactivate PDP Context | B657SP1 or later |
| AT+CIMI | Request International Mobile Subscriber Identity | B350 or later |
| AT+CGDCONT | Define a PDP Context | B350 or later |
| AT+CFUN | Set Phone Functionality | B350 or later |
| AT+CMEE | Report Mobile Termination Error | B600 or later |
| AT+CCLK | Return Current Date & Time | B656 or later |
| AT+CPSMS | Power Saving Mode Setting | B657SP1 or later |

| | | |
|---------------------------------|---|------------------|
| AT+CEDRXS | eDRX Setting | B657SP1 or later |
| AT+CEER | Extended Error Report | B657SP1 or later |
| AT+CEDRXRDP | eDRX Read Dynamic Parameters | B657SP1 or later |
| AT+CTZR | Time Zone Reporting | B657SP1 or later |
| ETSI Commands* (127.005) | | |
| AT+CSMS | Select Message Service | B657SP1 or later |
| AT+CNMA | New Message Acknowledgement to ME/TA | B657SP1 or later |
| AT+CSCA | Service Centre Address | B657SP1 or later |
| AT+CMGS | Send SMS Message | B657SP1 or later |
| AT+CMGC | Send SMS Command | B657SP1 or later |
| AT+CSODCP | Sending of Originating Data via the Control Plane | B657SP1 or later |
| AT+CRTDCP | Reporting of Terminating Data via the Control Plane | B657SP1 or later |
| General Commands | | |
| AT+NMGS | Send a Message | B350 or later |
| AT+NMGR | Get a Message | B350 or later |
| AT+NNMI | New Message Indications | B350 or later |
| AT+NSMI | Sent message Indications | B350 or later |
| AT+NQMGR | Query Messages Received | B350 or later |
| AT+NQMGS | Query Messages Sent | B350 or later |
| AT+NMSTATUS | Message Registration Status | B657SP1 or later |
| AT+NRB | Reboot | B350 or later |
| AT+NCDP | Configure and Query CDP Server Settings | B350 or later |
| AT+NUESTATS | Query UE Statistics | B350 or later |
| AT+NEARFCN | Specify Search Frequencies | B350 or later |
| AT+NSOCR | Create a Socket | B350 or later |

| | | |
|---------------------------|--|------------------|
| AT+NSOST | SendTo Command (UDP Only) | B350 or later |
| AT+NSOSTF | SendTo Command with Flags (UDP Only) | B656 or later |
| AT+NSORF | Receive Command (UDP only) | B350 or later |
| AT+NSOCL | Close a Socket | B350 or later |
| +NSONMI | Socket Message Arrived Indicator (Response Only) | B350 or later |
| AT+NPING | Test IP Network Connectivity to a Remote Host | B350 or later |
| AT+NBAND | Set Supported Bands | B600 or later |
| AT+NLOGLEVEL | Set Debug Logging Level | B600 or later |
| AT+NCONFIG | Configure UE Behaviour | B650 or later |
| AT+NATSPEED | Configure UART Port Baud Rate | B656 or later |
| AT+NCCID | Card Identification | B657SP1 or later |
| AT+NFWUPD | Firmware Update via UART | B657SP1 or later |
| AT+NRDCTRL | Control Radio Configurations | B657SP1 or later |
| AT+NCHIPINFO | Read System Information | B657SP1 or later |
| Temporary Commands | | |
| AT+NTSETID | Set ID | B350 or later |

NOTE

"*" means the commands listed in this chapter are under development.

3 3GPP Commands (27.007)

3.1. AT+CGMI Request Manufacturer Identification

Execution command returns manufacturer information. By default it will return “Quectel” on the standard platform. Please refer to **Chapter 7** for possible <err> values.

| AT+CGMI Request Manufacturer Identification | |
|---|---|
| Execution Command AT+CGMI | Response <manufacturer> OK If there is any error, response: +CME ERROR:<err> |
| Test Command AT+CGMI=? | Response OK |

Parameter

| | |
|-----------------------------|---|
| <manufacturer> | The total number of characters, including line terminators. In the information text shall not exceed 2048 characters, and shall not contain the sequence 0<CR> or OK<CR>. |
|-----------------------------|---|

Example

```
AT+CGMI
Quectel
OK
```

3.2. AT+CGMM Request Manufacturer Model

Execution command returns manufacturer model information. Please refer to **Chapter 7** for possible <err> values.

AT+CGMM Request Manufacturer Model

| | |
|-------------------------------------|--|
| Execution Command AT+CGMM | Response <model> OK If there is any error, response: +CME ERROR:<err> |
| Test Command AT+CGMM=? | Response OK |

Parameter

| | |
|----------------------|---|
| <model> | The total number of characters, including line terminators. In the information text shall not exceed 2048 characters, and shall not contain the sequence 0<CR> or OK<CR>. |
|----------------------|---|

Example

```
AT+CGMM
BC95HB-02-STD_850

OK
```

3.3. AT+CGMR Request Manufacturer Revision

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 - release and build.

Execution command returns one or more lines of information text <revision>. Please refer to **Chapter 7** for possible <err> values.

AT+CGMR Request Manufacturer Revision

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

Parameter

| | |
|-------------------------|--|
| <revision> | The total number of characters, including line terminators. In the information text shall not exceed 2048 characters, and shall not contain the sequence 0<CR> or OK<CR> |
|-------------------------|--|

Example

```
AT+CGMR
SECURITY,V100R100C10B657SP1

PROTOCOL,V100R100C10B657SP1

APPLICATION,V100R100C10B657SP1

SEC_UPDATER,V100R100C10B657SP1

APP_UPDATER,V100R100C10B657SP1

RADIO,BC95HB-02-STD_850

OK
AT+CGMR=?
OK
```

BC95 Implementation

- <revision> will change format over time. It should be treated as an opaque identifier.

3.4. AT+CGSN Request Product Serial Number

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 7** for possible <err> values.

AT+CGSN Request Product Serial Number

| | |
|---|--|
| Execution Command AT+CGSN[=<snt>] | Response When <snt>=0 (or omitted) and command is executed successfully: <sn> When <snt>=1 and command is executed successfully: |
|---|--|

| | |
|---|---|
| | <p>+CGSN:<imei></p> <p>When <snt>=2 and command is executed successfully:</p> <p>+CGSN:<imeisv></p> <p>When <snt>=3 and command is executed successfully:</p> <p>+CGSN:<svn></p> <p>OK</p> <p>If there is any error, response:</p> <p>+CME ERROR:<err></p> |
| <p>Test Command</p> <p>AT+CGSN=?</p> | <p>Response</p> <p>When TE supports <snt> and command is executed successfully:</p> <p>+CGSN:(list of supported <snt>s)</p> <p>OK</p> |

Parameter

| | |
|-----------------------|--|
| <snt> | Integer type indicating the serial number type that has been requested |
| 0 | Returns <sn> |
| 1 | Returns the IMEI number |
| 2 | Returns the IMEISV (International Mobile station Equipment Identity and Software Version) number |
| 3 | Returns the SVN (Software Version Number) |
| <sn> | The 128-bit UUID of the UE. The total number of characters, including line terminators. In the information text shall not exceed 2048 characters, and shall not contain the sequence 0 <CR> or OK<CR>. |
| <imei> | String type in decimal format indicating the IMEI number |
| <imeisv> | String type in decimal format indicating the IMEISV |
| <svn> | String type in decimal format indicating the current SVN which is a part of IMEISV |

Example

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

BC95 Implementation

- AT+CGSN=0 (requesting serial number) is not implemented, and will return an error. This will change in a future release.

3.5. AT+CEREG EPS Network Registration Status

The set command controls the presentation of an unsolicited result code (URC) “+CEREG:<stat>” when <n>=1 and there is a change in the MT's EPS network registration status in E-UTRAN, or unsolicited result code “+CEREG:<stat>[,<tac>],<ci>[,<AcT>]” when <n>=2 and there is a change of the network cell in E-UTRAN. The parameters <AcT>, <tac> and <ci> are provided only if available. The value <n>=3 further extends the unsolicited result code with [,<cause_type>,<reject_cause>], when available, when the value of <stat> changes. Please refer to **Chapter 7** for possible <err> values.

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

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

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

Test command returns supported parameter values.

AT+CEREG EPS Network Registration Status

Set Command
AT+CEREG=<n>

Response
OK

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

Read Command
AT+CEREG?

Response
When <n>=0, 1, 2 or 3 and command is executed successfully:
+CEREG:<n>,<stat>[,<tac>],<ci>[,<AcT>],<cause_type>,<reject_cause>]]]

When <n>=4 or 5 and command is executed successfully:
+CEREG:<n>,<stat>[,<tac>],<ci>[,<AcT>],<Active-Time>,<Periodic-TAU>],<cause_type>,<reject_cause>]]]

| | |
|-----------------------------------|---|
| | OK |
| Test Command AT+CEREG=? | Response +CEREG: (list of supported <n>s) |
| | OK |

Parameter

| | |
|---------------------|--|
| <n> | Integer type 0 Disable network registration unsolicited result code 1 Enable network registration unsolicited result code: "+CEREG:<stat>" 2 Enable network registration and location information unsolicited result code: "+CEREG:<stat>,[<tac>],[<ci>],[<AcT>]" 3 Enable network registration, location information and EMM cause value information unsolicited result code: "+CEREG:<stat>,[<tac>],[<ci>],[<AcT>],[<cause_type>,<reject_cause>]" 4 For a UE that requests PSM, enable network registration and location information unsolicited result code: "+CEREG:<stat>,[<tac>],[<ci>],[<AcT>],[<Active-Time>],[<Periodic-TAU>]" 5 For a UE that requests PSM, enable network registration, location information and EMM cause value information unsolicited result code: "+CEREG:<stat>,[<tac>],[<ci>],[<AcT>],[<cause_type>],[<reject_cause>],[<Active-Time>],[<Periodic-TAU>]" |
| <stat> | Integer type, indicates 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 6 Registered for "SMS only", home network (not applicable) 7 Registered for "SMS only", roaming (not applicable) 8 Attached for emergency bearer services only 9 Registered for "CSFB not preferred", home network (not applicable) 10 Registered for "CSFB not preferred", roaming (not applicable) |
| <tac> | String type; two bytes tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal) |
| <ci> | String type; four bytes E-UTRAN cell ID in hexadecimal format |
| <AcT> | Integer type; indicates the access technology of the serving cell 0 GSM (not applicable) 1 GSM Compact (not applicable) 2 UTRAN (not applicable) |

| | |
|-----------------------------|---|
| 3 | GSM w/EGPRS (not applicable) |
| 4 | UTRAN w/HSDPA (not applicable) |
| 5 | UTRAN w/HSUPA (not applicable) |
| 6 | UTRAN w/HSDPA and HSUPA (not applicable) |
| 7 | E-UTRAN |
| <cause_type> | Integer type; indicates the type of <reject_cause> 0 Indicates that <reject_cause> contains an EMM cause value 1 Indicates that <reject_cause> contains a manufacturer-specific cause value |
| <reject_cause> | Integer type; contains the cause of the failed registration. The value is of type as defined by <cause_type>. |
| <Active-Time> | String type; one byte in an 8-bit format. Indicates the active time value (T3324) allocated to the UE in E-UTRAN. The active time value is coded as one byte (octet 3) of the GPRS Timer 2 information element coded as bit format (e.g. "00100100" equals 4 minutes). For the coding and the value range, please refer to the <i>GPRS Timer 2 IE in 3GPP TS 24.008 Table 10.5.163/3Gpp TS 24.008, 3GPP TS 23.682 and 3GPP TS 23.401</i> . |
| <Periodic-TAU> | String type; one byte in an 8-bit format. Indicates the extended periodic TAU value (T3412) allocated to the UE in E-UTRAN. The extended periodic TAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours). For the coding and the value range, please refer to the <i>GPRS Timers 3 IE in 3GPP TS 24.008 Table 10.5.163a/3GPP TS 24.008, 3GPP TS 23.682 and 3GPP TS 23.401</i> . |

NOTES

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

Example

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

```
+CEREG:1,1

OK
AT+CEREG=?
+CEREG:(0,1,2,3,4,5)

OK
```

3.6. AT+CSCON Signalling Connection Status

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

The set command controls the presentation of an unsolicited result code. If $\langle n \rangle = 1$, "+CSCON:<mode>" is sent from the MT when the connection mode of the MT is changed. If $\langle n \rangle = 2$ and there is a state within the current mode, "+CSCON:<mode>[,<state>]" is sent from the MT. If $\langle n \rangle = 3$, "+CSCON:<mode>[,<state>[,<access>]]" is sent from the MT. If setting fails, an MT error, "+CME ERROR:<err>" is returned. Please refer to **Chapter 7** for possible <err> values.

When the MT is in UTRAN or E-UTRAN, the mode of the MT refers to idle when no PS signalling connection and to connected mode when a PS signalling connection between UE and network is setup. When the UE is in GERAN, the mode refers to idle when the MT is in either the idle state or the standby state and to connected mode when the MT is in ready state.

The <state> value indicates the state of the MT when the MT is in GERAN, UTRAN connected mode or E-UTRAN.

The read command returns the status of result code presentation and an integer <mode> which shows whether the MT is currently in idle mode or connected mode. State information <state> is returned only when $\langle n \rangle = 2$. Radio access type information <access> is returned only when $\langle n \rangle = 3$.

Test command returns supported values as a compound value.

AT+CSCON Signalling Connection Status

Set Command
AT+CSCON=[<n>]

Response
OK

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

| | |
|-----------------------------------|---|
| Read Command AT+CSCON? | <p>Response</p> <p>+CSCON:<n>,<mode>[,<state>]</p> <p>OK</p> <p>If there is any error, response:</p> <p>+CME ERROR:<err></p> |
| Test Command AT+CSCON=? | <p>Response</p> <p>+CSCON:(list of supported <n>s)</p> <p>OK</p> |

Parameter

| | |
|-----------------------|---|
| <n> | Integer type |
| 0 | Disable unsolicited result code |
| 1 | Enable unsolicited result code: "+CSCON:<mode>" |
| 2 | Enable unsolicited result code: "+CSCON:<mode>[,<state>]" |
| 3 | Enable unsolicited result code: "+CSCON:<mode>[,<state>[,<access>]]" |
| <mode> | Integer type; indicates the signalling connection status |
| 0 | Idle |
| 1 | Connected |
| 2-255 | <reserved for future use> |
| <state> | Integer type; indicates the CS or PS state while in GERAN and the RRC state information if the MT is in connected mode while in UTRAN and E-UTRAN |
| 0 | UTRAN URA_PCH state |
| 1 | UTRAN Cell_PCH state |
| 2 | UTRAN Cell_FACH state |
| 3 | UTRAN Cell_DCH state |
| 4 | GERAN CS connected state |
| 5 | GERAN PS connected state |
| 6 | GERAN CS and PS connected state |
| 7 | E-UTRAN connected state |
| <access> | Integer type; indicates the current radio access type |
| 0 | Indicates usage of radio access type of GERAN |
| 1 | Indicates usage of radio access type of UTRAN TDD |
| 2 | Indicates usage of radio access type of UTRAN FDD |
| 3 | Indicates usage of radio access type of E-UTRAN TDD |
| 4 | Indicates usage of radio access type of E-UTRAN FDD |

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
```

BC95 Implementation

- Only <n>=0 and <n>=1 are supported and <n>=0 is the default value.

3.7. AT+CLAC List Available Commands

The command lists the available AT commands. Execution command causes the MT to return one or more lines of AT commands. Please refer to **Chapter 7** for possible <err> values. Please note that this command only returns the AT commands that are available for the user.

AT+CLAC List Available Commands

Execution Command

AT+CLAC

Response

<AT Command>

[<CR><LF><AT Command>[...]]

OK

If there is any error, response:

+CME ERROR:<err>

AT+CLAC=?

Response

OK

Parameter

<AT Command>

Defines the AT command including the prefix AT. Text shall not contain the sequence 0<CR> or OK<CR>

Example

AT+CLAC

AT+COPS

AT+CGATT

...

AT+NQMGR

AT+NQMGS

...

OK

3.8. AT+CSQ Get Signal Strength Indicator

The terminal will provide a current signal strength indicator of 0 to 255 where larger is generally better. This information is based on a single measurement so 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.

Execution command returns received signal strength indication <rss> and channel bit error rate <ber> from the MT. Please refer to **Chapter 7** for possible <err> values.

Test command returns values supported as compound values.

AT+CSQ Get Signal Strength Indicator

Execution Command

AT+CSQ

Response

+CSQ:<rss>,<ber>

OK

If there is any error, response:

+CME ERROR:<err>

Test Command

AT+CSQ=?

Response

+CSQ:(list of supported <rss>s),(list of supported <ber>s)

OK

Parameter

| | |
|---------------------|--|
| <rssI> | Integer type |
| 0 | -113dBm or less |
| 1 | -111dBm |
| 2...30 | -109dBm... -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 (please refer to 3GPP specifications) |
| 99 | Not known or not detectable |

Example

```
AT+CSQ
+CSQ:31,99
OK
```

BC95 Implementation

- <ber> is currently not implemented, and will always be 99.

3.9. AT+CGPADDR Show PDP Addresses

The command returns the IP address of the device.

The execution command returns a list of PDP addresses for the specified context identifiers. If no <cid> is specified, the addresses for all defined contexts are returned. Please refer to **Chapter 7** for possible <err> values.

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

| Execution Command | Response |
|----------------------------------|---|
| AT+CGPADDR[=<cid>[,<cid>[,...]]] | [+CGPADDR:<cid>[,<PDP_addr_1>[,<PDP_addr_2>]]] [<CR><LF>+CGPADDR: <cid>[,<PDP_addr_1>[,<PDP_addr_2>]] [...]] |
| | OK |

| | |
|---|---|
| | <p>IPv4: The string is given as dot-separated numeric (0-255) parameter of the form: a1.a2.a3.a4</p> <p>IPv6: The string is given as colon-separated hexadecimal parameter.</p> |
| <p>Test Command AT+CGPADDR=?</p> | <p>Response +CGPADDR:(list of defined <cid>s)</p> <p>OK</p> |

Parameter

<cid> Integer type; specifies a particular PDP context definition (see the AT+CGDCONT and AT+CGDSCONT commands).

<PDP_addr_1> and <PDP_addr_2> String type that 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 and AT+CGDSCONT commands 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>. Both <PDP_addr_1> and <PDP_addr_2> are 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 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 execute form of AT+CGPADDR.

NOTE

In dual-stack terminals (<PDP_type>=IPv4v6), the IPv6 address will be provided in <PDP_addr_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=0
+CGPADDR:0,101.43.5.1
```

```
OK
```

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

```
OK
```

BC95 Implementation

- Only IPv4 is supported.
- <cid> values between 0 & 10 are supported.
- With AUTOCONNECT enabled, <cid>=0 will not be listed until an IP address is acquired.

3.10. AT+COPS PLMN Selection

Set command forces an attempt to select and register the GSM/UMTS/EPS network operator using the USIM card installed in the currently selected card slot. <mode> is used to select whether the selection is done automatically by the MT or is forced by this command to operator <oper> (it shall be given in format <format>) to a certain access technology, indicated in <AcT>. If the selected operator is not available, no other operator shall be selected (except <mode>=4). If the selected access technology is not available, then the same operator shall be selected in other access technology. The selected operator name format shall also apply to further read commands (AT+COPS?). <mode>=2 forces an attempt to deregister from the network. The selected mode affects all further network registration (e.g. after <mode>=2, MT shall be unregistered until <mode>=0 or 1 is selected). This command should be abortable when registration/deregistration attempt is made. Please refer to **Chapter 7** for possible <err> values.

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.

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

It is recommended (although optional) that after the operator list TA returns lists of supported <mode>s and <format>s. These lists shall be delimited from the operator list by two commas.

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

AT+COPS PLMN Selection

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

Parameter

| | |
|-----------------------|--|
| <mode> | Integer type <u>0</u> Automatic (<oper> field is ignored) 1 Manual (<oper> field shall be present, and <AcT> is optional) 2 Deregister from network 3 Set only <format> (for read command AT+COPS?), do not attempt to register/deregister (<oper> and <AcT> fields are ignored); this value is not applicable in read command response 4 Manual/automatic (<oper> field shall be present); if manual selection fails, automatic mode (<mode>=0) is entered |
| <format> | Integer type <u>0</u> Long format alphanumeric <oper> 1 Short format alphanumeric <oper> |

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

NOTES

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

Example

```

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

OK
AT+COPS=?
+COPS:(2,,,"46000"),,(0-2),(2)

OK

```

BC95 Implementation

- <Act>, if provided, must be set to 7.
- Only <format>=2 is supported.
- Only <mode>=0, <mode>=1 and <mode>=2 are supported.
- When <mode>=1, the PLMN setting will not be retained after the UE is rebooted.
- <mode>=1 is only for development use and <mode>=0 should be used in production when AUTOCONNECT is enabled.
- The test command currently returns the configured values rather than performs a PLMN search.

3.11. AT+CGATT PS Attach or Detach

The execution command is used to attach the MT to, or detach the MT from, the packet domain service. After the command has completed, the MT remains in V.250 command state. If the MT is already in the requested state, the command is ignored and the "OK" response is returned. If the requested state cannot be achieved, an "ERROR" or "+CME ERROR" response is returned. Please refer to **Chapter 7** 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

| | |
|--|--|
| Execution/Set Command AT+CGATT=<state> | Response OK If there is any error, response: +CME ERROR:<err> |
| Read Command AT+CGATT? | Response +CGATT:<state> OK |
| Test Command AT+CGATT=? | Response +CGATT:(list of supported <state>s) OK |

Parameter

| | |
|----------------------|---|
| <state> | Integer type; indicates the state of PDP context activation. The default value is manufacturer specific 0 Detached 1 Attached |
| <err> | Error value |

Example

```
AT+CGATT?
+CGATT:0

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

OK
```

NOTES

1. If the initial PDP context is supported, the context with <cid>=0 is automatically defined at startup.
2. This command has the characteristics of both the V.250 action and parameter commands. Hence it has the read form in addition to the execution/set and test forms.

BC95 Implementation

- When <state>=1, AT+COPS=0 is automatically selected.
- If AT+CGATT is in progress, further execution of this command before the finishing of attach or detach procedure will return error

3.12. AT+CGACT Activate or Deactivate PDP Context

The execution command is used to activate or deactivate the specified PDP context (s). After the command has completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the requested state for any specified context cannot be achieved, an "ERROR" or "+CME ERROR" response is returned. Extended error responses are enabled by the AT+CMEE command. If the MT is not PS attached when the activation form of the command is executed, the MT first performs a PS attach and then attempts to activate the specified

contexts. If the attach fails then the MT responds with error or, if extended error responses are enabled, with the appropriate failure-to-attach error message. Please refer to *Subclause 9.2* for possible <err> values.

For EPS, if an attempt is made to disconnect the last PDN connection, then the MT 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 MT 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.

AT+CGACT Activate or Deactivate PDP Context

| | |
|--|--|
| Execution/Set Command AT+CGACT=[<state>[,<cid>[,<cid>[,...]]]] | Response OK If there is any error, response: +CME ERROR:<err> |
| Read Command AT+CGACT? | Response +CGACT:<cid>,<state>[...] OK |
| Test Command AT+CGACT=? | Response +CGACT:(list of supported <state>s) OK |

Parameter

| | |
|----------------------|--|
| <state> | Integer type; indicates the activation state of PDP context. The default value is manufacturer specific. 0 Deactivated 1 Activated |
| <cid> | Integer type; specifies a particular PDP context definition (see the AT+CGDCONT). |

Example

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

NOTES

1. If the initial PDP context is supported, the context with <cid>=0 is automatically defined at startup.
2. This command has the characteristics of both the V.250 action and parameter commands. Hence it has the read form in addition to the execution/set and test forms.

BC95 Implementation

- AT+CGACT=? will be supported in next version.

3.13. AT+CIMI Request International Mobile Subscriber Identity

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

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

Please refer to **Chapter 7** for possible <err> values.

AT+CIMI Request International Mobile Subscriber Identity

Execution Command
AT+CIMI

Response
<IMSI>

OK

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

Test Command
AT+CIMI=?

Response
OK

Parameter

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

Example

```
AT+CIMI
460001357924680
OK
```

BC95 Implementation

- IMSI may not be displayed for a few seconds after power-on.

3.14. AT+CGDCONT Define a PDP Context

The set command specifies PDP context parameter values for a PDP context identified by <cid>, and the (local) context identification parameter. 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 7** for possible <err> values.

For EPS, the PDN connection and its associated EPS default bearer is identified herewith.

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

If the initial PDP context is supported, the context with <cid>=0 is automatically defined at startup, please refer to *3GPP TS 27.007 V13.5.0, subclause 10.1.0*. As for all other contexts, the parameters for <cid>=0 can be modified with AT+CGDCONT. If the initial PDP context is supported, AT+CGDCONT=0 resets context number 0 to its particular default settings.

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

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

Parameter

| | | | | | | | | | | | | | |
|------------------------------|---|------|--|----|---|------|---|--------|---|-------|---|-----|---|
| <cid> | Integer type; specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands. The range of permitted values (minimum value=1 or if the initial PDP context is supported, minimum value=0) is returned by the test form of the command. The <cid>s for network-initiated PDP contexts will have values outside the ranges indicated for the <cid> in the test form of the AT+CGDCONT and AT+CGDSCONT commands. | | | | | | | | | | | | |
| <PDP_type> | String type; specifies the type of packet data protocol. The default value is manufacturer specific. <table> <tr> <td>X.25</td><td>ITU-T/CCITT X.25 layer 3 (Obsolete)</td></tr> <tr> <td>IP</td><td>Internet Protocol (IETF STD 5 [103])</td></tr> <tr> <td>IPv6</td><td>Internet Protocol, version 6</td></tr> <tr> <td>IPv4v6</td><td>Virtual <PDP_type> introduced to handle dual IP stack UE capability</td></tr> <tr> <td>OSPIH</td><td>Internet Hosted Octect Stream Protocol (Obsolete)</td></tr> <tr> <td>PPP</td><td>Point to Point Protocol (IETF STD 51 [104])</td></tr> </table> <p>Only IP, IPv6 and IPv4v6 values are supported for EPS services.</p> | X.25 | ITU-T/CCITT X.25 layer 3 (Obsolete) | IP | Internet Protocol (IETF STD 5 [103]) | IPv6 | Internet Protocol, version 6 | IPv4v6 | Virtual <PDP_type> introduced to handle dual IP stack UE capability | OSPIH | Internet Hosted Octect Stream Protocol (Obsolete) | PPP | Point to Point Protocol (IETF STD 51 [104]) |
| X.25 | ITU-T/CCITT X.25 layer 3 (Obsolete) | | | | | | | | | | | | |
| IP | Internet Protocol (IETF STD 5 [103]) | | | | | | | | | | | | |
| IPv6 | Internet Protocol, version 6 | | | | | | | | | | | | |
| IPv4v6 | Virtual <PDP_type> introduced to handle dual IP stack UE capability | | | | | | | | | | | | |
| OSPIH | Internet Hosted Octect Stream Protocol (Obsolete) | | | | | | | | | | | | |
| PPP | Point to Point Protocol (IETF STD 51 [104]) | | | | | | | | | | | | |
| <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. The APN is a string of up to 82 characters. | | | | | | | | | | | | |
| <PDP_addr> | String type; identifies the MT in the address space applicable to the PDP. This parameter can be left blank. When AT+CGPIAF is supported, its settings can influence the format of this parameter returned with the read form of AT+CGDCONT. The value of this parameter is ignored with the set command. The parameter is included in the set command for backwards compatibility reasons only. | | | | | | | | | | | | |
| <d_comp> | Integer type; controls PDP data compression <table> <tr> <td>0</td><td>Off</td></tr> <tr> <td>1</td><td>On (manufacturer preferred compression)</td></tr> <tr> <td>2</td><td>V.42bis</td></tr> <tr> <td>3</td><td>V.44bis</td></tr> </table> | 0 | Off | 1 | On (manufacturer preferred compression) | 2 | V.42bis | 3 | V.44bis | | | | |
| 0 | Off | | | | | | | | | | | | |
| 1 | On (manufacturer preferred compression) | | | | | | | | | | | | |
| 2 | V.42bis | | | | | | | | | | | | |
| 3 | V.44bis | | | | | | | | | | | | |
| <h_comp> | Integer type; controls PDP header compression <table> <tr> <td>0</td><td>Off</td></tr> <tr> <td>1</td><td>On (manufacturer preferred compression)</td></tr> <tr> <td>2</td><td>RFC 1144 [105] (applicable for SNDTCP only)</td></tr> <tr> <td>3</td><td>RFC 2507 [107]</td></tr> <tr> <td>4</td><td>RFC 3095 [108] (applicable for PDCCP only)</td></tr> </table> | 0 | Off | 1 | On (manufacturer preferred compression) | 2 | RFC 1144 [105] (applicable for SNDTCP only) | 3 | RFC 2507 [107] | 4 | RFC 3095 [108] (applicable for PDCCP only) | | |
| 0 | Off | | | | | | | | | | | | |
| 1 | On (manufacturer preferred compression) | | | | | | | | | | | | |
| 2 | RFC 1144 [105] (applicable for SNDTCP only) | | | | | | | | | | | | |
| 3 | RFC 2507 [107] | | | | | | | | | | | | |
| 4 | RFC 3095 [108] (applicable for PDCCP only) | | | | | | | | | | | | |
| <IPv4AddrAlloc> | Integer type; controls how the MT/TA requests to get the IPv4 address information <table> <tr> <td>0</td><td>IPv4 address allocation through NAS signalling</td></tr> <tr> <td>1</td><td>IPv4 address allocated through DHCP</td></tr> </table> | 0 | IPv4 address allocation through NAS signalling | 1 | IPv4 address allocated through DHCP | | | | | | | | |
| 0 | IPv4 address allocation through NAS signalling | | | | | | | | | | | | |
| 1 | IPv4 address allocated through DHCP | | | | | | | | | | | | |
| <request_type> | Integer type; indicates the type of PDP context activation request for the PDP context. Please refer to <i>3GPP TS 24.301 (subclause 6.5.1.2)</i> and <i>3GPP TS 24.008 (subclause 10.5.6.17)</i> . If the initial PDP context is supported it is not allowed to assign <cid>=0 for emergency bearer services. According to <i>3GPP TS</i> | | | | | | | | | | | | |

24.008 (subclause 4.2.4.2.2 and subclause 4.2.5.1.4) and 3GPP TS 24.301 (subclause 5.2.2.3.3 and subclause 5.2.3.2.2), a separate PDP context must be established for emergency bearer services.

If the PDP context for emergency bearer services is the only activated context, only emergency calls are allowed, refer to 3GPP TS 23.401 subclause 4.3.12.9.

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

1 PDP context is for emergency bearer services

2 PDP context is for new PDP context establishment

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

<P-CSCF_discovery> Integer type; influences how the MT/TA requests to get the P-CSCF address, refer to 3GPP TS 24.229 [89] annex B and annex L.

0 Preference of P-CSCF address discovery not influenced by AT+CGDCONT

1 Preference of P-CSCF address discovery through NAS signalling

2 Preference of P-CSCF address discovery through DHCP

<IM_CN_Signalling_Flag_Ind> Integer type; indicates to the network whether the PDP context is for IM CN subsystem related signalling only or not.

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

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

<NSLPI> Integer type; indicates the NAS signalling priority requested for this PDP context

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

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

The MT utilizes the provided NSLPI information as specified in 3GPP TS 24.301 [83] and 3GPP TS 24.008.

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

0 Security protected transmission of PCO is not requested

1 Security protected transmission of PCO is requested

<IPv4_MTU_discovery> Integer type; influences how the MT/TA requests to get the IPv4 MTU size, refer to 3GPP TS 24.008 subclause 10.5.6.3.

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

1 Preference of IPv4 MTU size discovery through NAS signalling

Example

```
AT+CGDCONT=?
+CGDCONT:(0-10),("IP","NONIP"),,,(0),(0),,,,(0,1)

OK
AT+CGDCONT=1,"IP","HUAWEI.COM"
OK
AT+CGDCONT?
+CGDCONT:1,"IP","HUAWEI.COM" ,,0,0,,,,,0

OK
```

BC95 Implementation

- Only <PDP_type>="IP" is supported. <PDP_type>="IPv6" will be supported in a future release.
- Support AT+CGDCONT=<cid>,<PDP_type>,<APN> only.
- <cid> values of 0-10 are supported.
- <cid>=0 is read only and is only defined when AUTOCONNECT is enabled.
- Only <hcomp> and <dcomp> values of 0 are supported.

3.15. AT+CFUN Set Phone Functionality

Set command selects the level of functionality in the MT. Level "full functionality" is where the highest level of power is drawn. "Minimum functionality" is where minimum power is drawn. Level of functionality between these may also be specified by manufacturers. When supported by manufacturers, MT resetting with <rst> parameter may be utilized. Please refer to **Chapter 7** for possible <err> values.

NOTE

It is manufacturer specific if this command affects network registration. AT+COPS is used to force registration/deregistration.

Read command returns the current setting of <fun>.

Test command returns values supported by the MT as compound values.

AT+CFUN Set Phone Functionality

Set Command

AT+CFUN=[<fun>,<rst>]]

Response

OK

If there is any error, response:

| | |
|----------------------------------|--|
| | +CME ERROR:<err> |
| Read Command AT+CFUN? | Response +CFUN:<fun> OK |
| Test Command AT+CFUN=? | Response +CFUN:(list of supported <fun>s), (list of supported <rst>s) OK |

Parameter

| | |
|--------------------|---|
| <fun> | Integer type |
| <u>0</u> | Minimum functionality |
| 1 | Full functionality. Enable MT to transmit and receive RF circuits for all supported radio access technologies. For MTs supporting AT+CSRA, this equals the RATs indicated by the response of AT+CSRA=?. Currently AT+CSRA setting is ignored. It is not required that the transmitting and receiving RF circuits are in a disabled state when this setting takes effect. |
| 2 | Disable MT to transmit RF circuits only |
| 3 | Disable MT to receive RF circuits only |
| 4 | Disable MT to transmit and receive RF circuits |
| 5...127 | Reserved for manufacturers as intermediate states between full and minimum functionality |
| 128 | Full functionality with radio access support according to the setting of AT+CSRA. Enables MT to transmit and receive RF circuits if it not already enabled. This <fun> setting is applicable for MTs supporting AT+CSRA. |
| 129 | Prepare for shutdown. This setting has its prime use when some of the MT's resources (e.g. file system) are located on a tightly integrated TE (host). The MT will execute pending actions resulting in "permanent" changes, e.g. execute pending file system operations. The MT will also make an orderly network detachment. After this action and AT+CFUN has returned "OK", the MT can be shut down with <fun>=0, or by other means. After setting <fun>=129, only <fun>=0 is valid. All other values will make AT+CFUN return "ERROR". |
| <rst> | Integer type; MT resetting |
| <u>0</u> | Do not reset the MT before setting it to <fun> power level. This shall always be defaulted when <rst> is not given. |
| 1 | Reset the MT before setting it to <fun> power level |

Example

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

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

OK
```

BC95 Implementation

- Only <fun>=0 and <fun>=1 are supported.
- <rst> is not supported and will be ignored.

3.16. AT+CMEE Report Mobile Termination Error

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

Read command returns the current setting of <n>.

Test command returns values supported as a compound value.

Please refer to **Chapter 7** for possible <err> values.

AT+CMEE Report Mobile Termination Error

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

Parameter

| | |
|------------------|--|
| <n> | Integer type |
| 0 | Disable "+CMEE ERROR:<err>" result code and use "ERROR" instead |
| 1 | Enable "+CMEE ERROR:<err>" result code and use numeric <err> values (Please refer to Chapter 7 for possible <err> values) |
| 2 | Enable "+CMEE ERROR:<err>" result code and use verbose <err> values |

BC95 Implementation

- Only <n>=0 & <n>=1 are supported.

3.17. AT+CCLK Return Current Date & Time

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

Read command returns the current setting of the clock.

Please refer to **Chapter 7** for possible <err> values.

AT+CCLK Return Current Date & Time

| | |
|----------------------------------|---|
| Read Command AT+CCLK? | Response +CCLK:[<yy/MM/dd,hh:mm:ss>[<±zz>]] OK If there is any error, response: +CME ERROR:<err> |
| Test Command AT+CCLK=? | Response OK |

Parameter

| | |
|---------------------|--|
| <time> | String type; format is "yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minute, second and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; and range is -96 ~ +96). E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals "94/05/06,22:10:00+08" |
|---------------------|--|

NOTE

If MT does not support time zone information then the three last characters of <time> are not returned by AT+CCLK? command.

Example

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

BC95 Implementation

- If the RTC has not been set by the network, no value is returned.

3.18. AT+CPSMS Power Saving Mode Setting

The set command controls the setting of the UE's power saving mode (PSM) parameters. It can be used to control whether the UE wants to apply PSM or not, as well as the requested extended periodic RAU value and the requested GPRS READY timer value in GERAN/UTRAN, the requested extended periodic TAU value in E-UTRAN and the requested active time value. Please refer to the unsolicited result codes provided by AT+CGREG for the active time value, the extended periodic RAU value and the GPRS READY timer value that are allocated to the UE by the network in GERAN/UTRAN, and 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 manufacturer specific default values.

The read command returns the current parameter values.

The test command returns the supported <mode>s and the value ranges for the requested extended periodic RAU value and the requested GPRS READY timer value in GERAN/UTRAN, the requested extended periodic TAU value in E-UTRAN and the requested active time value as compound values.

Please refer to **Chapter 7** for possible <err> values.

AT+CPSMS Power Saving Mode Setting

| | |
|--|---|
| Execution/Set Command AT+CPSMS=[<mode>[,<Requested_Periodic-RAU>[,<Requested_GPRS-READY-timer>[,<Requested_Periodic-TAU>[,<Requested_Active-Time>]]]]] | Response OK If there is any error, response: +CME ERROR:<err> |
| Read Command AT+CPSMS? | Response +CPSMS:<mode>[,<Requested_Periodic-RAU>[,<Requested_GPRS-READY-timer>[,<Requested_Periodic-TAU>[,<Requested_Active-Time>]]]] OK |
| Test Command AT+CPSMS=? | Response +CPSMS:(list of supported <mode>s),(list of supported <Requested_Periodic-RAU>s),(list of supported <Requested_GPRS-READY-timer>s),(list of supported <Requested_Periodic-TAU>s),(list of supported <Requested_Active-Time>s) OK |

Parameter

| | |
|---|---|
| <mode> | Integer type, indicates to disable or enable the use of PSM in the UE 0 Disable the use of PSM 1 Enable the use of PSM 2 Disable the use of PSM and discard all parameters for PSM or, if available, reset to the manufacturer specific default values. |
| <Requested_Periodic-RAU> | String type; one byte in an 8 bit format. Requested extended periodic RAU value (T3312) to be allocated to the UE in GERAN/UTRAN. The requested extended periodic RAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours). For the coding and the value range, see the GPRS Timer 3 IE in 3GPP TS 24.008 [8] Table 10.5.163a/3GPP TS 24.008. See also 3GPP TS 23.682 [149] and 3GPP TS 23.060 [47]. The default value, if available, is manufacturer specific. |
| <Requested_GPRS-READY-timer> | String type; one byte in an 8 bit format. Requested GPRS READY timer value (T3314) to be allocated to the UE in GERAN/UTRAN. The requested GPRS READY timer value is coded as one byte (octet 2) of the GPRS Timer information element coded as bit format (e.g. "01000011" equals 3 decihours). |

or 18 minutes). For the coding and the value range, see the GPRS Timer IE in 3GPP TS 24.008 [8] Table 10.5.172/3GPP TS 24.008. See also 3GPP TS 23.060 [47]. The default value, if available, is manufacturer specific.

<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. The requested extended periodic TAU value is coded as one byte (octet 3) of the GPRS Timer 3 information element coded as bit format (e.g. "01000111" equals 70 hours). For the coding and the value range, see the GPRS Timer 3 IE in 3GPP TS 24.008 [8] Table 10.5.163a/3GPP TS 24.008. See also 3GPP TS 23.682 [149] and 3GPP TS 23.401 [82]. The default value, if available, is manufacturer specific.

<Requested_Active-Time>

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

Example

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

```
OK
```

```
AT+CPSMS?
```

```
+CPSMS:1,,01000011,01000011
```

```
OK
```

```
AT+CPSMS=?
```

```
+CPSMS:(0,1,2),,(00000000-11111111),(00000000-11111111)
```

```
OK
```

BC95 Implementation

- RAU is not supported by NB-IoT. No value will be output, and any input will be ignored.

3.19. AT+CEDRXS eDRX Setting

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

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

A special form of the command can be given as AT+CEDRXS=3. In this form, eDRX will be disabled and data for all parameters in AT+CEDRXS command will be removed or, if available, set to the manufacturer specific 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 7** for possible <err> values.

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

Parameter

| | |
|--------|---|
| <mode> | Integer type, indicates to disable or enable the use of eDRX in the UE. This parameter is applicable to all specified types of access technology, i.e. the most recent setting of |
|--------|---|

<mode> will take effect for all specified values of <AcT-type>.

- 0 Disable the use of eDRX
- 1 Enable the use of eDRX
- 2 Enable the use of eDRX and enable the unsolicited result code +CEDRXP:<AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]]
- 3 Disable the use of eDRX and discard all parameters for eDRX or, if available, reset to the manufacturer specific default values.

<AcT-type> Integer type, indicates the type of access technology. AT+CEDRXS? is used to specify the relationship between the type of access technology and the requested eDRX value.

- 0 Access technology is not using eDRX. This parameter value is only used in the unsolicited result code.
- 1 EC-GSM-IoT (A/Gb mode)
- 2 GSM (A/Gb mode)
- 3 UTRAN (Iu mode)
- 4 E-UTRAN (WB-S1 mode)
- 5 E-UTRAN (NB-S1 mode)

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

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

<Paging_time_window> String type; half a byte in a 4 bit format. The paging time window refers to bit 8 to 5 of octet 3 of the extended DRX parameters information element (see subclause 10.5.5.32 of 3GPP TS 24.008 [8]). For the coding and the value range, see the extended DRX parameters information element in 3GPP TS 24.008 [8] Table 10.5.5.32/3GPP TS 24.008.

Example

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

```
OK
```

```
AT+CEDRXS?
```

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

```
OK
AT+CEDRXS=?
+CEDRXS:(0,1,2,3),(5),("0000"-"1111")
OK
```

3.20. AT+CEER Extended Error Report

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

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

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

AT+CEER Extended Error Report

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

Parameter

| | |
|-----------------------|---|
| <report> | The total number of characters, including line terminators, in the information, text shall not exceed 2041 characters. Text shall not contain the sequence 0<CR> or OK<CR>. |
|-----------------------|---|

Example

```
AT+CEER
+CEER:EMM_CAUSE_EPS_AND_NON_EPS_SERVICES_NOT_ALLOWED
OK
AT+CEER=?
```

OK

3.21. AT+CEDRXRDP eDRX Read Dynamic Parameters

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

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

Please refer to **Chapter 7** for possible <err> values.

AT+CEDRXRDP eDRX Read Dynamic Parameters

| | |
|---|---|
| Execution Command AT+CEDRXRDP | Response +CEDRXRDP:<AcT-type>[,<Requested_eDRX_value>[,<NW-provided_eDRX_value>[,<Paging_time_window>]]] OK |
| Test Command AT+CEDRXRDP=? | Response OK |

Parameter

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

| | |
|-----------------------------------|--|
| <Paging_time_window> | (see subclause 10.5.5.32 of 3GPP TS 24.008 [8]). For the coding and the value range, see extended DRX parameters information element in 3GPP TS 24.008 [8] Table 10.5.5.32/3GPP TS 24.008. String type; half a byte in a 4 bit format. The paging time window refers to bit 8 to 5 of octet 3 of the extended DRX parameters information element (see subclause 10.5.5.32 of 3GPP TS 24.008 [8]). For the coding and the value range, see the extended DRX parameters information element in 3GPP TS 24.008 [8] Table 10.5.5.32/3GPP TS 24.008. |
|-----------------------------------|--|

Example

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

OK
AT+CEDRXRDP=?

OK
```

3.22. AT+CTZR Time Zone Reporting

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

Read command returns the current reporting settings in the MT.

Test command returns supported <reporting> values as a compound value.

Please refer to **Chapter 7** for possible <err> values.

AT+CTZR Time Zone Reporting

| | |
|---|---|
| Execution/Set Command AT+CTZR=[<reporting>] | Response +CTZR <reporting> OK |
| Read Command AT+CTZR? | Response +CTZR:<reporting> |

| | |
|---|---|
| | <p>OK</p> <p>If there is any error, response: +CME ERROR:<err></p> |
| <p>Test Command</p> <p>AT+CTZR=?</p> | <p>Response</p> <p>+CZTR:(list of supported <reporting>s)</p> <p>OK</p> <p>If there is any error, response: +CME ERROR:<err></p> |

Parameter

| | |
|--------------------------|--|
| <reporting> | <p>Integer type, indicates reporting status</p> <ul style="list-style-type: none"> 0 Disable time zone change event reporting 1 Enable time zone change event reporting by unsolicited result code +CTZV:<tz>. 2 Enable extended time zone and local time reporting by unsolicited result code +CTZE:<tz>,<dst>,<[time]>]. 3 Enable extended time zone and universal time reporting by unsolicited result code +CTZEU:<tz>,<dst>,<[utime]>]. |
| <tz> | <p>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 digit 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".</p> |
| <dst> | <p>Integer type, indicates whether <tz> includes daylight savings adjustment;</p> <ul style="list-style-type: none"> 0 <tz> includes no adjustment for daylight saving time 1 <tz> includes +1 hour (equals 4 quarters in <tz>) adjustment for daylight saving time 2 <tz> includes +2 hours (equals 8 quarters in <tz>) adjustment for daylight saving time |
| <time> | <p>String type, represents the local time. The format is "YYYY/MM/DD,hh:mm:ss", expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). The local time can be derived by the MT from information provided by the network at the time of delivering time zone information and will be present in the unsolicited result code for extended time zone and local time reporting if the universal time is provided by the network.</p> |
| <utime> | <p>String type, represents the universal time. The format is "YYYY/MM/DD,hh:mm:ss", expressed as integers representing year (YYYY), month (MM), date (DD), hour (hh), minute (mm) and second (ss). The universal time can be provided by the network at the time of delivering time zone information and will be present in the unsolicited result code for extended time zone and universal time reporting if provided by the network.</p> |

Example

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

OK
AT+CTZR=?
+CTZR: (0,1,2,3,)

OK
```

NOTE

The time zone reporting is not affected by the automatic time zone setting command, if implemented +CTZU.

4 ETSI Commands* (127.005)

The commands listed in this chapter are under development.

4.1. AT+CSMS Select Message Service

Set command selects messaging service. It returns the types of messages supported by the ME:<mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages. If chosen service is not supported by the ME (but is supported by the TA), final result code +CMS ERROR:<err> will be returned.

Read command returns supported message types along the current service setting.

Test command returns a list of all services supported by the TA.

Please refer to **Chapter 7** for possible <err> values.

| AT+CSMS Select Message Service | |
|---|---|
| Execution/Set Command AT+CSMS=<service> | Response +CSMS:<mt>,<mo>,<bm> OK If there is any error, response: +CMS ERROR:<err> |
| Read Command AT+CSMS? | Response +CSMS:<service>,<mt>,<mo>,<bm> OK |
| Test Command AT+CSMS=? | Response +CSMS:(list of supported <service>s) OK |

Parameter

| | |
|---|---|
| <service> | Integer type, messaging service |
| 0 | 3GPP TS 23.040 [3] and 3GPP TS 23.041 [4] |
| 1 | 3GPP TS 23.040 [3] and 3GPP TS 23.041 [4] the requirement of <service> setting 1 is mentioned under corresponding command descriptions) |
| 2...127 | Reserved |
| 128... | Manufacturer specific |
| <mt>, <mo>, <bm> | Integer type, mobile terminated messages, mobile originated messages, and broadcast type messages |
| 0 | Type not supported |
| 1 | Type supported |

Example

```

AT+CSMS=1
+CSMS:2,3,4

OK
AT+CSMS?
+CSMS:1,2,3,4

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

OK

```

4.2. AT+CNMA New Message Acknowledgement to ME/TA

Execution command confirms reception of a new message (SMS-DELIVER or SMS-STATUS-REPORT) which is routed directly to the TE. This acknowledgement command shall be used when AT+CSMS parameter <service> equals 1. In PDU mode, it is possible to send either positive (RPACK) or negative (RP-ERROR) acknowledgement to the network. Parameter <n> defines which one will be sent. Optionally (when <length> is greater than zero) an acknowledgement TPDU (SMS-DELIVER-REPORT for RPACK or RP-ERROR) may be sent to the network. The entering of PDU is done similarly as specified in command AT+CMGS, except that the format of <ackpdu> is used instead of <pdu> (i.e. SMSC address field is not present). PDU shall not be bounded by double quotes. TA shall not send another +CMT or +CDS result code to TE before previous one is acknowledged.

If ME does not get acknowledgement within required time (network timeout), ME should respond as specified in 3GPP TS 24.011 [6] to the network. ME/TA shall automatically disable routing to TE by setting

both <mt> and <ds> values of AT+CNMI to zero.

If command is executed, but no acknowledgement is expected, or some other ME related error occurs, final result code +CMS ERROR:<err> is returned. In case that a directly routed message must be buffered in ME/TA (possible when AT+CNMI parameter <mode> equals 0 or 2) or AT interpreter remains too long in a state where result codes cannot be sent to TE (e.g. user is entering a message using AT+CMGS), acknowledgement (RP-ACK) must be sent to the network without waiting AT+CNMA command from TE. Later, when buffered result codes are flushed to TE, TE must send +CNMA[=0] acknowledgement for each result code. In this way, ME/TA can determine if message should be placed in non-volatile memory and routing to TE disabled (+CNMA[=0] not received). Refer command AT+CNMI for more details how to use <mode> parameter reliably.

Test command returns a list of supported <n> values. If the only value supported is 0, the device does not support sending of TPDU.

Please refer to **Chapter 7** for possible <err> values.

AT+CNMA New Message Acknowledgement to ME/TA

Execution/Set Command
**AT+CNMA=[<n>[,<length>][<CR>PDU
is given<ctrl-Z/ESC>]]]**

Response

OK

If there is any error, response:

+CMS ERROR:<err>

Test Command
AT+CNMA=?

Response

+CNMA:(list of supported<n>s)

OK

Parameter

| | |
|----------|--|
| <n> | Integer type |
| | 0 Command operates similarly as defined for the text mode (UE does not support text mode for SMS currently) |
| | 1 Send RP-ACK (or buffered result code received correctly) |
| | 2 Send RP-ERROR [if PDU is not given, ME/TA shall send SMS-DELIVER-REPORT with 3GPP TS 23.040 [3] TP-FCS value set to 'FF' (unspecified error cause)] |
| <length> | Integer type, indicates in the text mode (AT+CMGF=1) the length of the message body <data> > (or <cdata>) in characters; or in PDU mode (AT+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length) |

Example

```
AT+CNMA=1
```

```
OK
```

```
AT+CNMA=?
```

```
+CNMA:(0-2)
```

```
OK
```

BC95 Implementation

- Only <n>=1 and <n>=2 are supported.

4.3. AT+CSCA Service Centre Address

Set command updates the SMSC address, through which mobile originated SMS are transmitted. In text mode, setting is used by send and write commands. In PDU mode, setting is used by the same commands, but only when the length of the SMSC address coded into <pdu> parameter equals zero.

Please refer to **Chapter 7** for possible <err> values.

AT+CSCA Service Centre Address

| | |
|---|--|
| Execution/Set Command AT+CSCA=<sca>[,<tosca>] | Response OK If there is any error, response: +CMS ERROR:<err> |
| Read Command AT+CSCA? | Response +CSCA:<sca>[,<tosca>] OK |
| Test Command AT+CSCA=? | Response OK |

Parameter

| | |
|--------------------|--|
| <sca> | 3GPP TS 24.011 [6] RP SC address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer to AT+CSCS command in 3GPP TS 27.007 [9]); type of address |
|--------------------|--|

| | |
|---------|--|
| | given by <tosca> |
| <tosca> | 3GPP TS 24.011 [6] RP SC address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129) |

Example

```
AT+CSCA=358501234567,145
```

```
OK
```

```
AT+CSCA?
```

```
+CSCA:"358501234567",145
```

```
OK
```

```
AT+CSCA=?
```

```
OK
```

4.4. AT+CMGS Send SMS Message

Execution command sends message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally (when AT+CSMS <service> value is 1 and network supports) <ackpdu> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR:<err> is returned. This command should be abortable.

- <length> must indicate the number of octets coded in the TP layer data unit to be given (i.e. SMSC address octets are excluded).
- The TA shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10,62, 32) after command line is terminated with <CR>; after that PDU can be given from TE to ME/TA.
- The DCD signal shall be in ON state while PDU is given.
- The echoing of given characters back from the TA is controlled by V.25ter echo command E.
- The PDU shall be hexadecimal format (similarly as specified for <pdu>) and given in one line; ME/TA converts this coding into the actual octets of PDU.
- When the length octet of the SMSC address (given in the PDU) equals zero, the SMSC address set with AT+CSCA command is used; in this case the SMSC Type-of-Address octet shall not be present in the PDU, i.e. TPDU starts right after SMSC length octet.
- Sending can be cancelled by giving <ESC> character (IRA 27).
- <ctrl-Z> (IRA 26) must be used to indicate the ending of PDU

Please refer to **Chapter 7** for possible <err> values.

AT+CMGS Send SMS Message

| | |
|--|---|
| Execution/Set Command AT+CMGS=<length><CR>PDU is given<ctrl-Z/ESC> | Response +CMGS:<mr>[,<ackpdu>]] OK If there is any error, response: +CMS ERROR:<err> |
| Test Command AT+CMGS=? | Response OK |

Parameter

| | |
|-----------------------|--|
| <mr> | 3GPP TS 23.040 [3] TP-Message-Reference in integer format |
| <length> | Integer type, indicates in the text mode (AT+CMGF=1) the length of the message body <data> > (or <cdata>) in characters; or in PDU mode (AT+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length) |
| <ackpdu> | 3GPP TS 23.040 [3] RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without 3GPP TS 24.011 [6] SC address field and parameter shall be bounded by double quote characters like a normal string type parameter |

BC95 Implementation

- The value range of <length> is 8-220.

4.5. AT+CMGC Send SMS Command

Execution command sends a command message from a TE to the network (SMS-COMMAND). The entering of text (3GPP TS 23.040 [3] TP-Command-Data) is done similarly as specified in AT+CMGS command, but the format is fixed to be a sequence of two IRA character long hexadecimal numbers which ME/TA converts into 8-bit octets (refer to AT+CMGS). Message reference value <mr> is returned to the TE on successful message delivery. Optionally (when AT+CSMS <service> value is 1 and network supports) <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR:<err> is returned. This command should be abortable.

Please refer to **Chapter 7** for possible <err> values.

AT+CMGS Send SMS Message

| | |
|--|---|
| Execution/Set Command AT+CMGC=<length><CR>PDU is given<ctrl-Z/ESC> | Response +CMGC:<mr>[,<ackpdu>]] OK If there is any error, response: +CMS ERROR:<err> |
| Test Command AT+CMGC=? | Response OK |

Parameter

| | |
|-----------------------|--|
| <mr> | 3GPP TS 23.040 [3] TP-Message-Reference in integer format |
| <length> | Integer type, indicates in the text mode (AT+CMGF=1) the length of the message body <data> > (or <cdata>) in characters; or in PDU mode (AT+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length) |
| <ackpdu> | 3GPP TS 23.040 [3] RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without 3GPP TS 24.011 [6] SC address field and parameter shall be bounded by double quote characters like a normal string type parameter |

4.6. AT+CSODCP Sending of Originating Data via the Control Plane

Send a non-IP message

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

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

This command also optionally indicates whether or not the data to be transmitted is an exception data. It causes transmission of an ESM DATA TRANSPORT message, as defined in 3GPP TS 24.301 [83].

Test command returns the maximum number of bytes of the user data container supported by the MT, supported <RAI>s and supported <type_of_user_data>s as a compound value.

Please refer to **Chapter 7** for possible <err> values.

AT+CSODCP Sending of Originating Data via the Control Plane

| | |
|--|---|
| Execution/Set Command AT+CSODCP=<cid>,<cpdata_length>,<cpdata>[,<RAI>[,<type_of_user_data>]] | Response OK If there is any error, response: +CMS ERROR:<err> |
| Test Command AT+CSODCP=? | Response +CSODCP: (range of supported <cid>s),(maximum number of bytes of the <cpdata_length>),(list of supported <RAI>s),(list of supported <type_of_user_data>s) OK |

Parameter

| | |
|----------------------------------|--|
| <cid> | Integer type, a numeric parameter which specifies a particular PDP context or EPS bearer context definition. The <cid> parameter is local to the TE-MT interface and identifies the PDP or EPS bearer contexts which have been setup via AT commands (see the AT+CGDCONT and AT+CGDSCONT commands). |
| <cpdata_length> | Integer type, indicates the number of bytes of the <cpdata> information element. When there is no data to transmit, the value shall be set to zero. |
| <cpdata> | String of octets. Contains the user data container contents (refer 3GPP TS 24.301 [83] subclause 9.9.4.24). When there is no data to transmit, the <cpdata> shall be an empty string (""). This parameter shall not be subject to conventional character conversion as per +CSCS. The coding format of the user data container and the maximum length of <cpdata> are implementation specific. |
| <RAI> | Integer type. Indicates the value of the release assistance indication, refer to 3GPP TS 24.301 [83] subclause 9.9.4.25. 0 No information available 1 The MT expects that exchange of data will be completed with the transmission of the ESM DATA TRANSPORT message. 2 The MT expects that exchange of data will be completed with the receipt of an ESM DATA TRANSPORT message. |
| <type_of_user_data> | Integer type, indicates whether the user data that is transmitted is regular or exceptional. 0 Regular data 1 Exception data |

Example

```
AT+CSODCP=?
+CSODCP:(0-10),(512),(0,1,2),(0,1)
```

OK

BC95 Implementation

- There is a maximum data length of 512 bytes
- Only one message will be buffered at any one time.

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

Receive a message from the CDP server

The set command is used to enable and disable reporting of data from the network to the MT that is transmitted via the control plane in downlink direction. If reporting is enabled, the MT returns the unsolicited result code +CRTDCP:<cid>,<cpdata_length>,<cpdata> when data is received from the network.

Read command returns the current settings.

Test command returns supported values as compound values

Please refer to **Chapter 7** for possible <err> values.

AT+CRTDCP Reporting of Terminating Data via the Control Plane

| | |
|---|--|
| Execution/Set Command AT+CRTDCP=<reporting> | <p>Response</p> <p>OK</p> <p>If there is any error, response:</p> <p>+CMS ERROR:<err></p> |
| Read Command AT+CRTDCP? | <p>Response</p> <p>+CRTDCP:<reporting></p> <p>OK</p> |
| Test Command AT+CRTDCP=? | <p>Response</p> <p>+CRTDCP:(list of supported <reporting>s),(range of supported <cid>s),(maximum number of octets of user data indicated by <cpdata_length>)</p> <p>OK</p> |

Parameter

| | |
|------------------------------|---|
| <reporting> | Integer type, controls reporting of mobile terminated control plane data events 0 Disable reporting of MT control plane data 1 Enable reporting of MT control plane data by the unsolicited result code "+CRTDCP:<cid>,<cpdata_length>,<cpdata>" |
| <cid> | Integer type, a numeric parameter which specifies a particular PDP context or EPS bearer context definition. The <cid> parameter is local to the TE-MT interface and identifies the PDP or EPS bearer contexts which have been setup via AT commands (see AT+CGDCONT and AT+CGDSCONT commands) |
| <cpdata_length> | Integer type. Indicates the number of bytes of the <cpdata> information element. When there is no data to transmit, the value shall be set to zero. |
| <cpdata> | String of octets. Contains the user data container contents (refer 3GPP TS 24.301 [83] clause 9.9.4.24). When there is no data to transmit, the <cpdata> shall be an empty string (""). This parameter shall not be subject to conventional character conversion as per +CSCS. The coding format of the user data container and the maximum length of <cpdata> are implementation specific. |

Example

```
AT+CRTDCP=1
```

```
OK
```

```
AT+CRTDCP?
```

```
+CRTDCP:1
```

```
OK
```

```
AT+CRTDCP=?
```

```
+CRTDCP:(0-1),(0-10),(512)
```

```
OK
```

```
+CRTDCP:0,2,"ab" //URC
```

BC95 Implementation

- Maximum length of received data is 512 bytes.

5 General Commands

5.1. AT+NMGS Send a Message

The command is used to send a message from the terminal to the network via the Connected Device Platform (CDP) server. It will give an <err> code and description as an intermediate message if the message cannot be sent. Please refer to **Chapter 7** for possible <err> values.

AT+NMGS Send a Message

Set Command

AT+NMGS=<length>,<data>

Response

OK

If there is any error, response:

+CME ERROR:<err>

Parameter

| | |
|-----------------------|---|
| <length> | Decimal length of message |
| <data> | Data to be transmitted in hex string format |
| <err> | TBD |

Example

AT+NMGS=3,AA11BB

OK

BC95 Implementation

- There is a maximum data length of 512 bytes.
- Only one message will be buffered at any one time.

5.2. AT+NMGR Get a Message

Receive a message from the CDP server.

The command returns the oldest buffered message and deletes from the buffer. If there are no messages then no command response will be given. If new message indications (AT+NNMI) are turned on then received messages will not be available via this command.

AT+NMGR Get a Message

Execution Command
AT+NMGR

Response
<length>,<data>

OK

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

Parameter

| | |
|-----------------------|------------------------------------|
| <length> | Decimal length of message |
| <data> | Data received in hex string format |

Example

```
AT+NMGR
5,48656C6C6F
OK
```

BC95 Implementation

- Maximum length of received data is 512 bytes.

5.3. AT+NNMI New Message Indications

The command sets or gets new message indications that are sent. New message indications can be sent when a downstream message is received by the terminal from the CDP server. Please refer to **Chapter 7** for possible <err> values.

When new message indications and messages are enabled (AT+NNMI=1), all currently buffered messages will be returned in the format of "+NNMI:<length>,<data>". For example: "+NNMI:5,48656C6C6F".

If indications alone are turned on (AT+NNMI=2), each newly received message triggers an indication that a new datagram is waiting using the unsolicited informational response. The buffered messages can be

collected using AT+NMGR. The format of response is: "+NNMI". The default setting is 0, which indicates no indications are sent.

AT+NNMI New Message Indications

| | |
|--|--|
| Set Command AT+NNMI=<status> | Response OK If there is any error, response: +CME ERROR:<err> |
| Read Command AT+NNMI? | Response +NNMI:<status> OK |

Parameter

| | | |
|-----------------------|---|-------------------------------------|
| <status> | <u>0</u> | No indications, the default setting |
| | 1 | Indications and message |
| | 2 | Indications only |
| <length> | Decimal length of message | |
| <data> | Data to be transmitted in hex string format | |

Example

```
AT+NNMI=1
OK
AT+NNMI?
+NNMI:1
OK
```

5.4. AT+NSMI Sent Message Indications

The command sets or gets indications that are sent when an upstream message is sent to the CDP server.

If sent message indications are turned on, the unsolicited informational response: "+NSMI:<status>" (e.g. "+NSMI:SENT") will be issued when a new message is sent into NB-IoT stack. Please refer to **Chapter 7** for possible <err> values.

The default setting is 0, which indicates no indications are sent.

AT+NSMI Sent Message Indications

| | |
|---|--|
| Set Command AT+NSMI=<indications> | Response OK If there is any error, response: +CME ERROR:<err> |
| Read Command AT+NSMI? | Response +NSMI:<indications> OK |

Parameter

| | |
|----------------------------|--|
| <indications> | <u>0</u> No indications, the default setting 1 Indications will be sent |
| <status> | SENT DISCARDED |

Example

```
AT+NSMI=1
OK
AT+NSMI?
+NSMI:1
OK
```

5.5. AT+NQMGR Query Messages Received

The command queries the status of the downstream messages received from the CDP server. Please refer to **Chapter 7** for possible <err> values.

AT+NQMGR Query Messages Received

| | |
|--------------------------------------|---|
| Execution Command AT+NQMGR | Response BUFFERED=<buffered>,RECEIVED=<received>,DROPPED=<dropped> OK If there is any error, response: |
|--------------------------------------|---|

+CME ERROR:<err>

Parameter

| | |
|-------------------------|---|
| <buffered> | The number of messages waiting to be read in the downstream buffer |
| <received> | The total number of messages received by the terminal since terminal boot |
| <dropped> | The number of messages dropped by the terminal since terminal boot |

Example

```
AT+NQMGR
BUFFERED=0,RECEIVED=34,DROPPED=2

OK
```

5.6. AT+NQMGS Query Messages Sent

The command queries the status of the upstream messages sent to the CDP server. Please refer to **Chapter 7** for possible <err> values.

AT+NQMGS Query Messages Sent

| | |
|--------------------------------------|--|
| Execution Command AT+NQMGS | Response PENDING=<pending>,SENT=<sent>,ERROR=<error> OK If there is any error, response: +CME ERROR:<err> |
|--------------------------------------|--|

Parameter

| | |
|------------------------|--|
| <pending> | The number of messages waiting to be sent in the upstream buffer, if Layer 3 is registered and activated |
| <sent> | The total number of uplink messages sent into the NB-IoT stack since terminal boot |
| <error> | The number of messages that could not be sent by the terminal due to an error since terminal boot |

Example

AT+NQMG

PENDING=1,SENT=34,ERROR=0

OK

5.7. AT+NMSTATUS Message Registration Status

Report the current registration status when connected to the CDP server. Please refer to **Chapter 7** for possible <err> values.

AT+NMSTATUS Message Registration Status

Read Command
AT+NMSTATUS?

Response
+NMSTATUS:<registration_status>

OK

Parameter

| | |
|------------------------------------|--|
| <registration_status> | Current registration status: "UNINITIALISED", "MISSING_CONFIG", "INIT_FAILED", "INITIALISED", "REGISTERING", "REREGISTERING", "REGISTERED", "REREGISTERED", "MO_DATA_ENABLED", "NO_UE_IP", "MEMORY_ERROR", "COAP_ERROR", "MSG_SEND_FAILED", "REJECTED_BY_SERVER", "TIMEOUT_AND_RETRYING", "TIMEOUT_AND_FAILED" |
|------------------------------------|--|

5.8. AT+NRB Reboot

The command reboots the terminal. There is a short delay after issuing this command before the terminal reboots. No further AT commands will be processed. Please refer to **Chapter 7** for possible <err> values.

Please note that there is no final “OK” to signal that the command line has finished processing as AT command processing terminates with this command. No confirmation messages are expected until the reboot.

AT+NRB Reboot

| | |
|-------------------|-----------|
| Execution Command | Response |
| AT+NRB | REBOOTING |

Example

```
AT+NRB
REBOOTING
```

5.9. AT+NCDP Configure and Query CDP Server Settings

The command is used to set and query the server IP address and port for the CDP server. It is used when there is a HiSilicon CDP or Huawei IoT platform acting as gateway to network server applications. Please refer to **Chapter 7** for possible <err> values.

AT+NCDP Configure and Query CDP Server Settings

| | |
|----------------------------|---|
| Set Command | Response |
| AT+NCDP=<ip_addr>[,<port>] | Update the CDP server configuration from the supplied parameters. OK |
| | If there is any error, response: +CME ERROR:<err> |
| Test Command | Response |
| AT+NCDP? | Return the current CDP server IP address and port. +NCDP:<ip_addr>,<port> |
| | OK |
| | If CDP server is not set, response: +CME ERROR:<err> |

Parameter

| | |
|-----------|---|
| <ip_addr> | IPv4 address, IP address in dot-separated numeric (0-255) parameter of the form: a1.a2.a3.a4 |
| <port> | Unsigned integer, 0-65535. If port 0 is provided, the default port (5683) will be used. If no port is specified the previously set port will be used. If no port is specified, and no port was previously set, the default port will be used. |

Example

```
AT+NCDP=192.168.5.1
OK
AT+NCDP?
+NCDP:192.168.5.1,5683
OK
```

BC95 Implementation

- Only IPv4 is supported.
- The values assigned are persistent across reboots.
- This command is available after the IMEI number has been set.
- For versions earlier than B657SP1, this command must be executed when the radio is inactive (AT+CFUN=0 will force the module to enter into this state)
- IP addresses can be specified in decimal, octal or hexadecimal notation.

5.10. AT+NUESTATS Query UE Statistics

The command fetches the most recent operational statistics. Please refer to **Chapter 7** for possible <err> values. It can take an optional parameter that allows different sets of statistics to be displayed. The <type>=RADIO provides the default set of values, and <type>=ALL will print all data

AT+NUESTATS Query UE Statistics

| Set Command | Response |
|-------------|--|
| AT+NUESTATS | Signal power:<signal power in centibels> Total power:<total power in centibels> TX power:<current Tx power level in centibels> TX time:<total Tx time since last reboot in millisecond> RX time:<total Rx time since last reboot in millisecond> Cell ID:<last cell ID> ECL:<last ECL value> SNR:<last snr value> |

| | |
|-------------------------------|--|
| | <p>EARFCN:<last earfcn value> PCI:<last pci value> RSRQ:<rsrq in centibels></p> <p>OK</p> <p>If there is any error, response: +CME ERROR:<err></p> |
| AT+NUESTATS=CELL | <p>NUESTATS:CELL,<earfcn>,<physical cell id>,<primarycell>,<rsrp>,<rsrq>,<rssi>,<snr> [...NUESTATS:CELL,<earfcn>,<physical cell id>,<primarycell>,<rsrp>,<rsrq>,<rssi>,<snr>]</p> <p>OK</p> <p>If there is any error, response: +CME ERROR:<err></p> |
| AT+NUESTATS=THP | <p>NUESTATS:THP,<throughput_type>,<throughput> [...NUESTATS:THP,<throughput_type>,<throughput>]</p> <p>OK</p> <p>If there is any error, response: +CME ERROR:<err></p> |
| AT+NUESTATS=APPSMEM | <p>APPSMEM:Current Allocated,<allocated> APPSMEM:Total Free,<free> APPSMEM:Max Free,<max free> APPSMEM:Num Allocs,<num allocs> APPSMEM:Num Frees,<num frees></p> |
| AT+NUESTATS=<type> | <p>NUESTATS:<type>,<name/value>,<value>[,<value>[,<value>[...]]] [...NUESTATS:<type>,<name/value>,<value>[,<value>[,<value>[...]]]]</p> <p>OK</p> <p>If there is any error, response: +CME ERROR:<err></p> |
| Test Command AT+NUESTATS=? | <p>Response NUESTATS:[<type>,...]</p> <p>OK</p> |

Parameter

| | |
|---------------------|---|
| <type> | Type of data to be displayed as an unquoted string. Supported values of <type> are: |
| RADIO | Radio specific information |
| CELL | Per-cell information for the top 8 cells |
| BLER | Block error rate information |
| THP | Throughput |
| APPSMEM | Dynamic memory usage |
| ALL | All information. The value of <type> output is the correct one for each data type. |

If <type>=RADIO, return the default set of values:

| | |
|---|--|
| <signal power in centibels> | Signal power in centibels |
| <total power in centibels> | Total power in centibels |
| <current TX power level in centibels> | Current Tx power level in centibels |
| <total TX time since last reboot in millisecond> | Total Tx time since last reboot in millisecond |
| <total RX time since last reboot in millisecond> | Total Rx time since last reboot in millisecond |
| <last SIB1 cell ID> | Last SIB1 cell ID |
| <last ECL value> | Last ECL value |
| <last snr value> | Last SNR value |
| <last earfcn value> | Last EARFCN value |
| <last pci value> | Last PCI value |
| <rsrq in centibels> | Reference signal received quality in centibels |

If <type>=CELL, per-cell information for the top 5 cells. Returned entries are of the form:

| | |
|---------------------------------|---|
| <earfcn> | Absolute radio-frequency channel number |
| <physical cell id> | Physical id of the cell |
| <primary cell> | 1 indicates the current serving cell |
| <rsrp> | Reference signal received power |
| <rsrq> | Reference signal received quality |
| <rssi> | Received signal strength indicator |
| <snr> | Signal to noise ratio |

If <type>=BLER, returned entries are:

| | |
|----------------------------|---|
| <rlc_ul_bler> | RLC layer block error rate (uplink). Integer % |
| <rlc_dl_bler> | RLC layer block error rate (downlink). Integer % |
| <mac_ul_bler> | Physical layer block error rate (uplink). Integer % |
| <mac_dl_bler> | Physical layer block error rate (downlink). Integer % |

| | |
|---|----------------------------------|
| <total bytes transmitted> | Total bytes transmitted |
| <total bytes received> | Total bytes received |
| <transport blocks sent> | Transport blocks sent |
| <transport blocks received> | Transport blocks received |
| <transport blocks retransmitted> | Transport blocks retransmitted |
| <total ack/nack messages received> | Total ACK/NACK messages received |

If <type>=THP, returned entries are:

| | |
|--|---|
| <rlc_ul> | RLC layer throughput (uplink). Integer bps |
| <rlc_dl> | RLC layer throughput (downlink). Integer bps |
| <mac_ul> | Physical layer throughput (uplink). Integer bps |
| <mac_dl> | Physical layer throughput (downlink). Integer bps |
| If <type>=APPSMEM, dynamic memory usage, returned entries are: | |
| <allocated> | Current allocated size |
| <free> | Total free size |
| <max free> | Max free size |
| <num allocs> | Number of times to allocate memory |
| <num frees> | Number of times to free memory |

Example

AT+NUESTATS

Signal power:-663

Total power:-632

TX power:-35

TX time:1572

RX time:17847

Cell ID:27447553

ECL:0

SNR:290

EARFCN:3701

PCI:37

RSRQ:-108

OK

AT+NUESTATS=CELL

NUESTATS:CELL,3569,69,1,23,-1073,-1145,286

OK

AT+NUESTATS=THP

NUESTATS:THP,RLC UL,100

NUESTATS:THP,RLC DL,98

NUESTATS:THP,MAC UL,103

NUESTATS:THP,MAC DL,100

OK

AT+NUESTATS=BLER

NUESTATS:BLER,RLC UL BLER,10

NUESTATS:BLER,RLC DL BLER,5

NUESTATS:BLER,MAC UL BLER,8

NUESTATS:BLER,MAC DL BLER,3

NUESTATS:BLER,Total TX bytes,1080


```
NUESTATS:BLER,Total RX bytes,900
NUESTATS:BLER,Total TX blocks,80
NUESTATS:BLER,Total RX blocks,80
NUESTATS:BLER,Total RTX blocks,100
NUESTATS:BLER,Total ACK/NACK RX,100
```

OK

BC95 Implementation

- The variant of NUESTATS without an argument prints out the RADIO arguments without the command and variant prefixes. This will be deprecated in a future release.

5.11. AT+NEARFCN Specify Search Frequencies

The set command provides a mechanism to lock to a specific E-UTRA Absolute Radio Frequency Channel Number (EARFCN) and, if desired, Physical Cell ID. All actions will be locked to this carrier until either the lock is removed or the UE is rebooted. It is not persistent over reboots. If the specified EARFCN is not present, the UE will enter out of service mode. If the specified PCI is not present, the UE will enter out of service mode. Please refer to **Chapter 7** for possible <err> values.

AT+NEARFCN Specify Search Frequencies

| | |
|--|--|
| Set Command AT+NEARFCN=<search_mode>,<earfcn>[,<ci>] | Response OK +CME ERROR:<err> |
| Execution Command AT+NEARFCN=? | Response OK |

Parameter

| | |
|----------------------------|--|
| <search_mode> | Specifies the type of search and defines the supplied parameters 0 Lock to a specific EARFCN |
| <earfcn> | A number in the range 1-65535 representing the EARFCN to search. An <earfcn> value of 0 will remove the EARFCN restriction and any associated Physical Cell ID lock. |
| <ci> | String type; four-byte E-UTRAN cell ID in hexadecimal format. |

Example

```
AT+NEARFCN=0,10,AB
OK
```

5.12. AT+NSOCR Create a Socket

The command creates a socket on the UE and associates with specified protocol. If the port is set, receiving is enabled and "+NSONMI" unsolicited messages will appear for any message that is received on that port. Please refer to **Chapter 7** for possible <err> values.

If a socket has already been created for a protocol or port combination, then AT+NSOCR will fail if requested a second time.

AT+NSOCR Create a Socket

Set Command

```
AT+NSOCR=<type>,<protocol>,<listen port>[,<receive control>]
```

Response

```
<socket>
```

```
OK
```

If there is any error, response:

```
+CME ERROR:<err>
```

Parameter

| | |
|-------------------|---|
| <type> | Socket type. Supported value is DGRAM |
| <protocol> | Standard internet protocol definition. For example, UDP is 17 |
| <listen port> | A number in the range 0-65535. This is the local port that will be included in sent messages and on which messages will be received. |
| <socket> | This is a reference to the created socket. It is an integer greater than or equal to 0. |
| <receive control> | Set to 1 if incoming messages should be received, 0 if incoming messages should be ignored. Default is 1 (messages will be received). |

Example

```
AT+NSOCR=DGRAM,17,4587,1
0

OK
AT+NSOCR=DGRAM,17,1234,0
1
```

OK

BC95 Implementation

- A maximum of 7 sockets are supported, but other services may reduce this number.
- Only UDP protocol 17, is supported.
- <type>=RAW and <protocol>=6 will be accepted, but are not supported and should not be used.
- <listen port> cannot be set as 5683 for B656SP2 version or later.

5.13. AT+NSOST SendTo Command (UDP Only)

Send a UDP datagram containing length bytes of data to remote_port on remote_addr.

The command sends a UDP datagram containing length bytes of data to the specified host:port. It will return with the socket that it was sent on, and the number of bytes of data sent. If the amount of data is larger than the largest datagram that can be sent, return value of AT+NSOST will indicate how much of the data was successfully sent. Please refer to **Chapter 7** for possible <err> values.

AT+NSOST SendTo Command (UDP Only)

Set Command

AT+NSOST=<socket>,<remote_addr>
,<remote_port>,<length>,<data>

Response

<socket>,<length>

OK

If there is any error, response:

+CME ERROR:<err>

Parameter

| | |
|---------------|---|
| <socket> | Socket number returned by AT+NSOCR |
| <remote_addr> | IPv4 A dot notation IP address |
| <remote_port> | A number in the range 0-65535. This is the remote port on which messages will be received |
| <length> | Decimal length of data to be sent |
| <data> | Data received in hex string format, or quoted string format |

Example

AT+NSOST=0,192.158.5.1,1024,2,AB30
0,2

OK

BC95 Implementation

- Maximum length of received data is 512 bytes.
- Only IPv4 is supported.
- <data>: only hex string format is supported.
- IP addresses can be specified in decimal, octal or hexadecimal notation.

5.14. AT+NSOSTF SendTo Command with Flags (UDP Only)

Send a UDP datagram containing length bytes of data to remote_port on remote_addr and allows meta-data flags to be set.

The command sends a UDP datagram to the specified host:port. It will return with the socket that it was sent on, and the number of bytes of data sent. If the amount of data is larger than the largest datagram that can be sent, the AT+NSOSTF return value will indicate how much of the data was successfully sent. Please refer to **Chapter 7** for possible <err> values.

AT+NSOSTF SendTo Command with Flags (UDP Only)

Set Command

AT+NSOSTF=<socket>,<remote_addr>,<remote_port>,<flag>,<length>,<data>

Response

<socket>,<length>

OK

If there is any error, response:

+CME ERROR:<err>

Parameter

| | |
|---------------|---|
| <socket> | Socket number returned by AT+NSOCR |
| <remote_addr> | IPv4 A dot notation IP address |
| <remote_port> | A number in the range 0-65535. This is the remote port on which messages will be received |
| <flag> | Specifies the type of message transmission. Values of this argument are in hex format and are formed by logically OR'ing zero or more of the following flags: <ul style="list-style-type: none"> 0x100 Exception Message: Send message with high priority 0x200 Release Indicator: indicate release after next message 0x400 Release Indicator: indicate release after next message has been replied to If no flags are set, a value of 0 should be provided |

| | |
|----------|---|
| <length> | Decimal length of data to be sent |
| <data> | Data received in hex string format, or quoted string format |

Example

```
AT+NSOTF=1,192.158.5.1,1024,0x100,2,AB30
1,2
OK
```

BC95 Implementation

- Maximum length of received data is 512 bytes.
- Only IPv4 is supported.
- <data>: only hex string format is supported.
- IP addresses can be specified in decimal, octal or hexadecimal notation.

5.15. AT+NSORF Receive Command (UDP Only)

The command can read up to <req_length> characters of data from <socket>, and returned length is the actual number of characters returned.

The command is use to receive data on a socket. When data arrives, a "+NSONMI" response will be generated to indicate the socket the message was received on and also the amount of data. The AT+NSORF command takes a length, which is the maximum amount of data that will be returned.

If the requested length is larger than the actual size of the returned data, only the length of returned data is provided, and the remaining length is returned as 0. If the requested length is less than the amount of data returned, only the requested amount of data will be returned, plus an indication of the number of bytes remaining. Once a message has been fully read, a new "+NSONMI" notification will be sent if there is another message to process. Please refer to **Chapter 7** for possible <err> values.

If messages arrive faster than they are read, and the internal message buffer is full, the most recent message will be discarded.

AT+NSORF Receive Command (UDP Only)

| | |
|--------------------------------|--|
| Set Command | Response |
| AT+NSORF=<socket>,<req_length> | <socket>,<ip_addr>,<port>,<length>,<data>,<remaining_length> |
| | OK |

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

Parameter

| | |
|---------------------------------|--|
| <socket> | Socket number returned by AT+NSOCR |
| <req_length> | Maximum amount of data to be returned as a decimal byte length |
| <ip_addr> | Address of system sending the message IPv4 A dot notation IP address |
| <port> | A number in the range 0-65535. This is the remote port that messages was sent from |
| <length> | Amount of data returned as a decimal byte length |
| <remaining_length> | Amount of data left to read for this message as a decimal byte length |
| <data> | Data received in hex string format |

Example

```
AT+NSORF=0,10
0,192.168.5.1,1024,2,ABAB,0
OK
```

BC95 Implementation

- Maximum length of received data is 512 bytes.
- Only IPv4 is supported.
- Remaining length is always 0. The remaining data is readable.

5.16. AT+NSOCL Close a Socket

The command is used to close the specified socket. If there are pending messages to be read, they will be dropped. No further unsolicited "+NSONMI" notifications will be generated. If the socket has already been closed, or was never created, an error will be returned.

AT+NSOCL Close a Socket

Set Command
AT+NSOCL=<socket>

Response
OK

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

Parameter

<socket> Socket number returned by AT+NSOCR

Example

```
AT+NSOCL=0
OK
```

5.17. +NSONMI Socket Message Arrived Indicator (Response Only)

This is an unsolicited message to notify that data has been received on a socket and is ready to be read. It returns socket number and number of bytes of data available to read for the first message that is queued. If another message is received on the same socket, it will only be notified when the preceding message has been completely read. Please refer to **Chapter 7** for possible <err> values.

+NSONMI Socket Message Arrived Indicator (Response Only)

| Command | Response |
|----------|-------------------|
| +NSONMI: | <socket>,<length> |

Parameter

<socket> Socket on which data is received. Decimal number returned by AT+NSOCR
<length> Number of bytes of data in the first message

BC95 Implementation

- Maximum length of received data is 512 bytes.
- This message can occur at any point if it is indicating a new message with no messages buffered. If there are buffered messages it will occur in the AT+NSORF command before the data is returned.

5.18. AT+NPING Test IP Network Connectivity to a Remote Host

The command sends an ICMP packet to the specified host address. Please refer to **Chapter 7** for possible <err> values.

AT+NPING initiates the sending of a PING packet to the specified address. This will either cause a packet to be returned if the remote system is connected and responding to PING packets or no response will be

received. A maximum of 1 ping attempts will be tried. If none of the packets receive a response within the timeout period, an error will be raised.

If a response is received, the unsolicited “+NPING” message will be returned. If no response is received the “+NPINGERR” unsolicited response will be returned with an error value.

AT+NPING Test IP Network Connectivity to a Remote Host

| | |
|--|---|
| Set Command AT+NPING=<remote_address>[,<p_size>[,<timeout>]] | Response OK +NPING:<remote_address>,<ttl>,<rtt> If there is any error, response: +NPINGERR:<err> |
|--|---|

Parameter

| | |
|-------------------------------|--|
| <remote_address> | Address of system sending the message IPv4 A dot notation IP address |
| <p_size> | Size in bytes of echo packet payload. Range is 8-1460, and default value is 8 |
| <timeout> | Maximum time in ms to wait for an echo reply response. Range is 10-60000, and default value is 10000 |
| <ttl> | TTL received in the response packet |
| <rtt> | Elapsed time in msec from packet sent to response received |
| <err> | An integer value to provide some information on why the ping request failed 1 No response from remote host within timeout period 2 Failed to send ping request |

BC95 Implementation

- IP addresses can be specified in decimal, octal or hexadecimal notation.

5.19. AT+NBAND Set Supported Bands

The command sets the bands to be used. Please refer to **Chapter 7** for possible <err> values.

AT+NBAND Set Supported Bands

| | |
|---|---|
| Set Command AT+NBAND=n[,n[,n[...]]] | Response OK If there is any error, response: |
|---|---|

| | |
|--|---|
| | +CME ERROR:<err> |
| Read Command AT+NBAND? | Response +NBAND:n[,n[,n[...]]] OK |
| Execution Command AT+NBAND=? | Response +NBAND:(n[,n[,n[...]]]) OK |

Parameter

| | |
|------------------|--------------------------|
| <n> | Band in a decimal number |
|------------------|--------------------------|

BC95 Implementation

- Only band 5, 8, 20 and 28 are supported currently.
- AT+NBAND=? returns the list of bands supported by the hardware.
- Band value should not be set after B657SP1 version or later.

5.20. AT+NLOGLEVEL Set Debug Logging Level

The command sets the logging level. It can take one of the following values.

AT+NLOGLEVEL Set Debug Logging Level

| | |
|---|---|
| Set Command AT+NLOGLEVEL=<core>,<level> | Response OK If there is any error, response: +CME ERROR:<err> |
| Read Command AT+NLOGLEVEL? | Response +NLOGLEVEL:<core>,<level> OK |
| Execution Command AT+NLOGLEVEL=? | Response +NLOGLEVEL:(<core>, ...),(<level>,<level>, ...) OK |

Parameter

| | |
|----------------------|---|
| <core> | PROTOCOL APPLICATION SECURITY |
| <level> | Logging level required VERBOSE NORMAL WARNING ERROR NONE |

BC95 Implementation

- Logging level is not persistent.
- Default logging level is NORMAL.

5.21. AT+NCONFIG Configure UE Behaviour

The command allows configuring certain aspects of UE behavior. It takes a function and a value that controls operation of that function.

| AT+NCONFIG Configure UE Behaviour | |
|---|---|
| Set Command AT+NCONFIG=<function>,<value> | Response OK If there is any error, response: +CME ERROR:<err> |
| Read Command AT+NCONFIG? | Response +NCONFIG:<function>,<value> [+NCONFIG:<function>,<value> [...]] OK |
| Test Command AT+NCONFIG=? | Response +NCONFIG:(<function>,<value1>,<value2>[,<value3>[,...]])) [+NCONFIG:(<function>,<value1>,<value2>[,<value3>[,...]])) [,...]] |

OK

Parameter

<function> UE function to configure

AUTOCONNECT: Control whether the platform will automatically attempt to connect to the network after power-on or reboot. When enabled, it will set AT+CFUN=1 and read the PLMN from the USIM. And it will use the APN provided by the network.

COMBINE_ATTACH: Enable/disable combine attach.

CELL_RESELECTION: Enable support for RRC cell reselection

ENABLE_BIP: Enable/disable BIP

Example

AT+NCONFIG?

```
+NCONFIG:AUTOCONNECT,TRUE
+NCONFIG:CR_0354_0338_SCRAMBLING,TRUE
+NCONFIG:CR_0859_SI_AVOID,TRUE
+NCONFIG:COMBINE_ATTACH,FALSE
+NCONFIG:CELL_RESELECTION,FALSE
+NCONFIG:ENABLE_BIP,FALSE
```

OK

AT+NCONFIG=?

```
+NCONFIG:(AUTOCONNECT,(FALSE,TRUE))
+NCONFIG:(CR_0354_0338_SCRAMBLING,(FALSE,TRUE))
+NCONFIG:(CR_0859_SI_AVOID,(FALSE,TRUE))
+NCONFIG:(COMBINE_ATTACH,(FALSE,TRUE))
+NCONFIG:(CELL_RESELECTION,(FALSE,TRUE))
+NCONFIG:(ENABLE_BIP,(FALSE,TRUE))
```

OK

BC95 Implementation

- CR_ function is temporary and will be retired when no longer required.

5.22. AT+NATSPEED Configure UART Port Baud Rate

The command is used to configure UART port baud rate. Please refer to **Chapter 7** for possible <err> values.

AT+NATSPEED Configure UART Port Baud Rate

| | |
|---|--|
| Set Command AT+NATSPEED=<baud_rate>[,<timeout>[,<store>[,<sync_mode>]]] | Response OK If there is any error, response: +CME ERROR:<err> |
| Read Command AT+NATSPEED? | Response +NATSPEED:<baud_rate>,<sync_mode> OK |
| Test Command AT+NATSPEED=? | Response +NATSPEED:(list of supported <baud rate>s) OK |

Parameter

| | |
|--------------------------|--|
| <baud_rate> | Integer type indicating the baud rate of UART port that has been requested |
| <timeout> | Integer type indicating the time to wait for communication before switching back to the original speed, unit is second. Default value is 3 second. Maximum value is 30s. 0 means using default value. |
| <store> | Integer type indicating whether to store <baud_rate> and <sync_mode> to NV or not. Default value is 0. 0 Do not store to NV, need to configure again after reboot 1 Store to NV, while there is interaction before timeout |
| <sync_mode> | The LP UART synchronizes to each start bit that it detects and uses this to configure its optimum sampling point for each subsequent bit in a data word. The Sync Mode field allows this sampling point to be modified if required 0 Default value for most operations 1 Sample later 2 Sample earlier 3 Sample even earlier |

Example

```
AT+NATSPEED=9600,3,1,2
OK
```

AT+NATSPEED?

+NATSPEED:9600,2

OK

AT+NATSPEED=?

+NATSPEED:(4800,9600,57600,115200),(0-30),(0,1),(0-3)

OK

BC95 Implementation

- **<baud_rate>** value higher than the fastest speed supported by the low power UART will disable deep sleep low power operation.
- **<sync_mode>** parameter may be removed in a future release.
- **<sync_mode>** defaults to 2 for B657SP1 version.

5.23. AT+NCCID Card Identification

Both the execution and read commands read the ICCID off the SIM card. If no SIM card is present, or the SIM card is unreadable, no data is returned. Please refer to **Chapter 7** for possible <err> values.

AT+NCCID Card Identification

Set Command

AT+NCCID

Response

+NCCID:<ICCID>

OK

If there is any error, response:

+CME ERROR:<err>

Read Command

AT+NCCID?

Response

+NCCID:<ICCID>

OK

If there is any error, response:

+CME ERROR:<err>

Test Command

AT+NCCID=?

Response

OK

Parameter

<ICCID> SIM Card Identification Number

Example

```
AT+NCCID
+NCCID:44123456789012345678

OK
AT+NCCID?
+NCCID:44123456789012345678

OK
```

5.24. AT+NFWUPD Firmware Update via UART

This command enables firmware updating. It allows package download, package validation, package name and version querying and firmware upgrading. Before upgrading firmware, it need package download first. After downloading is finished, it sends package validity command. If package is legal return OK, otherwise return error and print reason. When validity is running, it refuses to execute other commands with error return. After validation is finished, it sends firmware upgrade command. It refuses to execute firmware upgrade command without package validity.

Please refer to **Chapter 7** for possible <err> values.

AT+NFWUPD Firmware Update via UART

| | |
|--|--|
| Set Command AT+NFWUPD=<cmd>[,<sn>,<len>,<d ata>,<crc>] | Response OK If there is any error, response: +CME ERROR:<err> |
| Test Command AT+NFWUPD=? | Response +NFWUPD:(list of supported <cmd>s) OK |

Parameter

<cmd> Package process command

- 1 <sn>,<len>,<data>,<crc>. Download a package segment. Download a FOTA package. Package segments are continuous segments of the FOTA package. Segments can be of any length, but must be provided in order.
- 2 Validate package
- 3 Get package name
- 4 Get package version
- 5 Upgrade firmware

<sn> Sequence number. It starts with 0, and increments by one for each package segment

<len> Data length in bytes of data. <data>: Hex string format

<CRC> CRC of the package segment binary data. CRC is sent as a hex string. The <CRC> is an XOR8 of each byte in the package segment

BC95 Implementation

- <cmd>=2 and <cmd>=3 are not supported now.
- AT+NFWUPD=? returns the string type interpretation for <cmd> now, will be modified in next version.
- AT+NFWUPD is just for test purpose.

5.25. AT+NRDCTRL Control Radio Configurations

This command is used to control radio configurations. Please refer to **Chapter 7** for possible <err> values.

AT+NRDCTRL Control Radio Configurations

Set Command
AT+NRDCTRL=<cmd>

Response
OK

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

Test Command
AT+NRDCTRL=?

Response
+NRDCTRL:(list of supported commands)

OK

Parameter

| | | |
|--------------------|-------------------------------|-----------------------------------|
| <cmd> | Command, radio configurations | |
| | ACTIVATE | LL1 activate |
| | DEACTIVATE | LL1 deactivate |
| | RESET | Reset radio configuration to idle |

Example

```
AT+NRDCTRL=RESET
```

```
OK
```

```
AT+NRDCTRL=?
```

```
+NRDCTRL:(ACTIVATE,DEACTIVATE,RESET)
```

```
OK
```

5.26. AT+NCHIPINFO Read System Information

This command is used to read system information, including temperature and battery voltage.

Please refer to **Chapter 7** for possible <err> values.

AT+NCHIPINFO Read System Information

Set Command
AT+NCHIPINFO=<cmd>

Response
+CME ERROR:<err>

OK

Test Command
AT+NCHIPINFO=?

Response
+NCHIPINFO:(list of supported commands)

OK

Parameter

| | | |
|-------|--------------------|---|
| <cmd> | Command to execute | |
| | ALL | Return all data |
| | TEMP | Current temperature in degrees °C. If the temperature sensor has not been calibrated, it will return an error |
| | VBAT | Battery voltage in mV |

Example

```
AT+NCHIPINFO=ALL
```

```
+NCHIPINFO:TEMP,25
```

```
+NCHIPINFO:VBAT,1800
```

```
OK
```

```
AT+NCHIPINFO=?
```



```
+NTCHIPINFO:(ALL,TEMP,VBAT)
```

```
OK
```

BC95 Implementation

- AT+NRDCTRL=ACTIVATE should be sent first to activate LL1. If the LL1 is not activated, module may reboot.

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6 Temporary Commands

As part of development, some commands are temporarily added. They are unsupported and may disappear or change behaviour, without warning. And they are listed here for completeness.

6.1. AT+NTSETID Set ID

Set system identities such as UUID or IMEI value. This is a temporary command that will be replaced with a production tool.

AT+NTSETID Set ID

Set Command

AT+NTSETID=<snt>,<data>

Response

OK

If there is any error, response:

+CME ERROR:<err>

Parameter

| | | | |
|--------|--|---------------------|--|
| <snt> | Integer type indicating the serial number type that has been requested | | |
| | 1 | Set the IMEI number | |
| | 2 | SVN | |
| <data> | If <snt>=1 | IMEI | 15-character string type in decimal format |
| | If <snt>=2 | SVN | 2 digit SVN |

Example

AT+NTSETID=1,123456789012345

OK

BC95 Implementation

- IMEI number is persistent.
- SVN is not persistent and will default to 0x00.
- For versions earlier than B657SP1, IMEI number can only be set when the radio is inactive (AT+CFUN=0 will force the module to enter into this state).

7 Error Values

The <err> error codes listed below are not implemented, and only a subset will be implemented.

In B600 version and later, AT+CMEE command is implemented and it supports modes 0 & 1. In mode 1, a limited set of error codes are returned.

Error codes are compliant with the 3GPP specifications. Please refer to *3GPP TS 27.007 V13.5.0, sub-clause 9.2* for all possible <err> values. The error codes listed are those returned for the BC95 implementation.

Error codes 0-255 are reserved and defined in *3GPP TS 27.007* and may be used in future releases.

Table 4: General Errors (27.007)

| Code of <err> | Description |
|---------------|--|
| 3 | Operation not allowed |
| 4 | Operation not supported |
| 23 | Memory failure |
| 30 | No network service |
| 50 | Incorrect parameters |
| 51 | Command implemented but currently disabled |
| 52 | Command aborted by user |
| 159 | Uplink busy/flow control |

Table 5: General Errors (127.005)

| Code of <err> | Description |
|---------------|-----------------------------------|
| 300 | ME failure |
| 301 | SMS service of ME reserved |
| 302 | Operation not allowed |
| 303 | Operation not supported |
| 304 | Invalid PDU mode parameter |
| 305 | Invalid text mode parameter |
| 310 | USIM not inserted |
| 311 | USIM PIN required |
| 312 | PH-USIM PIN required |
| 313 | USIM failure |
| 314 | USIM busy |
| 315 | USIM wrong |
| 316 | USIM PUK required |
| 317 | USIM PIN2 required |
| 318 | USIM PUK2 required |
| 320 | Memory failure |
| 321 | Invalid memory index |
| 322 | Memory full |
| 330 | SMSC address unknown |
| 331 | No network service |
| 332 | Network timeout |
| 340 | No +CNMA acknowledgement expected |
| 500 | Unknown error |

Specific error codes are in the range 512 onwards. Error codes 256 & 257 are listed in the following table for compatibility reasons.

Table 6: Specific Error Codes

| Code of <err> | Description |
|---------------|-----------------------------------|
| 256 | Required parameter not configured |
| 257 | TUP not registered |
| 512 | Required parameter not configured |
| 513 | TUP not registered |
| 514 | AT internal error |
| 515 | CID is active |

8 Reset Reasons

If the module is rebooted for any reason apart from either being power cycled or being externally reset, it will return a message before the <CR><LF>Neul<CR><LF>OK<CR><LF> message that indicates the reason for the reboot.

Table 7: Reboot Messages Displayed

| No. | Reboot Message Displayed |
|-----|--|
| 1 | REBOOT_CAUSE_SECURITY_RESET_UNKNOWN |
| 2 | REBOOT_CAUSE_SECURITY_SYSRESETREQ |
| 3 | REBOOT_CAUSE_SECURITY_WATCHDOG |
| 4 | REBOOT_CAUSE_SECURITY_SELF |
| 5 | REBOOT_CAUSE_SECURITY_ALTBOOT |
| 6 | REBOOT_CAUSE_SECURITY_REGIONS_UPDATED |
| 7 | REBOOT_CAUSE_PROTOCOL_UNKNOWN |
| 8 | REBOOT_CAUSE_PROTOCOL_SYSRESETREQ |
| 9 | REBOOT_CAUSE_PROTOCOL_WATCHDOG |
| 10 | REBOOT_CAUSE_PROTOCOL_MONITOR_REBOOT_REQ |
| 11 | REBOOT_CAUSE_APPLICATION_UNKNOWN |
| 12 | REBOOT_CAUSE_APPLICATION_SYSRESETREQ |
| 13 | REBOOT_CAUSE_APPLICATION_WATCHDOG |
| 14 | REBOOT_CAUSE_APPLICATION_AT |
| 15 | REBOOT_CAUSE_UNKNOWN |

9 Examples

9.1. Attach Network

The module can automatically attach network by default on B650 version or later, which is controlled by AT+NCONFIG=AUTOCONNECT,TRUE command. If customers want to manually attach the network, please execute AT+NCONFIG=AUTOCONNECT,FALSE to disable automatic attachment. This value will be saved to NV and take effect after restarting the module by using AT+NRB.

Customers need to make sure the module type corresponds to the frequency band (AT+NBAND? command can be used to query the band) before attaching network.

The module's band is defaulted as 900MHz (factory setting), customers can configure the band by AT+NBAND=n command and the configuration will take effect after restarting the module by using AT+NRB.

The module types and corresponding frequency bands are shown as follows:

| Module Type | BC95-B8 | BC95-B5 | BC95-B20 | BC95-B28 |
|----------------|---------|---------|----------|----------|
| Frequency band | 900MHz | 850MHz | 800MHz | 700MHz |

The following shows a simple example to automatically attach the network. Customers only need to query whether the module has attached network by the following commands:

```

AT+NBAND?           //Query the band
+NBAND:8

OK
AT+CFUN?           //Value is 1.
+CFUN:1

OK
AT+CIMI           //Query the IMSI number.
460012345678969

OK

```

```
AT+CSQ //Query the signal strength.
+CSQ:21,99

OK
AT+NUESTATS //Query the module status.
Signal power:-663
Total power:-632
TX power:-35
TX time:1572
RX time:17847
Cell ID:27447553
DL MCS:0
UL MCS:0
DCI MCS:2
ECL:0
SNR:290
EARFCN:3701
PCI:37
RSRQ:-108

OK
AT+CGATT? //Query whether network is activated, +CGATT:1 means activated successfully,
              sometimes customers need to wait for 30s.
+CGATT:1

OK
AT+CEREG? //Query the network registration status, 1 means registered on network, 2 means
              searching the network.
+CEREG:0,1

OK
AT+CSCON? //Query the signal connection status, 1 means "Connected", 0 means "Idle".
+CSCON:0,1

OK
```

The following shows two ways of manual network attachment process.

1. Do not specify PLMN.

```
AT+CFUN=1 //Configure the level of functionality in the MT.
OK
AT+CIMI //Query the IMSI number and wait for 4 seconds after executing AT+CFUN=1. If
           IMSI number is returned, it means the card has been identified; if not returned,
```


please check whether it is a USIM card and whether the card is properly inserted.

460012345678966

OK

AT+NBAND? //Query the band information. Set BC95-B8 to band 8, BC95-B5 to band 5, BC95-B20 to band 20 and BC95-B28 to band 28 by AT+NBAND=n. It will take effect after restart.

+NBAND:8

OK

AT+CGDCONT=1,"IP","APN" //APN is a local access point. This step is optional. If needed, please configure it accordingly.

OK

AT+CEREG=1 //Set to automatically report network registration status, when the module is registered on the network, a URC will be reported.

OK

AT+CSCON=1 //Set to automatically report network registration status, when the module is registered on the network, a URC will be reported.

OK

AT+CGATT=1 //Activate the network.

OK

+CEREG:2 //Report the URC, the MT is currently trying to attach or searching an operator to register to.

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

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

AT+CSQ //Query current signal quality.

+CSQ:31,99

OK

AT+NUESTATS //Query the module status.

Signal power:-663

Total power:-632

TX power:-35

TX time:1572

RX time:17847

Cell ID:27447553

DL MCS:0

UL MCS:0

DCI MCS:2

ECL:0
SNR:290
EARFCN:3701
PCI:37
RSRQ:-108

OK

AT+CGATT? //Query whether network is activated, +CGATT:1 means activated successfully
sometimes customers need to wait for 30s

+CGATT:1

OK

AT+CEREG? //Query current EPS network registration status: Registered.

+CEREG:1,1

OK

AT+CSCON? //Query the signaling connection status, 1 means "Connected", 0 means "Idle".

+CSCON:1,1

OK

2. Specify PLMN.

AT+CFUN=1 //Configure the level of functionality in the MT.

OK

AT+CIMI //Query the IMSI number and wait for 4 seconds after executing AT+CFUN=1. If
IMSI number is returned, it means the card has been identified; if not returned,
please check whether it is a USIM card and whether the card is properly inserted.

460012345678966

OK

AT+NBAND? //Query the band information. Set BC95-B8 to band 8, BC95-B5 to band 5,
BC95-B20 to band 20 and BC95-B28 to band 28 by AT+NBAND=n. It will take
effect after restart.

+NBAND:8

OK

AT+CGDCONT=1,"IP","APN" //APN is a local access point. This step is optional. If needed, please
configure it accordingly.

OK

AT+CEREG=1 //Set to automatically report network registration status, when the
module is registered on the network, a URC will be reported.

OK

AT+CSCON=1 //Set to automatically report network registration status, when the

module is registered on the network, a URC will be reported.

OK
AT+COPS=1,2,"46000" //Specify the PLMN searching or automatic searching, PLMN needs to be configured by customers.

OK
AT+CSQ //Query current signal quality.
+CSQ:31,99

OK
AT+NUESTATS //Query the module status.
Signal power:-663
Total power:-632
TX power:-35
TX time:1572
RX time:17847
Cell ID:27447553
DL MCS:0
UL MCS:0
DCI MCS:2
ECL:0
SNR:290
EARFCN:3701
PCI:37
RSRQ:-108

OK
AT+CGATT? //Query whether network is activated, +CGATT:1 means activated successfully, sometimes customers need to wait for 30s
+CGATT:1

OK
AT+CEREG? //Query current EPS network registration status: registered.
+CEREG:1,1

OK
AT+CSCON? //Query the signaling connection status, 1 means "Connected", 0 means "Idle".
+CSCON:1,1

OK

9.2. Send/Receive/Read CoAP Messages

The following is a simple example of sending, receiving and reading a CoAP message.

```
AT+CGSN=1 //Query the IMEI number. If only "ERROR" is
            returned, customers need to write the IMEI number.

+CGSN:863703030104298

OK
AT+NCDP=192.53.100.53 //Configuration CDP server, the value will be saved and
                       configure it only once. For versions earlier than
                       B657SP1, this command must be executed after
                       executing AT+CFUN=0. (The server can be configured
                       before attaching the network)

OK
AT+NCDP? //Query CDP server

+NCDP:192.53.100.53,5683

OK
AT+NSMI=1 //Sent message indications is enabled.

OK
AT+NNMI=2 //Enable new message indications when a downstream
           message is received by the terminal from the CDP
           server.

OK
AT+NMGS=10, AA7232088D0320623399 //Send a message.

OK

+NSMI:SENT //Message is sent.
AT+NQMGS //Query whether the messages is sent successfully.
PENDING=0,SENT=1,ERROR=0

OK

+NNMI //Receive a downstream message.
AT+NQMGR //Query whether the messages is received.
BUFFERED=1,RECEIVED=1,DROPPED=0

OK
AT+NMGR //Get the message.
2,AABB
```

```
OK
AT+NQMGR                                     //Query whether the messages is received.
BUFFERED=0,RECEIVED=1,DROPPED=0

OK
```

9.3. Send/Receive/Read UDP Messages

The following shows a simple example of sending, receiving and reading a UDP message. Once the socket is closed, no replies will be received.

```
AT+NSOCR=DGRAM,17,4587,1                     //Create a socket
0

OK
AT+NSOST=0,192.53.100.53,5683,25,400241C7B17401724D0265703D323031363038323331363438
                                             //Send a message
0,25

OK
+NSONMI:0,4                                  //Receive the message

AT+NSORF=0,4                                  //Read the messages
0,192.53.100.53,5683,4,60A041C7,0

OK
AT+NSOCL=0                                    //Close the socket

OK
```

10 Appendix A Reference

Table 8: Terms and Abbreviations

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

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