EG512R&EM1x0R Series
AT Commands Manual

LTE-A Module Series

Version: 1.0

Date: 2020-09-12

Status: Released

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About the Document

Revision History

Version	Date	Author	Description
1.0	2020-09-12	Amos ZHANG/ Amelia LI	Initial

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1 Introduction

1.1. Scope of the Document

This document presents the AT command set supported by Quectel LTE-A modules EM160R-GL, EM120R-GL, and EG512R-EA.

Table 1: Applicable Modules

Module Series	Model
EG512R-EA	EG512R-EA
EM160R-GL	EM160R-GL
EM120R-GL	EM120R-GL

1.2. AT Command Syntax

1.2.1. Definitions

- **<CR>** Carriage return character.
- **<LF>** Line feed character.
- **<...>** Parameter name. Angle brackets do not appear on command line.
- **[...]** Optional parameter of a command or an optional part of TA information response. Square brackets do not appear on command line. When an optional parameter is omitted, the new value equals its previous value or its default setting, unless otherwise specified.
- Underline Default setting of a parameter.

1.2.2. AT Command Syntax

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

The AT command set supported by EM160R-GL, EM120R-GL and EG512R-EA is a combination of international standards, such as *3GPP TS 27.007*, *3GPP TS 27.005* and *ITU-T recommendation V.25ter* as well as the AT commands developed by Quectel.

AT commands implemented by the modules can be split into three categories syntactically: “Basic”, “S Parameter” and “Extended”, as listed below:

- **Basic Syntax**

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

- **S Parameter Syntax**

  These AT commands are in the format of **ATS<n>=<m>**, in which **<n>** is the index of the **S** register to set, and **<m>** is the value to assign to it.

- **Extended Syntax**

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

Table 2: Types of AT Commands and Responses

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

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 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 **=?**.

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

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

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

1.3. Supported Character Sets

The AT command interface of EM160R-GL, EM120R-GL and EG512R-EA uses the GSM character set by default and supports the following character sets:

- GSM
- UCS2
- IRA

These character sets can be configured and interrogated with **AT+CSCS** command (*3GPP TS 27.007*) and it is defined in *3GPP TS 27.005*. The character set affects transmission and reception of SMS and SMS Cell Broadcast Messages, as well as the entry and display of phonebook entries text field.

1.4. AT Command Port

The main UART port, PCIe Modem port and two USB ports (USB modem port and USB AT port) support AT command communication and data transfer.

1.5. Unsolicited Result Code

Unsolicited Result Code (URC) is not issued as a part of the response related to an executed AT command, but as a report message issued by the modules without being requested by the TE. It is issued automatically when a certain event occurs. Typical events leading to URCs are incoming calls (RING), received short messages, high/low voltage alarm, high/low temperature alarm, etc.

1.6. Module Turn-off Procedure

It is recommended to execute **AT+QPOWD** command to power off the module, since it is the safest and best method through which the powering off is realized by letting the module log off from the network and allowing the software to enter a secure and safe data state before disconnecting the power supply.

After sending **AT+QPOWD**, please do not enter any other AT commands. When the command is executed successfully, the module will output message **POWERED DOWN** and then enter the power down mode. In order to avoid data loss, it is suggested to wait for 1s to disconnect the power supply after the URC **POWERED DOWN** is outputted. If **POWERED DOWN** cannot be received within 65s, the power supply shall be disconnected compulsorily.

2 General Commands

2.1. ATI Display MT Identification Information

This Execution Command delivers the MT identification information text.

ATI Display MT Identification Information	
Execution Command **ATI**	Response **Quectel** **<objectID>** **Revision: <revision>** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<objectID>	String type. Identifier of device type.
<revision>	String type. Identification text of the firmware version of the module.

Example

```
ATI
Quectel
EG512
Revision: EG512REAAAR01A02M4G

OK
```

2.2. AT+GMI Request Manufacturer Identification

This Execution Command returns the manufacturer identification text. It is identical with **AT+CGMI** command in ***Chapter 2.3***.

AT+GMI Request Manufacturer Identification	
Test Command **AT+GMI=?**	Response **OK**
Execution Command **AT+GMI**	Response **Quectel** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

2.3. AT+CGMI Request Manufacturer Identification

This command returns the manufacturer identification text. It is identical with the above **AT+GMI** command.

AT+CGMI Request Manufacturer Identification	
Test Command **AT+CGMI=?**	Response **OK**
Execution Command **AT+CGMI**	Response **Quectel** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

2.4. AT+GMM Request Model Identification

This command returns the MT model identification text. It is identical with **AT+CGMM** command in ***Chapter 2.5***.

AT+GMM Request MT Model Identification	
Test Command **AT+GMM=?**	Response **OK**
Execution Command **AT+GMM**	Response **<objectID>** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<objectID>	String type. Identifier of device type.

2.5. AT+CGMM Request MT Model Identification

This command returns the model information of the product. It is identical with the above **AT+GMM** command.

AT+CGMM Request MT Model Identification	
Test Command **AT+CGMM=?**	Response **OK**
Execution Command **AT+CGMM**	Response **<objectID>** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<objectID>	String type. Identifier of device type.

2.6. AT+GMR Request MT Firmware Revision Identification

This Execution Command returns the identification text of MT firmware version. It is identical with **AT+CGMR** command in ***Chapter 2.7***.

AT+GMR Request Firmware Revision Identification	
Test Command **AT+GMR=?**	Response **OK**
Execution Command **AT+GMR**	Response **<revision>** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<revision>	String type. Identification text of MT firmware version.

Example

```
AT+GMR
EG512REAAAR01A02M4G

OK
```

2.7. AT+CGMR Request MT Firmware Revision Identification

This Execution Command delivers the identification text of MT firmware version. It is identical with the above **AT+GMR** command.

AT+CGMR Request Firmware Revision Identification	
Test Command **AT+CGMR=?**	Response **OK**
Execution Command **AT+CGMR**	Response **<revision>** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<revision>	String type. Identification text of MT firmware version.

2.8. AT+GSN Request International Mobile Equipment Identity (IMEI)

This Execution Command requests the International Mobile Equipment Identity (IMEI) number of the ME which permits the user to identify individual ME device. It is identical with the **AT+CGSN** command in ***Chapter 2.9***.

AT+GSN Request International Mobile Equipment Identity (IMEI)	
Test Command **AT+GSN=?**	Response **OK**
Execution Command **AT+GSN**	Response **<IMEI>** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference	

V.25ter	

Parameter

<IMEI>	String type. IMEI number of the ME.

NOTE

The IMEI can be used to identify an ME since it is unique to each ME.

2.9. AT+CGSN Request International Mobile Equipment Identity (IMEI)

This Execution Command requests International Mobile Equipment Identity (IMEI) number of the ME. It is identical with the above **AT+GSN** command.

AT+CGSN Request International Mobile Equipment Identity (IMEI)	
Test Command **AT+CGSN=?**	Response **OK**
Execution Command **AT+CGSN**	Response **<IMEI>** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<IMEI>	String type. IMEI number of the ME.

NOTE

The IMEI can be used to identify an ME since it is unique to each ME.

2.10. AT&F Reset AT Command Settings to Factory Settings

This command resets AT command settings to the default values specified by the manufacturer (See ***Table 8***).

AT&F Reset AT Command Settings to Factory Settings	
Execution Command **AT&F[<value>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<value>	Integer type. 0 Reset all AT command settings to factory setting.

2.11. AT&V Display Current Configuration

This command displays the current settings of some AT command parameters (See ***Table 3***), even including the single-letter AT command parameters which are not readable.

AT&V Display Current Configuration	
Execution Command **AT&V**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Table 3: AT&V Response

AT&V
&C: 1 &D: 2 &F: 0

```
&W: 0
E: 1
Q: 0
V: 1
X: 4
Z: 0
S0: 0
S3: 13
S4: 10
S5: 8
S6: 2
S7: 0
S8: 2
S10: 15

OK
```

2.12. AT&W Store Current Settings to User-defined Profile

This command stores the current AT command settings to a user-defined profile in non-volatile memory (See ***Table 9***). The AT command settings will be automatically restored from the user-defined profile during power-up or if **ATZ** is executed.

AT&W Store Current Settings to User-defined Profile	
Execution Command **AT&W[<n>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type.	
	0	Profile number to store current AT command settings.

2.13. ATZ Restore All AT Command Settings from User-defined Profile

This command first resets the AT command settings to their manufacturer defaults, which is similar to **AT&F**. Afterwards, the AT command settings are restored from the user-defined profile in the non-volatile memory, if they have been stored with **AT&W** before (See ***Table 10***).

Any additional AT command on the same command line may be ignored.

ATZ Restore AT Command Settings from a User-defined Profile	
Execution Command **ATZ[<value>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<value>	Integer type.	
	0	Reset to profile number 0.

2.14. ATQ Set Result Code Presentation Mode

This command controls whether the result code is transmitted to the TE. Other information text transmitted as response is not affected.

ATQ Set Result Code Presentation Mode	
Execution Command **ATQ<n>**	Response If **<n>** = 0: **OK** If **<n>** = 1: (none)
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type.	
	0	Result codes are transmitted
	1	Result codes are suppressed and not transmitted

2.15. ATV MT Response Format

This command determines the contents of header and trailer transmitted with AT command result codes and information responses.

The numeric equivalents and brief descriptions of results code are listed in the following ***Table 4***.

ATV MT Response Format	
Execution Command **ATV<value>**	Response When **<value>** = 0 **0** When **<value>** = 1 **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<value>	Integer type.	
	0	Information response: **<text><CR><LF>** Short result code format: **<numeric code><CR>**
	1	Information response: **<CR><LF><text><CR><LF>** Long result code format: **<CR><LF><verbose code><CR><LF>**

Example

```
ATV1                                    //Set <value> = 1
OK
AT+CSQ
+CSQ: 30,99
```

```
OK                                  //When <value> = 1, the result code is OK.
ATV0                                //Set <value> = 0
0
AT+CSQ
+CSQ: 30,99
0                                   //When <value> = 0, the result code is 0.
```

Table 4: The Numeric Equivalents and Brief Description of ATV0&ATV1 Result Codes

ATV1	ATV0	Description
OK	0	Acknowledges execution of a command.
CONNECT	1	A connection has been established. The DCE is switching from command mode to data mode.
RING	2	The DCE has detected an incoming call signal from network.
NO CARRIER	3	The connection has been terminated or the attempt to establish a connection failed.
ERROR	4	Command not recognized, caused by command line maximum length exceeded, parameter value invalid, or other problem with processing the command line.
NO DIALTONE	6	No dial tone detected.
BUSY	7	Engaged (busy) signal detected.
NO ANSWER	8	@ (Wait for Quiet Answer) dialing modifier was used, but remote ringing followed by five seconds of silence was not detected before expiration of the connection timer (S7).

2.16. ATE Set Command Echo Mode

This command controls whether TA echoes characters received from TE or not during AT command mode.

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

Reference V.25ter	

Parameter

<value>	Integer type. Whether to echo the characters received from TE.	
	0	OFF
	1	ON

2.17. ATS3 Set Command Line Termination Character

This command determines the character recognized by TA to terminate an incoming command line. It is also generated for result codes and information text, along with character value set via **ATS4**.

ATS3 Set Command Line Termination Character	
Read Command **ATS3?**	Response **<n>** **OK**
Write Command **ATS3=<n>**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type. Command line termination character. Range: 0–127. Default: 13.

2.18. ATS4 Set Response Formatting Character

This command determines the character generated by TA for result code and information text, along with the command line termination character set via **ATS3**.

ATS4 Set Response Formatting Character	
Read Command **ATS4?**	Response **<n>** **OK**
Write Command **ATS4=<n>**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type. Response formatting character. Range: 0–127. Default: 10.

2.19. ATS5 Set Command Line Editing Character

This command determines the value of editing character used by TA to delete the immediately preceding character from the AT command line (i.e. equates to backspace key).

ATS5 Set Command Line Editing Character	
Read Command **ATS5?**	Response **<n>** **OK**
Write Command **ATS5=<n>**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type. Response editing character. Range: 0–127. Default: 8.

2.20. ATX Set CONNECT Result Code Format and Monitor Call Progress

This command determines whether TA transmits particular result codes to TE or not. It also controls whether TA detects the presence of a dial tone when it begins dialing and the engaged tone (busy signal) or not.

ATX Set CONNECT Result Code Format and Monitor Call Progress	
Execution Command **ATX<value>**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<value>	Integer type. 0 Only **CONNECT** result code returned, dial tone and busy detection are both disabled. 1 Only **CONNECT<text>** result code returned, dial tone and busy detection are both disabled. 2 **CONNECT<text>** result code returned, dial tone detection is enabled, and busy detection is disabled. 3 **CONNECT<text>** result code returned, dial tone detection is disabled, and busy detection is enabled. 4 **CONNECT<text>** result code returned, and dial tone and busy detection are both enabled.

2.21. AT+CFUN Set UE Functionality

This command controls the functionality level. It can also be used to reset the UE.

AT+CFUN Set UE Functionality	
Test Command **AT+CFUN=?**	Response **+CFUN: (**list of supported **<fun>**s**),(**list of supported **<rst>**s**)** **OK**
Read Command **AT+CFUN?**	Response **+CFUN: <fun>** **OK**
Write Command **AT+CFUN=<fun>[,<rst>]**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	15 s, determined by the network.
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<fun>	Integer type. 0 Minimum functionality 1 Full functionality 4 Disable both transmitting and receiving RF signals
<rst>	Integer type. 0 Do not reset the UE before setting it to **<fun>** power level 1 Reset the UE before setting it to **<fun>** power level. This value is available only for **<fun>** = 1. The device is fully functional after the reset.
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CFUN=0                    //Switch the UE to minimum functionality.
OK
```

```
AT+COPS?
+COPS: 0                                    //No operator is registered.

OK
AT+CPIN?
+CME ERROR: 13                              //(U)SIM failure
AT+CFUN=1                                   //Switch the UE to full functionality.
OK

+CPIN: SIM PIN
AT+CPIN=1234
OK

+CPIN: READY

+QUSIM: 1

+QIND: SMS DONE

+QIND: PB DONE
AT+CPIN?
+CPIN: READY

OK
AT+COPS?
+COPS: 0,0,"CHINA MOBILE CMCC",7            //Operator is registered.

OK
```

2.22. AT+CMEE Error Message Format

This command disables or enables the use of final result code **+CME ERROR: <err>** as the indication of an error. When enabled, errors cause **+CME ERROR: <err>** final result code instead of **ERROR**.

AT+CMEE Error Message Format	
Test Command **AT+CMEE=?**	Response **+CMEE: (**range of supported **<n>**s**)** **OK**
Read Command **AT+CMEE?**	Response **+CMEE: <n>**

	OK
Write Command **AT+CMEE=[<n>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. Whether to enable result code. 0 Disable result code and use **ERROR** instead. 1 Enable result code and use numeric values. 2 Enable result code and use verbose values.
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CMEE=0                          //Disable result code.
OK
AT+CPIN?
ERROR                              //Only ERROR will be displayed.
AT+CMEE=1                          //Enable error result code with numeric values.
OK
AT+CPIN?
+CME ERROR: 10
AT+CMEE=2                          //Enable error result code with verbose (string) values.
OK
AT+CPIN?
+CME ERROR: SIM not inserted
```

2.23. AT+CSCS Select TE Character Set

This Write Command informs the MT which character set is used by the TE. TA is then able to convert character strings correctly between TE and MT character sets.

AT+CSCS Select TE Character Set	
Test Command **AT+CSCS=?**	Response **+CSCS: (**list of supported **<chset>**s**)**

	OK
Read Command **AT+CSCS?**	Response **+CSCS: <chset>** **OK**
Write Command **AT+CSCS=<chset>**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<chset>	String type.	
	"GSM"	GSM default alphabet
	"IRA"	International reference alphabet
	"UCS2"	UCS2 alphabet

Example

```
AT+CSCS?                          //Query the current character set.
+CSCS: "GSM"                      //The character set is GSM

OK
AT+CSCS="UCS2"                    //Set the character set to UCS2.
OK
AT+CSCS?
+CSCS: "UCS2"                     //The character set is UCS2 after the configuration

OK
```

2.24. AT+QURCCFG Configure URC Indication Option

This command configures the output port of URC.

AT+QURCCFG Configure URC Indication Option	
Test Command **AT+QURCCFG=?**	Response **+QURCCFG: "urcport",(**list of supported **<URC_port_value>**s**)**

	OK
Write Command **AT+QURCCFG="urcport"[,<URC_port_value>]**	Response If the optional parameter is omitted, query the current configuration: **+QURCCFG: "urcport",<URC_port_value>** **OK** If the optional parameter is specified, configure the output port of URC: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<URC_port_value>	String type. URC output port.	
	"usbat"	USB AT port
	"usbmodem"	USB modem port
	"uart1"	Main UART

Example

```
AT+QURCCFG=?
+QURCCFG: "urcport",("usbat","usbmodem","uart1")

OK
AT+QURCCFG="urcport"                    //Query the current configuration of URC output port

+QURCCFG: "urcport","usbat"

OK
AT+QURCCFG="urcport","usbmodem"         //Configure the URC output port to USB modem port

OK
AT+QURCCFG="urcport"
+QURCCFG: "urcport","usbmodem"

OK
```

3 Status Control Commands

3.1. AT+CPAS Mobile Equipment Activity Status

This command queries the activity status of the ME.

AT+CPAS Mobile Equipment Activity Status	
Test Command **AT+CPAS=?**	Response **+CPAS: (**list of supported **<pas>**s**)** **OK**
Execution Command **AT+CPAS**	Response TA returns the activity status of MT: **+CPAS: <pas>** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<pas>	Integer type. MT activity status.	
	0	Ready
	3	Ringing
	4	Call in progress or call hold
<err>	Error codes. For more details, please refer to ***Table 11***.	

Example

```
AT+CPAS
+CPAS: 0                                    //MT is ready.

OK
RING
##0
AT+CLCC
+CLCC: 1,1,4,0,0,"15695519173",161

OK
AT+CPAS
+CPAS: 3                                    //MT is ringing.

OK
AT+CLCC
+CLCC: 1,0,0,0,0,"10010",129

OK
AT+CPAS
+CPAS: 4                                    //Call in progress.

OK
```

3.2. AT+CEER Extended Error Report

This command queries an extended error and report the cause of the last failed operation, such as:

- The failure to release a call
- The failure to set up a call (both mobile originated or terminated)
- The failure to modify a call by using supplementary services
- The failure to activate, register, query, deactivate or deregister a supplementary service

The release cause **<report>** is a text to describe the cause information given by the network.

AT+CEER Extended Error Report	
Test Command **AT+CEER=?**	Response **OK**
Execution Command **AT+CEER**	Response **+CEER: <report>** **OK**

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

Parameter

<report>	Release cause report. Reason for the last failed operation (listed in ***Chapter 13.9***). Both CS and PS domain call types are reported. Cause data is captured from Call Manager events and cached locally to later use by this command.
<err>	Error codes. For more details, please refer to ***Table 11***.

3.3. AT+QCFG Extended Configuration Settings

This command queries and configures various settings of UE.

AT+QCFG Extended Configuration Settings	
Test Command **AT+QCFG=?**	Response **+QCFG: "hsdpacat",(**list of supported **<cat>**s**)** **+QCFG: "hsupacat",(**list of supported **<cat>**s**)** **+QCFG: "rrc",(**range of supported **<rrcr>**s**)** **+QCFG: "pdp/duplicatechk",(**list of supported **<enable>**s**)** **+QCFG: "data_interface",(**list of supported **<network>**s**),(**list of supported **<diag>**s**)** **…** **OK**
Maximum Response Time	300 ms

3.3.1. AT+QCFG="hsdpacat" HSDPA Category Configuration

This command specifies the HSDPA category.

AT+QCFG="hsdpacat" HSDPA Category Configuration	
Write Command **AT+QCFG="hsdpacat"[,<cat>]**	Response If the optional parameter is omitted, return the current configuration:

	+QCFG: "hsdpacat",<cat> **OK** If the optional parameter is specified, set the HSDPA category: **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting. The configuration will be saved automatically.

Parameter

<cat>	Integer type. HSDPA category. 6 Category 6 8 Category 8 10 Category 10 12 Category 12 14 Category 14 18 Category 18 20 Category 20 24 Category 24
<err>	Error codes. For more details, please refer to ***Table 11***.

3.3.2. AT+QCFG="hsupacat" HSUPA Category Configuration

This command specifies the HSUPA category.

AT+QCFG="hsupacat" HSUPA Category Configuration	
Write Command **AT+QCFG="hsupacat"[,<cat>]**	Response If the optional parameter is omitted, return the current configuration: **+QCFG: "hsupacat",<cat>** **OK** If the optional parameter is specified, set the HSUPA category:

	OK Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting. The configuration will be saved automatically.

Parameter

<cat>	Integer type. HSUPA category. 5 Category 5 6 Category 6 7 Category 7 8 Category 8
<err>	Error codes. For more details, please refer to ***Table 11***.

3.3.3. AT+QCFG="rrc" RRC Release Version Configuration

This command specifies the RRC release version.

AT+QCFG="rrc" RRC Release Version Configuration	
Write Command **AT+QCFG="rrc"[,<rrcr>]**	Response If the optional parameter is omitted, return the current configuration: **+QCFG: "rrc",<rrcr>** **OK** If the optional parameter is specified, set the RRC release version: **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting. The configuration will be saved automatically.

Parameter

<rrcr>	Integer type. RRC release version. 0 R99 1 R5 2 R6 3 R7 4 R8 5 R9
<err>	Error codes. For more details, please refer to ***Table 11***.

3.3.4. AT+QCFG="pdp/duplicatechk" Establish Multi PDNs with the Same APN

This command allows/refuses establishing multi PDNs with the same APN profile.

AT+QCFG="PDP/duplicatechk"	**Establish Multi PDNs with the Same APN**
Write Command **AT+QCFG="pdp/duplicatechk"[,<enable>]**	Response If the optional parameter is omitted, return the current configuration: **+QCFG: "pdp/duplicatechk",<enable>** **OK** If the optional parameter is specified, allow/refuse establishing multiple PDNs with the same APN profile: **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<enable>	Integer type. 0 Refuse to establish multi PDNs with the same APN profile 1 Allow to establish multi PDNs with the same APN profile
<err>	Error codes. For more details, please refer to ***Table 11***.

3.3.5. AT+QCFG="data_interface" Set Network Port/Diagnostic Port Communication Through PCIe/USB Interface

This command sets the network port/diagnostic port communication through USB/PCIe interface.

AT+QCFG="data_interface" Set Network Port/Diagnostic Port Communication Through PCIe/USB Interface	
Write Command **AT+QCFG="data_interface"[,<network>,<diag>]**	Response If the optional parameters are omitted, query the current configuration: **+QCFG: "data_interface",<network>,<diag>** **OK** If the optional parameters are specified, set the network port/diagnostic port communication through USB/PCIe interface: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting. The configuration will be saved automatically.

Parameter

<network>	Integer type. 0 Set network port communication through USB interface. 1 Set network port communication through PCIe interface.
<diag>	Integer type. 0 Set diagnostic port communication through USB interface. 1 Set diagnostic port communication through PCIe interface.

NOTES

1. If the network port and diagnostic port communication is switched to PCIe through eFuse, this command will be invalid, and the communication cannot be switched back to USB any longer.
2. If the network port was set to communicate through the USB interface, the PCIe interface will be disabled. Therefore, if the network port is set to communicate through the USB interface, no AT port or diagnostic port will communicate through the PCIe interface.

Example

```
AT+QCFG="data_interface"                //Query the current configuration.
+QCFG: "data_interface",0,0
OK
AT+QCFG="data_interface",1,0            //Set network port communication through PCIe interface, and
                                          diagnostic port through USB interface.
OK
AT+QCFG="data_interface",1,1            //Set network port communication through PCIe interface, and
                                          diagnostic port through PCIe interface.
OK
```

3.4. AT+QINDCFG URC Indication Configuration

This command enables/disables URC indications.

AT+QINDCFG URC Indication Configuration	
Test Command **AT+QINDCFG=?**	Response **+QINDCFG: "all",(**list of supported **<enable>**s**),(**list of supported **<savetonvram>**s**)** **+QINDCFG: "csq",(**list of supported **<enable>**s**),(**list of supported **<savetonvram>**s**)** **+QINDCFG: "smsfull",(**list of supported **<enable>**s**),(**list of supported **<savetonvram>**s**)** **+QINDCFG: "ring",(**list of supported **<enable>**s**),(**list of supported **<savetonvram>**s**)** **+QINDCFG: "smsincoming",(**list of supported **<enable>**s**),(**list of supported **<savetonvram>**s**)** **+QINDCFG: "act",(**list of supported **<enable>**s**),(**list of supported **<savetonvram>**s**)** **OK**
Write Command **AT+QINDCFG=<urctype>[,<enable>[,<savetonvram>]]**	Response If both of the optional parameters are omitted, query the current configuration: **+QINDCFG: <urctype>,<enable>** **OK** If any of the optional parameters is specified, set the URC indication configurations: **OK**

	Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. Whether to save configuration depends on **<savetonvram>**.

Parameter

<urctype>	String type. URC type.	
	"all"	Master switch of all URCs. Default: ON.
	"csq"	Indication of signal strength and channel bit error rate change (similar to **AT+CSQ**). Default: OFF. If this configuration is ON, **+QIND: "csq",<rssi>,<ber>** is present.
	"smsfull"	SMS storage full indication. Default: OFF. If this configuration is ON, **+QIND: "smsfull",<storage>** is present.
	"ring"	**RING** indication. Default: ON.
	"smsincoming"	Incoming message indication. Default: ON. Related URCs list: **+CMTI**, **+CMT**, **+CDS**
	"act"	Indication of network access technology change. Default: OFF. If this configuration is ON, **+QIND: "act",<actvalue>** is present. **<actvalue>** is string type. The values are as below: "WCDMA" "HSDPA" "HSUPA" "HSDPA&HSUPA" "LTE" "UNKNOWN" The examples of URC are as below: **+QIND: "act","HSDPA&HSUPA"** **+QIND: "act","UNKNOWN"** The description of "act" is as below: 1. If MT does not register on network, the **<actvalue>** would be "UNKNOWN". 2. If this configuration is ON, the URC of "act" will be reported immediately. Only when the network access technology changes, a new URC will be reported.
<enable>	Integer type. URC indication is enabled or disabled.	
	0	Disable
	1	Enable
<savetonvram>	Integer type. Whether to save configuration into NVM.	

	0	Not save
	1	Save
<err>	Error codes. For more details, please refer to ***Table 11***.	

4 (U)SIM Related Commands

4.1. AT+CIMI Request International Mobile Subscriber Identity (IMSI)

This command requests the International Mobile Subscriber Identity (IMSI) which is intended to permit the TE to identify the individual SIM card or active application in the UICC (GSM or USIM) that is attached to MT.

AT+CIMI Request International Mobile Subscriber Identity (IMSI)	
Test Command **AT+CIMI=?**	Response **OK**
Execution Command **AT+CIMI**	Response TA returns **<IMSI>** for identifying the individual (U)SIM which is attached to MT. **<IMSI>** **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<IMSI>	International mobile subscriber identity (string without double quotes).
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CIMI                  //Query IMSI number of (U)SIM which is attached to MT.
460023210226023          //The IMSI returned by MT

OK
```

4.2. AT+CLCK Facility Lock

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

AT+CLCK Facility Lock	
Test Command **AT+CLCK=?**	Response **+CLCK: (**list of supported **<fac>**s**)** **OK**
Write Command **AT+CLCK=<fac>,<mode>[,<password>[,<class>]]**	Response If **<mode>** is not 2 and the command is set successfully: **OK** If **<mode>**=2 and the command is set successfully: **+CLCK: <status>[,<class1>]** **[+CLCK: <status>[,<class2>]]** **[…]** **OK**
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. The configuration will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<fac>	String type. Facility.	
	"SC"	(U)SIM (lock SIM/UICC card inserted in the currently selected card slot) (SIM/UICC asks password in MT power-up and when this lock command is issued).
	"AO"	BAOC (Bar All Outgoing Calls) (see *3GPP TS 22.088 [6] clause 1*).
	"OI"	BOIC (Bar Outgoing International Calls) (see *3GPP TS 22.088 [6] clause 1*).
	"OX"	BOIC-exHC (Bar Outgoing International Calls except to Home Country) (see *3GPP TS 22.088 [6] clause 1*).
	"AI"	BAIC (Bar All Incoming Calls) (see *3GPP TS 22.088 [6] clause 2*).
	"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country) (see *3GPP TS 22.088 [6] clause 2*).
	"AB"	All Barring services (see *3GPP TS 22.030 [19]*) (applicable only for **<mode>**=0).
	"AG"	All outGoing barring services (see *3GPP TS 22.030 [19]*) (applicable only for

		<mode>=0).
	"AC"	All inComing barring services (see *3GPP TS 22.030 [19]*) (applicable only for **<mode>**=0).
	"FD"	(U)SIM card or active application in the UICC (GSM or (U)SIM) fixed dialing memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as **<password>**).
	"PF"	Lock Phone to the very First inserted SIM/UICC card (also referred in the present document as PH-FSIM) (MT asks password when other SIM/UICC cards are inserted).
	"PN"	Network Personalization (see *3GPP TS 22.022 [33]*)
	"PU"	Network sUbset Personalization (see *3GPP TS 22.022 [33]*)
	"PP"	Service Provider Personalization (see *3GPP TS 22.022 [33]*)
	"PC"	Corporate Personalization (see *3GPP TS 22.022 [33]*)
<mode>		Integer type. Operation.
	0	Unlock
	1	Lock
	2	Query status
<password>		String type. Password.
<classx>		Integer type. A sum of integers each representing a class of information.
	1	Voice
	2	Data
	4	FAX
	7	All telephony except SMS
	8	Short message service
	16	Data circuit synchronization
	32	Data circuit asynchronization
<status>		Integer type. Lock status.
	0	OFF
	1	ON

Example

```
AT+CLCK="SC",2                  //Query the status of (U)SIM card.
+CLCK: 0                        //The (U)SIM card is unlocked (OFF).

OK
AT+CLCK="SC",1,"1234"           //Lock (U)SIM card, and the password is 1234.
OK
AT+CLCK="SC",2                  //Query the status of (U)SIM card.
+CLCK: 1                        //The (U)SIM card is locked (ON).

OK
AT+CLCK="SC",0,"1234"           //Unlock (U)SIM card.
OK
```

4.3. AT+CPWD Change Password

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

AT+CPWD Change Password	
Test Command **AT+CPWD=?**	Response MT returns a list of pairs which present the available facilities and the maximum length of their password. **+CPWD: (**list of supported **<fac>**s**),<pwdlength>** **OK**
Write Command **AT+CPWD=<fac>,<oldpwd>,<newpwd>**	Response MT sets a new password for the facility lock function. **OK**
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. The configuration will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<fac>	String type.	
	"SC"	(U)SIM (lock SIM/UICC card) (SIM/UICC asks password in MT power-up and when this lock command is issued)
	"AO"	BAOC (Bar All Outgoing Calls, see *3GPP TS 22.088*)
	"OI"	BOIC (Bar Outgoing International Calls, see *3GPP TS 22.088*)
	"OX"	BOIC-exHC (Bar Outgoing International Calls except to Home Country, see *3GPP TS 22.088*)
	"AI"	BAIC (Bar All Incoming Calls, see *3GPP TS 22.088*)
	"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country, see *3GPP TS 22.088*)
	"AB"	All barring services (see *3GPP TS 22.030*, applicable only for **<mode>**=0)
	"AG"	All outgoing barring services (see *3GPP TS 22.030*, applicable only for **<mode>**=0)
	"AC	All incoming barring services (see *3GPP TS 22.030*, applicable only for **<mode>**=0)
	"FD"	(U)SIM card or active application in the UICC (GSM or (U)SIM) fixed dialing memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as **<password>**).
	"PF"	Lock Phone to the very First inserted SIM/UICC card (also referred in the

		present document as PH-FSIM) (MT asks password when other SIM/UICC cards are inserted).
	"PN"	Network Personalization (see *3GPP TS 22.022 [33]*)
	"PU"	Network sUbset Personalization (see *3GPP TS 22.022 [33]*)
	"PP"	Service Provider Personalization (see *3GPP TS 22.022 [33]*)
	"PC"	Corporate Personalization (see *3GPP TS 22.022 [33]*)
<pwdlength>	Integer type. Maximum length of password.	
<oldpwd>	String type. Password specified for the facility from the user interface or with command.	
<newpwd>	String type. New password.	

Example

```
AT+CPIN?
+CPIN: READY

OK
AT+CPWD="SC","1234","4321"          //Change (U)SIM card password to "4321".
OK
//Restart MT or re-activate the (U)SIM card
AT+CPIN?                            //Waiting (U)SIM PIN to be given.
+CPIN: SIM PIN

OK
AT+CPIN="4321"                      //PIN must be entered to define a new password "4321".
OK

+CPIN: READY
```

4.4. AT+CPIN Enter PIN

This command sends to the MT a password which is necessary before it can be operated, or queries whether MT requires a password or not before it can be operated. The password may be (U)SIM PIN, (U)SIM PUK, PH-SIM PIN, etc.

AT+CPIN Enter PIN	
Test Command **AT+CPIN=?**	Response **OK**
Read Command **AT+CPIN?**	Response MT returns an alphanumeric string indicating whether or not a password is required. **+CPIN: <code>**

	OK If there is any error related to MT functionality: **+CME ERROR: <err>**
Write Command **AT+CPIN=<pin>[,<new_pin>]**	Response MT stores a password, such as (U)SIM PIN, (U)SIM PUK, which is necessary before it can be operated. If the PIN is to be entered twice, the MT shall automatically repeat the PIN. If no PIN request is pending, no action will be taken and an error message **+CME ERROR** is returned to TE. If the PIN required is (U)SIM PUK or (U)SIM PUK2, the second parameter is required. This second PIN **<new_pin>** replaces the old pin in the (U)SIM. **OK**
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. The configuration will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<code>	String without double quotes.	
	READY	MT is not pending for any password
	SIM PIN	MT is waiting for (U)SIM PIN to be given
	SIM PUK	MT is waiting for (U)SIM PUK to be given
	SIM PIN2	MT is waiting for (U)SIM PIN2 to be given
	SIM PUK2	MT is waiting for (U)SIM PUK2 to be given
	PH-NET PIN	MT is waiting for network personalization password to be given
	PH-NET PUK	MT is waiting for network personalization unlocking password to be given
	PH-NETSUB PIN	MT is waiting for network subset personalization password to be given
	PH-NETSUB PUK	MT is waiting for network subset personalization unlocking password to be given
	PH-SP PIN	MT is waiting for service provider personalization password to be given
	PH-SP PUK	MT is waiting for service provider personalization unlocking password to be given
	PH-CORP PIN	MT is waiting for corporate personalization password to be given
	PH-CORP PUK	MT is waiting for corporate personalization unlocking password to be

	given
<pin>	String type. Password. If the requested password was a PUK, such as (U)SIM PUK1, PH-FSIM PUK or another password, then **<pin>** must be followed by **<new pin>**.
<new_pin>	String type. New password required if the requested code was a PUK.
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
//Enter PIN
AT+CPIN?
+CPIN: SIM PIN                          //Waiting (U)SIM PIN to be given.

OK
AT+CPIN="1234"                          //Enter PIN.
OK

+CPIN: READY
AT+CPIN?                                //PIN has already been entered.
+CPIN: READY

OK
//Enter PUK and PIN
AT+CPIN?
+CPIN: SIM PUK                          //Waiting (U)SIM PIN to be given.
OK
AT+CPIN="26601934","1234"               //Enter PUK and the new password.
OK

+CPIN: READY
AT+CPIN?
+CPIN: READY                            //PUK has already been entered.

OK
```

4.5. AT+CSIM Generic (U)SIM Access

This command allows a direct control of the (U)SIM that is inserted in the currently selected card slot by a distant application on TE. TE should then keep the processing of (U)SIM information within the frame specified by GSM/UMTS.

AT+CSIM Generic (U)SIM Access	
Test Command **AT+CSIM=?**	Response **OK**
Write Command **AT+CSIM=<length>,<command>**	Response **+CSIM: <length>,<response>** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will not be saved.
Reference 3GPP TS 27.007	

Parameter

<length>	Integer type. String length of **<command>** or **<response>**.
<command>	String type in hexadecimal format. Command transferred by the MT to the (U)SIM in the format as described in *3GPP TS 51.011 [28]*.
<response>	Response to the command transferred by the (U)SIM to the MT in the format as described in *3GPP TS 51.011 [28]*.
<err>	Error codes. For more details, please refer to ***Table 11***.

4.6. AT+CRSM Restricted (U)SIM Access

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

AT+CRSM Restricted (U)SIM Access	
Test Command **AT+CRSM=?**	Response **OK**
Write Command **AT+CRSM=<command>[,<fileId>[,<P1>,<P2>,<P3>[,<data>][,<pathId>]]]**	Response **+CRSM: <sw1>,<sw2>[,<response>]** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will not be saved.
Reference 3GPP TS 27.007	

Parameter

<command>	Integer type. (U)SIM command number. 176 READ BINARY 178 READ RECORD 192 GET RESPONSE 214 UPDATE BINARY 220 UPDATE RECORD 242 STATUS 203 RETRIEVE DATA 219 SET DATA
<fileId>	Integer type. Identifier for an elementary data file on (U)SIM, if used by **<command>**.
<P1>, <P2>, <P3>	Parameters transferred by the MT to the (U)SIM. These parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in *3GPP TS 51.011 [28]*.
<data>	Information which should be written to the (U)SIM (hexadecimal character format; refer to **AT+CSCS**).
<pathId>	The directory path of an elementary file on a SIM/UICC in hexadecimal

	format.
<sw1>, **<sw2>**	Integer type. Information from the (U)SIM about the execution of the actual command. These parameters are delivered to the TE in both cases, on successful or failed execution of the command.
<response>	Response of a successful completion of the command previously issued (hexadecimal character format; refer to **AT+CSCS**). STATUS and GET RESPONSE return data, which gives information about the current elementary data field. The information includes the type of file and its size (see *3GPP TS 51.011 [28]*). After READ BINARY, READ RECORD or RETRIEVE DATA command, the requested data will be returned. **<response>** is not returned after a successful UPDATE BINARY, UPDATE RECORD or SET DATA command.
<err>	Error codes. For more details, please refer to ***Table 11***.

4.7. AT+QPINC Display PIN Remainder Counter

This command queries the number of attempts left to enter the password of (U)SIM PIN/PUK.

AT+QPINC Display PIN Remainder Counter	
Test Command **AT+QPINC=?**	Response **+QPINC: (**list of supported **<facility>**s**)** **OK**
Read Command **AT+QPINC?**	Response **+QPINC: "SC",<pincounter>,<pukcounter>** **+QPINC: "P2",<pincounter>,<pukcounter>** **OK**
Write Command **AT+QPINC=<facility>**	Response **+QPINC: <facility>,<pincounter>,<pukcounter>** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.

Parameter

<facility>	String type. "SC" (U)SIM PIN "P2" (U)SIM PIN2
<pincounter>	Integer type. Number of attempts left to enter the password of PIN.
<pukcounter>	Integer type. Number of attempts left to enter the password of PUK.
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+QPINC?
+QPINC: "SC",3,10
+QPINC: "P2",3,10

OK
AT+QPINC="SC"
+QPINC: "SC",3,10

OK
```

4.8. AT+QINISTAT Query Initialization Status of (U)SIM Card

This command queries the initialization status of (U)SIM card.

AT+QINISTAT Query Initialization Status of (U)SIM Card	
Test Command **AT+QINISTAT=?**	Response **+QINISTAT: (**range of supported **<status>**s**)** **OK**
Execution Command **AT+QINISTAT**	Response **+QINISTAT: <status>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<status>	Integer type. Initialization status of (U)SIM card. Actual value is the sum of several of the

	following four kinds (e.g. 7 = 1 + 2 + 4 means CPIN READY + SMS DONE + PB DONE). 0 Initial state 1 CPIN READY. Operation like locking/unlocking PIN is allowed. 2 SMS DONE. SMS initialization completed 4 PB DONE. Phonebook initialization completed

Example

```
AT+QINISTAT
+QINISTAT: 7          //Status is CPIN READY, SMS DONE and PB DONE

OK
```

4.9. AT+QSIMDET (U)SIM Card Detection

This command enables (U)SIM card hot-swap function. (U)SIM card is detected by GPIO interrupt. The level of (U)SIM card detection pin should also be set when the (U)SIM card is inserted.

AT+QSIMDET (U)SIM Card Detection	
Test Command **AT+QSIMDET=?**	Response **+QSIMDET: (**list of supported **<enable>**s**),(**list of supported **<insert_level>**s**)** **OK**
Read Command **AT+QSIMDET?**	Response **+QSIMDET: <enable>,<insert_level>** **OK**
Write Command **AT+QSIMDET=<enable>,<insert_level>**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting. The configuration will be saved automatically.

Parameter

<enable>	Integer type. Enable or disable (U)SIM card detection. 0 Disable 1 Enable

<insert_level>	Integer type. The level of (U)SIM detection pin when a (U)SIM card is inserted. 0 Low level 1 High level

NOTES

1. For EM120R-GL and EM160R-GL modules, the default of **<enable>** is 1; for EG512R-EA module, the default of **<enable>** is 0.
2. Hot-swap function is invalid if the configured value of **<insert_level>** is inconsistent with hardware design.

Example

```
AT+QSIMDET=1,1          //Set (U)SIM card detection pin level to high when (U)SIM card is inserted.
OK

//Remove (U)SIM card
+CPIN: NOT READY
<Insert (U)SIM card>
+CPIN: READY
```

4.10. AT+QSIMSTAT (U)SIM Card Insertion Status Report

This command queries (U)SIM card insertion status or determines whether (U)SIM card insertion status report is enabled.

AT+QSIMSTAT (U)SIM Card Insertion Status Report	
Test Command **AT+QSIMSTAT=?**	Response **+QSIMSTAT: (**list of supported **<enable>**s**)** **OK**
Read Command **AT+QSIMSTAT?**	Response **+QSIMSTAT: <enable>,<inserted_status>** **OK**
Write Command **AT+QSIMSTAT=<enable>**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms

Characteristics	The command takes effect immediately. The configurations will be saved automatically.

Parameter

<enable>	Integer type. Enable or disable (U)SIM inserted status report. If it is enabled, the URC **+QSIMSTAT: <enable>,<insertedstatus>** will be reported when (U)SIM card is inserted or removed. 0 Disable 1 Enable
<inserted_status>	Integer type. Inserted or removed status of the (U)SIM card. This parameter is not allowed to be set. 0 Removed 1 Inserted 2 Unknown (before (U)SIM initialization)

Example

```
AT+QSIMSTAT?                  //Query (U)SIM card insertion status.
+QSIMSTAT: 0,1

OK
AT+QSIMDET=1,0
OK
AT+QSIMSTAT=1                 //Enable reporting of (U)SIM card insertion status.
OK
AT+QSIMSTAT?
+QSIMSTAT: 1,1

OK
<Remove the (U)SIM card>
+QSIMSTAT : 1,0               //Report of (U)SIM card insertion status: removed.

+CPIN: NOT READY
AT+QSIMSTAT?
+QSIMSTAT: 1,0

OK
<Insert a (U)SIM card>
+QSIMSTAT : 1,1               //Report of (U)SIM card insertion status: inserted.

+CPIN: READY
```

4.11. AT+QUIMSLOT Switch (U)SIM Slot

This command queries the slot currently used by the (U)SIM and configure which to use.

AT+QUIMSLOT Switch (U)SIM Slot	
Test Command **AT+QUIMSLOT=?**	Response **+QUIMSLOT: (**list of supported **<slot>**s**)** **OK**
Read Command **AT+QUIMSLOT?**	Response **+QUIMSLOT: <slot>** **OK**
Write Command **AT+QUIMSLOT=<slot>**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.

Parameter

<slot>	Integer type. Physical (U)SIM slot. 1 (U)SIM slot 1 2 (U)SIM slot 2

Example

```
AT+QUIMSLOT?                //Query the (U)SIM slot currently used.
+QUSIMSLOT: 1

OK
AT+QUIMSLOT=2               //Switch to (U)SIM slot 2.
OK
```

5 Network Service Commands

5.1. AT+COPS PLMN Selection

This command returns the current operators and their status, and allows automatic or manual network selection.

The Test Command returns a set of five parameters, each representing an operator presenting in the network. The set consists of an integer indicating the availability of the operator **<stat>**, long and short alphanumeric format of the name of the operator, numeric format representation of the operator and access technology. Any of the formats may be unavailable and should then be an empty field. The list of operators shall be in the order of: home network, networks referenced in (U)SIM and other networks.

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

The Write Command forces an attempt to select and register the GSM/UMTS/LTE network operator. If the selected operator is not available, no other operator shall be selected (except **<mode>**=4). The format of selected operator name shall apply to further Read Commands (**AT+COPS?**).

AT+COPS PLMN Selection	
Test Command **AT+COPS=?**	Response **+COPS: [**list of supported **(<stat>,**long alphanumeric **<oper>,**short alphanumeric **<oper>,**numeric **<oper>[,<AcT>])**s**][,,(**range of supported **<mode>**s**),(**range of supported **<format>**s**)]** **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Read Command **AT+COPS?**	Response **+COPS: <mode>[,<format>[,<oper>][,<AcT>]]** **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**

Write Command **AT+COPS=<mode>[,<format>[,<oper>[,<AcT>]]]**	Response **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	180 s, determined by the network.
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<stat>	Integer type. Availability of operators. 0 Unknown 1 Operator available 2 Current operator 3 Operator forbidden
<oper>	String type. Operator in format as per **<format>**.
<mode>	Integer type. 0 Automatic operator selection (**<oper>** field is ignored). 1 Manual operator selection (**<oper>** field shall be present and **<AcT>** optionally) 2 Deregister from network 3 Set only **<format>** (for the read command **AT+COPS?**), and do not attempt registration/deregistration (**<oper>** and **<AcT>** fields are ignored). This value is not applicable in the read command response. 4 Manual/automatic selection (**<oper>** field shall be presented). If manual selection fails, automatic mode (**<mode>**=0) will be entered
<format>	Integer type. 0 Long format alphanumeric **<oper>** which can be up to 16 characters long 1 Short format alphanumeric **<oper>** 2 Numeric **<oper>**. GSM location area identification number
<AcT>	Integer type. Access technology selected. Values 4, 5, 6 occur only in the response of Read Command while MS is in data service state and is not intended for the **AT+COPS** Write Command. 2 UTRAN 4 UTRAN W/HSDPA 5 UTRAN W/HSUPA 6 UTRAN W/HSDPA and HSUPA 7 E-UTRAN
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+COPS=?                                   //List all current network operators.
+COPS: (1,"CHN-UNICOM","UNICOM","46001",2),(2,"CHN-UNICOM","UNICOM","46001",7),(3,"460
11","46011","46011",7),(3,"CHINA MOBILE","CMCC","46000",7),,(0-4),(0-2)

OK
AT+COPS?                                    //Query the currently selected network operator.
+COPS: 0,0,"CHN-UNICOM",7

OK
```

5.2. AT+CREG Network Registration Status

The Read Command returns the network registration status and returns the status of result code presentation and an integer **<stat>** which shows whether the network has currently indicated the registration of MT. Location information parameters **<lac>** and **<ci>** are returned only when **<n>**=2 and MT is registered on the network.

The Write Command sets whether to present URC or not and controls the presentation of an unsolicited result code **+CREG: <stat>** when **<n>**=1 and there is a change in the MT network registration status.

AT+CREG Network Registration Status	
Test Command **AT+CREG=?**	Response **+CREG: (**range of supported **<n>**s**)** **OK**
Read Command **AT+CREG?**	Response **+CREG: <n>,<stat>[,<lac>,<ci>[,<AcT>]]** **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Write Command **AT+CREG=[<n>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved by executing **AT&W** after this command is issued.
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. 0 Disable network registration unsolicited result code 1 Enable network registration unsolicited result code: **+CREG: <stat>** 2 Enable network registration unsolicited result code with location information: **+CREG: <stat>[,<lac>,<ci>[,<AcT>]]**
<stat>	Integer type. Circuit mode registration status. 0 Not registered. MT is not currently searching a new operator to register to 1 Registered, home network 2 Not registered, but MT is currently searching a new operator to register to 3 Registration denied 4 Unknown 5 Registered, roaming
<lac>	String type. Two-byte location area code (when **<AcT>** indicates value 2 to 6), or tracking area code (when **<AcT>** indicates value 7) in hexadecimal format.
<ci>	String type. Four-byte GERAN/UTRAN/E-UTRAN cell ID in hexadecimal format.
<AcT>	Integer type. Access technology of the serving cell. 2 UTRAN 4 UTRAN W/HSDPA 5 UTRAN W/HSUPA 6 UTRAN W/HSDPA and HSUPA 7 E-UTRAN
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CREG=1
OK

+CREG: 1                              //URC reports that MT has registered on network.
AT+CREG=2                             //Activate extended URC mode.
OK

+CREG: 1,"D509","80D413D",7           //URC reports that operator has found location area code
                                        and cell ID.
```

5.3. AT+CSQ Signal Quality Report

This command indicates the received signal strength **<RSSI>** and the channel bit error rate **<ber>**.

The Test Command returns values supported by MT.

The Execution Command returns received signal strength indication **<RSSI>** and channel bit error rate **<ber>** from MT.

AT+CSQ Signal Quality Report	
Test Command **AT+CSQ=?**	Response **+CSQ: (**list of supported **<RSSI>**s**),(**list of supported **<ber>**s**)** **OK**
Execution Command **AT+CSQ**	Response **+CSQ: <RSSI>,<ber>** **OK** If there is error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<RSSI>	Integer type. Received signal strength indication.	
	0	-113 dBm or less
	1	-111 dBm
	2–30	-109 dBm to -53 dBm
	31	-51 dBm or greater
	99	Not known or not detectable
<ber>	Integer type. Channel bit error rate (in percent).	
	0–7	As RxQual values in the table in *3GPP TS 45.008 subclause 8.2.4*
	99	Not known or not detectable
<err>	Error codes. For more details, please refer to ***Table 11***.	

Example

```
AT+CSQ=?
+CSQ: (0-31,99),(0-7,99)

OK
AT+CSQ
+CSQ: 28,99          //The current signal strength indication is -57 dBm and channel bit error rate is not known or not detectable.
```

OK

NOTE

After using network related commands such as **AT+CCWA** and **AT+CCFC**, it is recommended to wait for 3s before entering **AT+CSQ** so as to ensure that any network access required for the preceding command has been finished.

5.4. AT+CPOL Preferred Operator List

This command edits and queries the list of preferred operators.

AT+CPOL Preferred Operator List	
Test Command **AT+CPOL=?**	Response **+CPOL: (**list of supported **<index>**s**),(**range of supported **<format>**s**)** **OK**
Read Command **AT+CPOL?**	Response Query the list of preferred operators: **+CPOL: <index1>,<format>,<oper1>[,<GSM_AcT1>,<GSM_Compact_AcT1>,<UTRAN_AcT1>,<E-UTRAN_AcT1>]** **[+CPOL: <index2>,<format>,<oper2>[,<GSM_AcT2>,<GSM_Compact_AcT2>,<UTRAN_AcT2>,<E-UTRAN_AcT2>]** **[…]]** **OK**
Write Command **AT+CPOL=<index>[,<format>[,<oper>[<GSM_AcT>,<GSM_Compact_AcT>,<UTRAN_AcT>,<E-UTRAN_AcT>]]]**	Response Edit the list of preferred operators: **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>** If the **<index>** is given but the **<oper>** is omitted, the entry will be deleted.
Maximum Response Time	300 ms
Characteristics	/

Reference
3GPP TS 27.007

Parameter

<indexn>	Integer type. The order number of operators in the (U)SIM preferred operator list.
<format>	Integer type. 0 Long format alphanumeric **<oper>** 1 Short format alphanumeric **<oper>** 2 Numeric **<oper>**
<opern>	String type. **<format>** indicates the format is alphanumeric or numeric (see **AT+COPS**)
<GSM_AcTn>	Integer type. GSM access technology. 0 Access technology is not selected 1 Access technology is selected
<GSM_Compact_AcTn>	Integer type. GSM compact access technology. 0 Access technology is not selected 1 Access technology is selected
<UTRAN_AcTn>	Integer type. UTRAN access technology. 0 Access technology is not selected 1 Access technology is selected
<E-UTRAN_AcTn>	Integer type. E-UTRAN access technology. 0 Access technology is not selected 1 Access technology is selected
<err>	Error codes. For more details, please refer to ***Table 11***.

NOTE

The access technology selection parameters **<GSM_AcTn>**, **<GSM_Compact_AcTn>**, **<UTRAN_AcTn>** and **<E-UTRAN_AcTn>** are required for (U)SIM cards or UICC's containing PLMN selector with access technology.

5.5. AT+COPN Read Operator Names

This command returns the list of the supported operator names from MT. Each operator code **<numericn>** that has an alphanumeric equivalent **<alphan>** in the MT memory is returned.

AT+COPN Read Operator Names	
Test Command	Response
AT+COPN=?	**OK**

Execution Command **AT+COPN**	Response **+COPN: <numeric1>,<alpha1>** **[+COPN: <numeric2>,<alpha2>** **[…]]** **OK** If there is error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	Depends on the number of operator names.
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<numericn>	String type. Operator names in numeric format (see **AT+COPS**).
<alphan>	String type. Operator names in long alphanumeric format (see **AT+COPS**).
<err>	Error codes. For more details, please refer to ***Table 11***.

5.6. AT+CTZU Automatic Time Zone Update

This command enables/disables automatic time zone update via NITZ.

AT+CTZU Automatic Time Zone Update	
Test Command **AT+CTZU=?**	Response **+CTZU: (**list of supported **<onoff>**s**)** **OK**
Write Command **AT+CTZU=<onoff>**	Response **OK** Or **ERROR**
Read Command **AT+CTZU?**	Response **+CTZU: <onoff>** **OK**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately.

	The configurations will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<onoff>	Integer type, indicating the mode of automatic time zone update.	
	0	Disable automatic time zone update via NITZ
	1	Enable automatic time zone update via NITZ

Example

```
AT+CTZU?                //Read command
+CTZU: 0

OK
AT+CTZU=?               //Test command
+CTZU: (0,1)

OK
AT+CTZU=1               //Enable automatic time zone update
OK
AT+CTZU?
+CTZU: 1

OK
```

5.7. AT+CTZR Time Zone Reporting

This command controls the reporting of time zone change event. If reporting is enabled, the MT returns the unsolicited result code **+CTZV: <tz>** or **+CTZE: <tz>,<dst>,<time>** whenever the time zone is changed.

AT+CTZR Time Zone Reporting	
Test Command **AT+CTZR=?**	Response **+CTZR: (**range of supported **<reporting>**s**)** **OK**
Write Command **AT+CTZR=<reporting>**	Response **OK** Or

	ERROR
Read Command **AT+CTZR?**	Response **+CTZR: <reporting>** **OK**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<reporting>	Integer type, indicating the mode of time zone reporting. 0 Disable time zone change event reporting 1 Enable time zone change event reporting by unsolicited result code: **+CTZV: <tz>** 2 Enable extended time zone and local time reporting by unsolicited result code: **+CTZE: <tz>,<dst>,<time>**
<tz>	String type, representing the sum of the local time zone (difference between the local time and GMT is 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 to +56. To maintain a fixed width, numbers in the range -9 to +9 are expressed with a leading zero, e.g. "-09", "+00" and "+09".
<dst>	Integer type, indicating whether **<tz>** includes daylight savings adjustment. 0 **<tz>** includes no adjustment for Daylight Saving Time 1 **<tz>** includes +1 hour (equals 4 quarters in **<tz>**) adjustment for daylight saving time 2 **<tz>** includes +2 hours (equals 8 quarters in **<tz>**) adjustment for daylight saving time
<time>	String type, representing 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 when delivering time zone information and will be presented in the unsolicited result code of extended time zone and local time reporting if the universal time is provided by the network.

Example

```
AT+CTZR=2
OK
AT+CTZR?
+CTZR: 2
```

```
OK

+CTZE: "+32",0,"2018/03/23,06:51:13"      //Extended time zone and local time reporting by URC
```

5.8. AT+QLTS Obtain the Latest Time Synchronized through Network

The Execution Command returns the latest time that has been synchronized through network.

AT+QLTS Obtain the Latest Time Synchronized through Network	
Test Command **AT+QLTS=?**	Response **+QLTS: (**range of supported **<mode>**s**)** **OK**
Execution Command **AT+QLTS**	Response **+QLTS: <time>,<ds>** **OK**
Write Command **AT+QLTS=<mode>**	Response **+QLTS: <time>,<ds>** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<mode> Integer type. Query network time mode.

0 Query the latest time that has been synchronized through network

1 Query the current GMT time calculated from the latest time that has been synchronized through network

2 Query the current LOCAL time calculated from the latest time that has been synchronized through network

<time> Format is "yy/MM/dd,hh:mm:ss±zz", in which characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range: -48 to +48). E.g. 6th of May

	2004, 22:10:00 GMT+2 hours equals "04/05/06,22:10:00+08".
<ds>	Integer type. Daylight saving time. 0 No adjustment 1 Plus one hour 2 Plus two hours
<err>	Error codes. For more details, please refer to ***Table 11***.

NOTE

If the time has not been synchronized through network, the command will return a null time string: **+QLTS: ""**.

Example

```
AT+QLTS=?                   //Query supported network time modes.
+QLTS: (0-2)

OK
AT+QLTS                     //Query the latest time synchronized through network.
+QLTS: "2017/01/13,03:40:48+32,0"
OK
AT+QLTS=0                   //Query the latest time synchronized through network. It offers the same
                              function as Execution Command AT+QLTS.
+QLTS: "2017/01/13,03:40:48+32,0"

OK
AT+QLTS=1                   //Query the current GMT time calculated from the latest time that has been
                              synchronized through network.
+QLTS: "2017/01/13,03:41:22+32,0"

OK
AT+QLTS=2                   //Query the current LOCAL time calculated from the latest time that has been
                              synchronized through network.
+QLTS: "2017/01/13,11:41:23+32,0"

OK
```

5.9. AT+QNWINFO Query Network Information

This command queries network information such as the selected access technology, operator and band.

AT+QNWINFO Query Network Information	
Test Command **AT+QNWINFO=?**	Response **OK**
Execution Command **AT+QNWINFO**	Response **+QNWINFO: <AcT>,<oper>,<band>,<channel>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<AcT>	String type. Selected access technology. "NONE" "WCDMA" "HSDPA" "HSUPA" "HSPA+" "TDD LTE" "FDD LTE"
<oper>	Operator names in numeric format.
<band>	String type. Selected band. "WCDMA 2100" "WCDMA 1900" "WCDMA 1800" "WCDMA 1700 US" "WCDMA 850" "WCDMA 800" "WCDMA 2600" "WCDMA 900" "WCDMA 1700 JAPAN" "WCDMA 1500" "WCDMA 850 JAPAN" "LTE BAND 1"–"LTE BAND 66"
<channel>	Channel ID.

NOTE

If the devices have not been registered on a network, the command will return **+QNWINFO: No Service**.

Example

```
AT+QNWINFO=?
OK
AT+QNWINFO
+QNWINFO: "FDD LTE",46001,"LTE BAND 3",1650

OK
```

5.10. AT+QSPN Query the Service Provider Name

This command queries the service provider name.

AT+QSPN Query the Service Provider Name	
Test Command **AT+QSPN=?**	Response **OK**
Execution Command **AT+QSPN**	Response **+QSPN: <FNN>,<SNN>,<SPN>,<alphabet>,<RPLMN>** **OK**
Characteristics	/

Parameter

<FNN>	String type. Full name of the network.
<SNN>	String type. Shortened name of the network.
<SPN>	String type. Service provider name.
<alphabet>	Integer type. Alphabet of full and shortened network name. 0 GSM 7-bit default alphabet 1 UCS2
<RPLMN>	String type. Registered PLMN.

NOTES

1. If **<alphabet>** is 0, **<FNN>** and **<SNN>** will be shown in GSM 7-bit default alphabet string.
2. If **<alphabet>** is 1, **<FNN>** and **<SNN>** will be shown in UCS2 hexadecimal string.

Example

```
AT+QSPN                 //Query the service provider name.
+QSPN: "CHN-UNICOM","UNICOM","",0,"46001"

OK
```

5.11. AT+QENG Query Primary Serving Cell and Neighbour Cell Information

This command obtains the network information, such as serving cell and neighbour cells.

AT+QENG Query Primary Serving Cell and Neighbour Cell Information	
Test Command **AT+QENG=?**	Response **+QENG: (**list of supported **<cell_type>**s**)** **OK**
Write Command Query the serving cell information **AT+QENG="servingcell"**	Response In LTE mode: **+QENG: "servingcell",<state>,"LTE",<is_tdd>,<MCC>,<MNC>,<cellID>,<PCID>,<earfcn>,<freq_band_ind>,<UL_bandwidth>,<DL_bandwidth>,<TAC>,<RSRP>,<RSRQ>,<RSSI>,<SINR>,<CQI>,<tx_power>,<srxlev>** In WCDMA mode: **+QENG: "servingcell",<state>,"WCDMA",<MCC>,<MNC>,<LAC>,<cellID>,<uarfcn>,<PSC>,<RAC>,<RSCP>,<ecio>,<phych>,<SF>,<slot>,<speech_code>,<comMod>** **OK**
Write Command Query the information of neighbour cells **AT+QENG="neighbourcell"**	Response In LTE mode: **[+QENG: "neighbourcell intra","LTE",<earfcn>,<PCID>,<RSRQ>,<RSRP>,<RSSI>,<SINR>,<srxlev>,<cell_resel_priority>,<s_non_intra_search>,<thresh_serving_low>,<s_intra_search>** **…]** **[+QENG: "neighbourcell inter","LTE",<earfcn>,<PCID>,<RSRQ>,<RSRP>,<RSSI>,<SINR>,<srxlev>,<cell_resel_priority>,<threshX_low>,<threshX_high>** **…]**

	[+QENG:"neighbourcell","WCDMA",<uarfcn>,<cell_resel_priority>,<thresh_Xhigh>,<thresh_Xlow>,<PSC>,<RSCP><ecno>,<srxlev> **…]** In WCDMA mode: **[+QENG:"neighbourcell","WCDMA",<uarfcn>,<srxqual>,<PSC>,<RSCP>,<ecno>,<set>,<rank>,<srxlev>** **…]** **[+QENG: "neighbourcell","LTE",<earfcn>,<cellID>,<RSRP>,<RSRQ>,<s_rxlev>** **…]** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<celltype>	String type. The information of different cells. "servingcell" The information of 3G/4G serving cells "neighbourcell" The information of 3G/4G neighbor cells
<state>	String type. UE state. "SEARCH" UE is searching but could not (yet) find a suitable 3G/4G cell. "LIMSRV" UE is camping on a cell but has not registered on the network. "NOCONN" UE is camping on a cell and has registered on the network, and it is in idle mode. "CONNECT" UE is camping on a cell and has registered on the network, and a call is in progress.
<is_tdd>	String type. The LTE network mode. "TDD" "FDD"
<MCC>	Integer type. Mobile Country Code (first part of the PLMN code) - Invalid
<MNC>	Number format. Mobile Network Code (second part of the PLMN code) - Invalid
<LAC>	Integer type. Location Area Code. The parameter determines the two bytes location area code in hexadecimal format (e.g. 00C1 equals 193 in decimal) of the cell that was scanned. Range: 0–65535. - Cannot get the invalid value
<cellID>	Integer type. Cell ID. The parameter determines the 16-bit (GSM) or 28-bit (UMTS) cell ID. Range: 0–0xFFFFFFF. - Invalid

<PCID>	Integer type. Physical cell ID.
<uarfcn>	Integer type. The parameter determines the UTRA-ARFCN of the cell that was scanned.
<earfcn>	Integer type. The parameter determines the E-UTRA-ARFCN of the cell that was scanned.
<freq_band_ind>	E-UTRA frequency band (see *3GPP 36.101*)
<UL_bandwidth>	Integer type. UL bandwidth. 0 1.4 MHz 1 3 MHz 2 5 MHz 3 10 MHz 4 15 MHz 5 20 MHz
<DL_bandwidth>	Integer type. DL bandwidth. 0 1.4 MHz 1 3 MHz 2 5 MHz 3 10 MHz 4 15 MHz 5 20 MHz
<TAC>	Tracking Area Code (see *3GPP 23.003 Section 19.4.2.3*)
<PSC>	The parameter indicates the primary scrambling code of the cell that was scanned
<RAC>	Integer type. Routing Area Code. Range: 0–255.
<RSCP>	Integer type. The parameter indicates the Received Signal Code Power level of the cell that was scanned.
<ecio>	Carrier to noise ratio in dB = measured Ec/Io value in dB.
<RSRP>	Integer type. Indicates the signal of LTE Reference Signal Received Power (see *3GPP 36.214*). Range: -140 to -44. Unit: dBm. The closer to -44, the better the signal is. The closer to -140, the worse the signal is.
<RSRQ>	Integer type. Indicates the signal of current LTE Reference Signal Received Quality (see *3GPP 36.214*). Range: -20 to -3. Unit: dB. The closer to -3, the better the signal is. The closer to -20, the worse the signal is.
<RSSI>	Integer type. LTE Received Signal Strength Indication.
<SINR>	Integer type. LTE Signal-to-Interface plus Noise Ratio. The conversion formula for actual SINR is **Y** = (**1/5**) × **X** × **10** - **20** (**X** is the **<SINR>** value queried by **AT+QENG** and **Y** is the actual value of LTE SINR after calculating with the formula). Range: -20 to 30. Unit: dB.
<CQI>	Integer type. Channel Quality Indication. Range: 1–30.
<tx_power>	TX power value in 1/10 dBm. It is the maximum of all UL channel TX power. The **<tx_power>** value is only meaningful when the device is in traffic.
<phych>	Integer type. Physical channel. 0 DPCH 1 FDPCH

<SF>	Integer type. Spreading factor. 0 SF_4 1 SF_8 2 SF_16 3 SF_32 4 SF_64 5 SF_128 6 SF_256 7 SF_512 8 UNKNOWN
<slot>	Integer type. 0–16: slot format for DPCH. 0–9: slot format for FDPCH.
<speech_code>	Integer type. Destination number on which call is to be deflected.
<comMod>	Integer type. Number format. Compress mode. 0 Not support compress mode 1 Support compress mode
<srxqual>	Integer type. Receiver automatic gain control on the camped frequency.
<ecno>	Integer type. Carrier to noise ratio in dB = measured Ec/Io value in dB.
<set>	Integer type. 3G neighbor cell set. 1 Active set 2 Synchronous neighbor set 3 Asynchronous neighbor set
<rank>	Integer type. Rank of this cell as neighbor for inter-RAT cell reselection.
<srxlev>	Integer type. Suitable receive level for inter frequency cell.
<threshX_low>	Integer type. To be considered for re-selection. The suitable receive level value of an evaluated lower priority cell must be greater than this value.
<threshX_high>	Integer type. To be considered for re-selection. The suitable receive level value of an evaluated higher priority cell must be greater than this value.
<thresh_Xhigh>	Integer type. Reselection threshold for high priority layers.
<thresh_Xlow>	Integer type. Reselection threshold for low priority layers.
<cpich_rscp>	Integer type. Absolute power level of the common pilot channel as received by the UE in dBm × 10.
<cpich_ecno>	Integer type. Ratio of the received energy per PN chip for the common pilot channel to the total received power spectral density at the UE antenna connector in dB × 10.
<srxlev>	Integer type. Select receive level value for base station in dB (see *3GPP 25.304*).
<cell_resel_priority>	Integer type. Cell reselection priority. Range: 0–7.
<s_non_intra_search>	Integer type. Threshold to control non-intra frequency searches.
<thresh_serving_low>	Integer type. Specifies the suitable receive level threshold (in dB) used by the UE on the serving cell when reselecting towards a lower priority RAT/frequency.
<s_intra_search>	Integer type. Cell selection parameter for the intra frequency cell.

Example

```
AT +QENG="servingcell"
+QENG: "servingcell","NOCONN","LTE","FDD",460,00,81EF7D0,78,1300,3,5,5,1806,-68,-8,-38,15

OK

AT +QENG="neighbourcell"
+QENG: "neighbourcell intra","LTE",38950,276,-3,-88,-65,0,37,7,16,6,44
+QENG: "neighbourcell inter","LTE",39148,-,-,-,-,-,37,0,30,7,-,-,-,-
+QENG: "neighbourcell inter","LTE",37900,-,-,-,-,-,0,0,30,6,-,-,-,-

OK
```

NOTE

"-" or - indicates the parameter is invalid under current condition.

5.12. AT+QCAINFO Query Carrier Aggregation Parameters

This command queries carrier aggregation parameters. PCC and SCC respectively indicate Primary Carrier Component and Secondary Carrier Component.

AT+QCAINFO Query Carrier Aggregation Parameters	
Test Command **AT+QCAINFO=?**	Response **OK**
Execution Command **AT+QCAINFO**	Response **+QCAINFO: "PCC",<freq>,<bandwidth>,<band>,<pcell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<SINR>** **+QCAINFO: "SCC",<freq>,<bandwidth>,<band>,<scell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<SINR>** **[+QCAINFO: "SCC",<freq>,<bandwidth>,<band>,<scell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<SINR>** **[…]]** **OK** If no secondary cell was active: **OK**
Maximum Response Time	300 ms

Characteristics	/

Parameter

<freq>	EARFCN.
<bandwidth>	Integer type. Bandwidth. 6 1.4 MHz 15 3 MHz 25 5 MHz 50 10 MHz 75 15 MHz 100 20 MHz
<band>	String type. DL Band information. "LTE BAND 1" "LTE BAND 2" "LTE BAND 3" … "LTE BAND 66"
<pcell_state>	Integer type. Primary cell state. 0 No serving 1 Registered
<scell_state>	Integer type. Secondary cell state. 0 Deconfigured 1 Configuration deactivated 2 Configuration activated
<PCID>	Integer type. Physical Cell ID.
<RSRP>	Integer type. Reference Signal Received Power (see *3GPP 36.214*)
<RSRQ>	Integer type. Reference Signal Received Quality (see *3GPP 36.214*)
<RSSI>	Integer type. Received Signal Strength Indication.
<SINR>	Integer type. Logarithmic value of SINR. Values are in 1/5th of a dB. Range: 0–250 (-20 to +30 dB).

5.13. AT+QNWPREFCFG Configure Network Searching Preferences

This command configures the network searching preferences.

AT+QNWPREFCFG Configure Network Searching Preferences	
Test Command **AT+QNWPREFCFG=?**	Response **+QNWPREFCFG: "gw_band",**(list of supported **<gw_band>**s**)** **+QNWPREFCFG: "lte_band",(**list of supported **<LTE_b**

	and>s**)** **+QNWPREFCFG: "mode_pref",(**list of supported **<mode_pref>**s**)** **+QNWPREFCFG: "srv_domain",(**range of supported **<srv_domain>**s**)** **+QNWPREFCFG: "voice_domain",(**range of supported **<voice_domain>**s**)** **+QNWPREFCFG: "roam_pref",(**list of supported **<roam_pref>**s**)** **+QNWPREFCFG: "ue_usage_setting",(**list of supported **<setting>**s**)** **+QNWPREFCFG: "policy_band"** **+QNWPREFCFG: "ue_capability_band"** **+QNWPREFCFG: "rat_acq_order",(**list of supported **<RAT_order>**s**)** **OK**
Maximum Response Time	300 ms
Characteristics	/

5.13.1. AT+QNWPREFCFG="gw_band" WCDMA Band Configuration

This command specifies the preferred WCDMA bands to be searched by UE.

AT+QNWPREFCFG="gw_band" WCDMA Band Configuration	
Write Command **AT+QNWPREFCFG="gw_band"[,<gw_band>]**	Response If the optional parameter is omitted, return current configuration: **+QNWPREFCFG: "gw_band",<gw_band>** **OK** If the optional parameter is specified, configure the preferred WCDMA bands to be searched: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<gw_band>	String type. Use the colon as a separator to list the WCDMA Bands to be configured. The parameter format is B1:B2:…:BN. The module supports the following WCDMA Bands： B1 WCDMA 2100 band B2 WCDMA 1900 band B3 WCDMA 1800 band B4 WCDMA 1700 band B5 WCDMA 850 band B6 WCDMA 800 band B7 WCDMA 2600 band B8 WCDMA 900 band B9 WCDMA Japan 1700 band B11 WCDMA 1500 band B19 WCDMA Japan 850 band

Example

```
AT+QNWPREFCFG="gw_band"          //Query the currently configured WCDMA bands of the UE.
+QNWPREFCFG: "gw_band",1:2:3:4:5:6:7:8:9:19

OK
AT+QNWPREFCFG="gw_band",1:2      //Set WCDMA B1 and WCDMA B2.
OK
```

5.13.2. AT+QNWPREFCFG="lte_band" LTE Band Configuration

This command specifies the preferred LTE bands to be searched by UE.

AT+QNWPREFCFG="lte_band" LTE Band Configuration	
Write Command **AT+QNWPREFCFG="lte_band"[,<LTE_band>]**	Response If the optional parameter is omitted, return current configuration: **+QNWPREFCFG: "lte_band",<LTE_band>** **OK** If the optional parameter is specified, configure the preferred LTE bands to be searched: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<LTE_band>	String type. Use the colon as a separator to list the LTE Bands to be configured. The parameter format is B1:B2:…:BN.

NOTE

The LTE Band range supported by the module is: N1–N14, N17–N21, N23–N43, N46–N49, N66–N68, N71, N125–N127, N250, N252, N255.

Example

```
AT+QNWPREFCFG="lte_band"                    //Query the currently configured LTE bands of the UE.
+QNWPREFCFG:  "lte_band",1:2:3:4:5:7:8:12:13:14:17:18:19:20:25:26:28:29:30:32:34:38:39:40:41:
42:66:71

OK
AT+QNWPREFCFG="lte_band",1:2                //Set LTE N1 and LTE N2.
OK
```

5.13.3. AT+QNWPREFCFG="mode_pref" Network Search Mode Configuration

This command specifies the network search mode.

AT+QNWPREFCFG="mdoe_pref"	Network Search Mode Configuration
Write Command **AT+QNWPREFCFG="mode_pref"[,<mode_pref>]**	Response If the optional parameter is omitted, return the current configuration: **+QNWPREFCFG: "mode_pref",<mode_pref>** **OK** If the optional parameter is specified, configure the network search mode: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<mode_pref>	String type. Use the colon as a separator to list the RATs to be configured. The

	parameter format is: RAT1:RAT2:…RATN. The RATs supported by the module are as follows: AUTO WCDMA & LTE WCDMA WCDMA only LTE LTE only

Example

```
AT+QNWPREFCFG="mode_pref"                    //Query the current configuration.
+QNWPREFCFG: "mode_pref",AUTO

OK
AT+QNWPREFCFG="mode_pref",LTE                //Set RAT to LTE only.
OK
```

5.13.4. AT+QNWPREFCFG="srv_domain" Service Domain Configuration

This command specifies the registered service domain.

AT+QNWPREFCFG="srv_domain"	Service Domain Configuration
Write Command **AT+QNWPREFCFG="srv_domain"[,<srv_domain>]**	Response If the optional parameter is omitted, return current configuration: **+QNWPREFCFG: "srv_domain",<srv_domain>** **OK** If the optional parameter is specified, configure the service domain of UE: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<srv_domain>	Integer type. Service domain of UE. 0 CS only 1 PS only 2 CS & PS

Example

```
AT+QNWPREFCFG="srv_domain"          //Query the current configuration.
+QNWPREFCFG: "srv_domain",2

OK
AT+QNWPREFCFG="srv_domain",1        //Set PS only.
OK
```

5.13.5. AT+QNWPREFCFG="voice_domain" Voice Domain Configuration

This command specifies the voice domain of UE.

AT+QNWPREFCFG="voice_domain" Voice Domain Configuration	
Write Command **AT+QNWPREFCFG="voice_domain"[,<voice_domain>]**	Response If the optional parameter is omitted, return current configuration: **+QNWPREFCFG: "voice_domain",<voice_domain>** **OK** If the optional parameter is specified, configure the voice domain of UE: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<voice_domain>	Integer type. Service domain of UE.	
	0	CS voice only
	1	IMS PS voice only
	2	CS voice preferred
	3	IMS voice preferred

Example

```
AT+QNWPREFCFG="voice_domain"        //Query the current configuration.
+QNWPREFCFG: "voice_domain",2

OK
AT+QNWPREFCFG="voice_domain",3      //Set IMS voice preferred.
```

OK

5.13.6. AT+QNWPREFCFG="roam_pref" Roaming Preference Configuration

This command specifies the roaming preference of UE.

AT+QNWPREFCFG="roam_pref"	Roaming Preference Configuration
Write Command **AT+QNWPREFCFG="roam_pref"[,<roam_pref>]**	Response If the optional parameter is omitted, return current configuration: **+QNWPREFCFG: "roam_pref",<roam_pref>** **OK** If the optional parameter is specified, configure the roaming preference of UE: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<roam_pref>	Integer type. Roaming preference of UE. 1 Roam only on home networks 3 Roam on affiliate networks 255 Roam on any network

Example

```
AT+QNWPREFCFG="roam_pref"                  //Query the current configuration.
+QNWPREFCFG: "roam_pref",255

OK
AT+QNWPREFCFG= "roam_pref",1               //Set Roam Pref Home.
OK
```

5.13.7. AT+QNWPREFCFG="ue_usage_setting" UE Usage Setting Configuration

This command specifies the usage setting of UE.

AT+QNWPREFCFG="ue_usage_setting" UE Usage Setting Configuration	
Write Command **AT+QNWPREFCFG="ue_usage_setting"[,<setting>]**	Response If the optional parameter is omitted, return current configuration: **+QNWPREFCFG: "ue_usage_setting",<setting>** **OK** If the optional parameter is specified, configure the usage setting of UE: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<setting >	Integer type. Roaming preference of UE. 0 Voice centric 1 Data centric

Example

```
AT+QNWPREFCFG="ue_usage_setting"                    //Query the current configuration.
+QNWPREFCFG: "ue_usage_setting",1

OK
AT+QNWPREFCFG="ue_usage_setting",0                  //Set voice centric.
OK
```

5.13.8. AT+QNWPREFCFG="policy_band" Policyman Band

This command is used to query the band configured in the carrier policy.

AT+QNWPREFCFG="policy_band" Policyman Band	
Write Command **AT+QNWPREFCFG="policy_band"**	Response **+QNWPREFCFG: "gw_band",<gw_band>**

	+QNWPREFCFG: "lte_band",<LTE_band> **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<gw_band>	String type. Colons used as separators to list the WCDMA bands to be configured. The parameter format is **B1:B2:…:BN**.
<LTE_band>	String type. Colons used as separators to list the LTE bands to be configured. The parameter format is **B1:B2:…:BN.**

NOTE

The module supports the following WCDMA bands:
B1 WCDMA 2100 band
B2 WCDMA 1900 band
B3 WCDMA 1800 band
B4 WCDMA 1700 band
B5 WCDMA 850 band
B6 WCDMA 800 band
B7 WCDMA 2600 band
B8 WCDMA 900 band
B9 WCDMA Japan 1700 band
B11 WCDMA 1500 band
B19 WCDMA Japan 850 band
The LTE band range supported by the module is: N1–N14, N17–N21, N23–N43, N46–N49, N66–N68, N71, N125–N127, N250, N252, N255.

Example

```
AT+QNWPREFCFG="policy_band"
+QNWPREFCFG: "gw_band",1:8
+QNWPREFCFG: "lte_band",1:3:8

OK
```

5.13.9. AT+QNWPREFCFG="ue_capability_band" UE Capability Band

This command is used to query the band configured in the UE capability information.

AT+QNWPREFCFG="ue_capability_band" UE Capability Band	
Write Command **AT+QNWPREFCFG="ue_capability_band"**	Response **+QNWPREFCFG: "gw_band",<gw_band>** **+QNWPREFCFG: "lte_band",<LTE_band>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<gw_band>	String type. Colons used as separators to list the WCDMA bands to be configured. The parameter format is **B1:B2:…:BN**.
<LTE_band>	String type. Colons as separators to list the LTE bands to be configured. The parameter format is **B1:B2:…:BN.**

NOTE

The module supports the following WCDMA bands:
B1 WCDMA 2100 band
B2 WCDMA 1900 band
B3 WCDMA 1800 band
B4 WCDMA 1700 band
B5 WCDMA 850 band
B6 WCDMA 800 band
B7 WCDMA 2600 band
B8 WCDMA 900 band
B9 WCDMA Japan 1700 band
B11 WCDMA 1500 band
B19 WCDMA Japan 850 band
The LTE band range supported by the module is: N1–N14, N17–N21, N23–N43, N46–N49, N66–N68, N71, N125–N127, N250, N252, N255.

Example

```
AT+QNWPREFCFG="ue_capability_band"
+QNWPREFCFG: "gw_band",1:8
+QNWPREFCFG: "lte_band",1:3:8
```

```
OK
```

5.13.10. AT+QNWPREFCFG="rat_acq_order " UE RAT Priority

This command is used to set network rat priority in the UE capability information.

AT+QNWPREFCFG="rat_acq_order" UE RAT Priority	
Write Command **AT+QNWPREFCFG="rat_acq_order"[,<RAT_order>]**	Response If the parameter **<RAT_order>** is omitted, query the current configuration: **+QNWPREFCFG: "rat_acq_order",<RAT_order>** **OK** If the parameter **<RAT_order>** is specified, configure the network search mode: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<RAT_order>	String type. Colons are used as separators to list the RATs to be configured. The parameter format is: **RAT1:RAT2:…RATN**.

Example

```
AT+QNWPREFCFG= "rat_acq_order"                    //Query the current rat order.
+QNWPREFCFG: "rat_acq_order", LTE:WCDMA

OK
AT+QNWPREFCFG= " rat_acq_order ",LTE:WCDMA        //Set RAT order priority.
OK

AT+CFUN=1,1                                       //Reset

AT+QNWPREFCFG= " rat_acq_order "                  //Query the current RAT order.
+QNWPREFCFG: "rat_acq_order", LTE: WCDMA

OK
```

6 Call Related Commands

6.1. ATA Answer an Incoming Call

This command connects the MT to an incoming voice or data call indicated by a **RING** URC.

ATA Answer an Incoming Call	
Execution Command **ATA**	Response MT sends off-hook to the remote station. In case of data call, if successfully connected: **CONNECT<text>** And MT switches to data mode. **<text>** outputs only when **<value>** is greater than 0 in **ATX <value>** parameter setting. When MT returns to command mode after call release: **OK** Response in case of voice call, if successfully connected: **OK** Response if there is no connection: **NO CARRIER**
Maximum Response Time	90 s, determined by the network.
Characteristics	/
Reference V.25ter	

NOTES

1. Any additional commands on the same command line are ignored.
2. This command may be aborted generally when the module receives a character during command execution. However, the command will not be aborted during some connection establishments such as handshaking.

Example

```
RING                                    //A voice call is ringing.
##0
AT+CLCC
+CLCC: 1,0,0,1,0,"",128                 //PS call in LTE mode.
+CLCC: 2,1,4,0,0,"02154450290",129      //Incoming call.

OK
ATA                                     //Accept the voice call with ATA.
OK
```

6.2. ATD Originate a Call

This command sets up outgoing voice and data calls. Supplementary services can also be controlled with this command.

ATD Originate a Call	
Execution Command **ATD<n>[<mgsm>][;]**	Response If no dial tone and **ATX2** or **ATX4** is set: **NO DIALTONE** If busy and **ATX3** or **ATX4** is set: **BUSYBUSY** If a connection cannot be established: **NO CARRIER** If connection is successful and there is a non-voice call: **CONNECT<text>** And MT switches to data mode. Note: **<text>** outputs only when **<value>** is greater than 0 in **ATX<value>** parameter setting. When MT returns to command mode after the call release: **OK** If connection is successful and there is a voice call: **OK**
Maximum Response Time	5 s, determined by the network.
Characteristics	/
Reference V.25ter	

Parameter

<n>	String of dialing digits and optionally V.25ter modifiers. Dialing digits: 0-9, *, #, +, A, B, C Following V.25ter modifiers are ignored: ,(comma), T, P, !, W, @
<mgsm>	String of GSM modifiers: I Activate CLIR (Disable presentation of own number to the called party) i Deactivate CLIR (Enable presentation of own number to the called party) G Activate closed user group invocation for this call only g Deactivate closed user group invocation for this call only
<;>	It is required when setting up voice call, and will return to command state after call.

NOTES

1. When being executed, this command may be aborted generally by the module's receiving of an **ATH** command or a character. However, the command will not be aborted during some connection establishments such as handshaking.
2. Parameter "**I**" and "**i**" are only valid when no "*****" or "**#**" code is within the dial string.
3. See **ATX** command for setting result code and call monitoring parameters.
4. Responses returned after dialing with **ATD**:
   For voice call, two different response modes can be determined. MT returns **OK** immediately either after dialing was completed or after the call was established. The setting is controlled by **AT+COLP**, of which default is **AT+COLP=0** which causes the MT to return **OK** immediately after the dialing was completed. Otherwise MT will return **OK**, **BUSY**, **NO DIAL TONE**, or **NO CARRIER**.
5. Using **ATD** during an active voice call:
   - When a user originates a second voice call while there is already an active voice call, the first call will be automatically put on hold.
   - The current states of all calls can be easily checked at any time with **AT+CLCC**.

Example

```
ATD10086;                    //Dialing out the party's number.
OK
```

6.3. ATH Disconnect Existing Connection

This command disconnects data calls or voice calls. **AT+CHUP** is also used to disconnect the voice call.

ATH Disconnect Existing Connection	
Execution Command	Response
ATH[<n>]	Disconnect existing call by local TE from command line and

	terminate the call. **OK**
Maximum Response Time	90 s, determined by the network.
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type. 0 Disconnect existing call from command line and terminate the call

6.4. AT+CVHU Voice Hang up Control

This command controls whether **ATH** can be used to disconnect the voice call.

AT+CVHU Voice Hang up Control	
Test Command **AT+CVHU=?**	Response **+CVHU: (**list of supported **<mode>**s**)** **OK**
Read Command **AT+CVHU?**	Response **+CVHU: <mode>** **OK**
Write Command **AT+CVHU=<mode>**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<mode>	Integer type. 0 **ATH** can be used to disconnect the voice call

1	**ATH** is ignored with the response **OK** returned only

6.5. AT+CHUP Hang up Calls

This command cancels all voice calls in the state of Active, Waiting and Held. For data disconnections, use **ATH**.

AT+CHUP Hang up Calls	
Test Command **AT+CHUP=?**	Response **OK**
Execution Command **AT+CHUP**	Response **OK** Or **ERROR**
Maximum Response Time	90 s, determined by the network.
Characteristics	/
Reference 3GPP 27.007	

Example

```
RING                    //Incoming call.
##0
AT+CHUP                 //Hang up the call.
OK
```

6.6. ATS0 Set Number of Rings Before Automatic Answering

This command controls automatic answering mode for the incoming calls.

ATS0 Set Number of Rings Before Automatic Answering	
Read Command **ATS0?**	Response **<n>** **OK**
Write Command **ATS0=<n>**	Response This parameter setting determines the number of rings before automatic answering.

	OK If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type.	
	0	Automatic answering is disabled
	1–255	Enable automatic answering on the ring number specified

NOTE

If **<n>** is set too high, the calling party may hang up before the call is answered automatically.

Example

```
ATS0=3                          //Set three rings before automatically answering a call.
OK

RING                            //A call is coming.
##0

RING
##0

RING                            //Automatically answering the call after three rings.
##0
```

6.7. ATS6 Set Pause Before Blind Dialing

This command is implemented for compatibility reasons only, and has no effect.

ATS6 Set Pause Before Blind Dialing	
Read Command **ATS6?**	Response **<n>** **OK**
Write Command **ATS6=<n>**	Response **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type. Number of seconds to wait before blind dialing. Default: 2; Range: 2–10.

6.8. ATS7 Set Time to Wait for Connection Completion

This command specifies the duration (unit: second) to wait for the connection completion in case of answering or originating a call. If no connection is established during the time, MT will be disconnected from the line.

ATS7 Set Time to Wait for Connection Completion	
Read Command **ATS7?**	Response **<n>** **OK**
Write Command **ATS7=<n>**	Response **OK** If there is any error:

	ERROR
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type. The amount of time to wait for the connection completion in case of answering originating a call. Unit: second. 0 Disabled 1–255 The seconds to wait for connection completion

6.9. ATS8 Set the Time to Wait for Comma Dial Modifier

This command is implemented for compatibility reasons only, and has no effect.

ATS8 Set the Time to Wait for Comma Dial Modifier	
Read Command **ATS8?**	Response **<n>** **OK**
Write Command **ATS8=<n>**	Response **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type. 0 No pause when comma encountered in dial string 1–2–255 Number of seconds to wait for comma dial modifier

6.10. ATS10 Set Disconnection Delay after Indicating the Absence of Data Carrier

This command determines the duration (unit: tenths of a second) during which the UE remains connected in absence of a data carrier. This parameter setting determines the amount of time (unit: tenths of a second) during which the MT will remain connected in absence of a data carrier. If the data carrier is once more detected before disconnection, the MT remains connected.

ATS10 Set Disconnection Delay after Indicating the Absence of Data Carrier	
Read Command **ATS10?**	Response **<n>** **OK**
Write Command **ATS10=<n>**	Response **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	/
Reference V.25ter	

Parameter

<n>	Integer type. 1–15–254 Duration of tenths of seconds to wait before disconnecting after UE has indicated the absence of received line signal

6.11. AT+CSTA Select Type of Address

This command selects the type of number for further dialing commands **ATD** according to *3GPP TS 24.008 [8]*. Read Command returns the current value of **<type>**.

AT+CSTA Select Type of Address	
Test Command **AT+CSTA=?**	Response **+CSTA: (**list of supported **<type>**s**)**

	OK
Read Command **AT+CSTA?**	Response **+CSTA: <type>** **OK**
Write Command **AT+CSTA=[<type>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<type>	Integer type. Current address type setting.	
	129	Unknown type
	145	International type (contains the character "+")

6.12. AT+CLCC List Current Calls

This command returns the list of all current calls of MT. If the command is executed successfully but no calls existed, no information will be responded but **OK** will be sent to TE.

AT+CLCC List Current Calls	
Test Command **AT+CLCC=?**	Response **OK**
Execution Command **AT+CLCC**	Response **[+CLCC: <ccid1>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>]]** **[+CLCC: <ccid2>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>]]** **[...]]** **...** **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms

Characteristics	/

Parameter

<ccidx>	Integer type. The call identification number, as described in *3GPP TS 22.030 [19] subclause 6.5.5.1*. This number can be used in **AT+CHLD** command operations.
<dir>	Integer type. 0 Mobile originated (MO) call 1 Mobile terminated (MT) call
<stat>	Integer type. State of the call. 0 Active 1 Held 2 Dialing (MO call) 3 Alerting (MO call) 4 Incoming (MT call) 5 Waiting (MT call)
<mode>	Integer type. Bearer/teleservice. 0 Voice 1 Data 2 FAX
<mpty>	Integer type. 0 Call is not one of multiparty (conference) call parties 1 Call is one of multiparty (conference) call parties
<number>	String type. Phone number in format specified by **<type>**.
<type>	Type of address octet in integer format (See *3GPP TS 24.008, subclause 10.5.4.7* for details). Usually, it is one of the following three values: 129 Unknown type 145 International type (contains the character "+") 161 National type
<alpha>	String type. Alphanumeric representation for **<number>** corresponding to the entry found in phonebook..
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
ATD10086;                          //Establish a call.
OK
AT+CLCC
+CLCC: 1,0,0,1,0,"",128            //PS call in LTE mode.
+CLCC: 2,0,0,0,0,"10086",129       //The call is established and active, and the call has been
                                   answered.

OK
```

6.13. AT+CR Service Reporting Control

The Write command controls whether the MT transmits an intermediate result code **+CR: <serv>** via TA to the TE or not when a call is set up.

If it is enabled, the intermediate result code is transmitted at the point during connect negotiation at which the TA has determined which speed and quality of service will be used, before any error control or data compression reports are transmitted, and before the result code **CONNECT** is transmitted.

AT+CR Service Reporting Control	
Test Command **AT+CR=?**	Response **+CR: (**list of supported **<mode>**s**)** **OK**
Read Command **AT+CR?**	Response **+CR: <mode>** **OK**
Write Command **AT+CR=[<mode>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<mode>	Integer type. Disable or enable the reporting of intermediate result code **+CR: <serv>**.	
	0	Disable reporting
	1	Enable reporting
<serv>	String type.	
	ASYNC	Asynchronous transparent
	SYNC	Synchronous transparent
	REL ASYNC	Asynchronous non-transparent
	REL SYNC	Synchronous non-transparent

6.14. AT+CRC Set Cellular Result Codes for Incoming Call Indication

The Writer Command controls whether to use the extended format of incoming call indication or not. When enabled, an incoming call is indicated to the TE with unsolicited result code **+CRING: <type>** instead of the normal **RING**.

AT+CRC Set Cellular Result Codes for Incoming Call Indication	
Test Command **AT+CRC=?**	Response **+CRC: (**list of supported **<mode>**s**)** **OK**
Read Command **AT+CRC?**	Response **+CRC: <mode>** **OK**
Write Command **AT+CRC=[<mode>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<mode>	Integer type. Disable or enable the extended format of incoming call URC **+CRING: <type>**	
	0	Disable extended format
	1	Enable extended format
<type>	String type.	
	ASYNC	Asynchronous transparent
	SYNC	Synchronous transparent
	REL ASYNC	Asynchronous non-transparent
	REL SYNC	Synchronous non-transparent
	FAX	Facsimile
	VOICE	Voice

Example

```
AT+CRC=1                    //Enable extended format.
OK

+CRING: VOICE               //Indicate incoming call of VOICE type to TE.
```

```
ATH
OK
AT+CRC=0                    //Disable extended format.
OK

RING                        //Indicate incoming call to TE.
##0
ATH
OK
```

6.15. AT+CRLP Select Radio Link Protocol Parameter

The Writer Command selects radio link protocol (RLP) parameters used when non-transparent data calls are originated.

AT+CRLP Select Radio Link Protocol Parameter	
Test Command **AT+CRLP=?**	Response MT returns values supported. RLP (Radio Link Protocol) versions 0 and 1 share the same parameter set. MT returns only one line for this set (during which **<ver>** is not presented). **+CRLP: (**range of supported **<iws>**s**),(**range of supported **<mws>**s**),(**range of supported **<T1>**s**),(**range of supported **<N2>**s**),<ver>** **+CRLP: (**range of supported **<iws>**s**),(**range of supported **<mws>**s**),(**range of supported **<T1>**s**),(**range of supported **<N2>**s**),<ver>** **+CRLP: (**range of supported **<iws>**s**),(**range of supported **<mws>**s**),(**range of supported **<T1>**s**),(**range of supported **<N2>**s**),<ver>** **OK**
Read Command **AT+CRLP?**	Response MT returns current settings for RLP version. RLP versions 0 and 1 share the same parameter set. TA returns only one line for this set (during which **<ver>** is not presented). **+CRLP: <iws>,<mws>,<T1>,<N2>,<ver>** **...** **OK**
Write Command **AT+CRLP=[<iws>[,<mws>[,<T1>[,<N2>[,<ver>]]]]]**	Response TA sets RLP parameters used when non-transparent data calls are set up.

	OK
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS27.007	

Parameter

<iws>	Integer type. Interworking Window Size (IWF to MS window size).	
	0–61	Interworking window size
	0–240–488	For **<ver>**=2
<mws>	Integer type. Mobile Window Size (MS to IWF window size).	
	0–61	Mobile window size
	0–240–488	For **<ver>**=2
<T1>	Integer type.	
	38–48–255	Acknowledgment timer T1 in a unit of 10 ms
	42–52–255	For **<ver>**=2
<N2>	Integer type.	
	1–6–255	Retransmission attempts N2
<ver>	Integer type. RLP version number.	
	0–2	RLP version

6.16. AT+QECCNUM* Configure Emergency Call Numbers

This command queries, adds and deletes ECC (Emergency Call Codes) numbers. There are two kinds of ECC numbers: ECC numbers without (U)SIM and that with (U)SIM. The default ECC numbers without (U)SIM are 911, 112, 00, 08, 110, 999, 118 and 119. The default ECC number with (U)SIM is 911 and 112. 911 and 112 and will always be supported as ECC numbers, and cannot be deleted. ECC numbers can be saved into NVM automatically. If the (U)SIM card contains ECC file, the numbers in ECC file can also be regarded as ECC numbers.

The maximal supported ECC numbers of either type is 20.

AT+QECCNUM* Configure Emergency Call Numbers	
Test Command **AT+QECCNUM=?**	Response **+QECCNUM: (**range of supported **<mode>**s**)** **OK**
Write Command	Response

AT+QECCNUM=<mode>,<type>[,<eccnum1>[,<eccnum2>,...[,<eccnumN>]]]	If **<mode>** is 0, query the ECC numbers. In this case, **<eccnumN>** should be omitted: **+QECCNUM: <type>,<eccnum1>,<eccnum2>[…]** **OK** If **<mode>** is not 0, add (**<mode>**=1) or delete (**<mode>**=2) ECC numbers, at least one ECC number **<eccnumN>** should be specified: **OK** Or **ERROR**
Read Command **AT+QECCNUM?**	Response **[+QECCNUM: 0,<eccnum1>,<eccnum2>[…]]** **[+QECCNUM: 1,<eccnum1>,<eccnum2>[…]]** **…** **OK**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.

Parameter

<mode>	Integer type. ECC number operations. 0 Query ECC numbers 1 Add ECC numbers 2 Delete ECC numbers
<type>	Integer type. ECC number type. 0 ECC numbers without (U)SIM 1 ECC numbers with (U)SIM
<eccnumN>	String type. ECC numbers (e.g."110", "119")

Example

```
AT+QECCNUM=?                    //Query the supported ECC number operation mode.
+QECCNUM: (0-2)

OK
AT+QECCNUM?                     //Query the ECC numbers with or without (U)SIM.
+QECCNUM: 0,"911","112","00","08","110","999","118","119"
+QECCNUM: 1,"911","112"
```

```
OK
AT+QECCNUM=0,1                  //Query the ECC numbers of the type with (U)SIM.
+QECCNUM: 1,"911","112"

OK
AT+QECCNUM=1,1,"110", "234"     //Add "110" and "234" as ECC numbers of the type with (U)SIM.
OK
AT+QECCNUM=0,1                  //Query the ECC numbers with (U)SIM.
+QECCNUM: 1, "911","112","110","234"

OK
AT+QECCNUM=2,1,"110"            //Delete "110" from ECC numbers of the type with (U)SIM.
OK
AT+QECCNUM=0,1                  //Query the ECC numbers with (U)SIM.
+QECCNUM: 1, "911","112","234"

OK
```

6.17. AT^DSCI Call Status Indication

This command indicates the call status.

AT^DSCI Call Status Indication	
Test Command **AT^DSCI=?**	Response **^DSCI: (**list of supported **<n>**s**)** **OK**
Read Command **AT^DSCI?**	Response **^DSCI: <n>** **OK**
Write Command **AT^DSCI=[<n>]**	Response **OK**
Characteristics	/
Reference	

Parameter

<n>	Integer type. Presentation of the DSCI at TE. 0 DSCI not supported

1	DSCI supported

NOTE

When the presentation of the DSCI at the TE is enabled, an unsolicited result code is returned after the action. The URC is presented as follows:

^DSCI: <id>,<dir>,<stat>,<type>,<number>,<num_type>

Parameters

<id>	Integer type. Call ID	
<dir>	Integer type. Call direction	
	0	Mobile originated call
	1	Mobile terminated call
<stat>	Integer type. Call state	
	1	CALL_LOCAL_HOLD
	2	CALL_ORIGINAL
	3	CALL_CONNECT
	4	CALL_INCOMING
	5	CALL_WAITING
	6	CALL_END
	7	CALL_ALERTING
	8	CALL_REMOTE_HOLD
	9	CALL_BOTH_HOLD
<type>	Integer type. Call type	
	0	Voice call
	1	PS call
	9	Emergency call
<number>	String type. Phone number	
<num_type>	Integer type. Type of address of octet in integer format (See *3GPP TS 24.008*). Usually, it has three kinds of values:	
	129	Unknown type
	145	International type (contains the character "+")
	161	National type

Example

```
//Dial a call
AT^DSCI=1                          //Enable DSCI.
OK
ATD10086;                          //Dial 10086.
OK

^DSCI: 1,0,2,0,10086,129           //A call is originated.

^DSCI: 1,0,7,0,10086,129           //The call is alerting.
```

```
^DSCI: 1,0,3,0,10086,129                    //The call is connected.

ATH
OK

^DSCI: 1,0,6,0,10086,129                    //The call is ended.

//Incoming call
RING
##0

^DSCI: 1,1,4,0,13022100000,129              //A call is coming.

RING
##0

^DSCI: 1,1,6,0,13022100000,129              //The call is ended.

NO CARRIER
```

7 Phonebook Commands

7.1. AT+CNUM Subscriber Number

This command gets the subscribers' own number(s) from the (U)SIM.

AT+CNUM Subscriber Number	
Test Command **AT+CNUM=?**	Response **OK**
Execution Command **AT+CNUM**	Response **[+CNUM: [<alpha1>],<number1>,<type1>]** **[+CNUM: [<alpha2>],<number2>,<type2>]** **[…]** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP 27.007	

Parameter

<alphax>	Optional alphanumeric string associated with **<numberx>**. The used character set is the one selected with **AT+CSCS**.
<numberx>	String type. Phone number of format specified by **<type>**.
<typex>	Type of address octet in integer format (See *3GPP TS 24.008 [8] subclause 10.5.4.7*). Usually, it is one of the following three values: 129 Unknown type 145 International type (contains the character "+") 161 National type

<err>	Error codes. For more details, please refer to ***Table 11***.

7.2. AT+CPBF Find Phonebook Entries

This command searches the phonebook entries starting with the given **<findtext>** string from the current phonebook memory storage selected with **AT+CPBS**, and return all found entries sorted in alphanumeric order.

AT+CPBF Find Phonebook Entries	
Test Command **AT+CPBF=?**	Response **+CPBF: <nlength>,<tlength>** **OK**
Write Command **AT+CPBF=<findtext>**	Response **[+CPBF: <index>,<number>,<type>,<text>]** **[+CPBF: <index>,<number>,<type>,<text>** **[…]]** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	Depend on the storage of phonebook entries.
Characteristics	/
Reference 3GPP 27.007	

Parameter

<nlength>	Integer type. The maximum length of field **<number>**.
<tlength>	Integer type. The maximum length of field **<text>**.
<findtext>	String type. The field of maximum length **<tlength>** in current TE character set specified by **AT+CSCS**.
<index>	Integer type. In the range of location numbers of phonebook memory.
<number>	String type. Phone number of format specified by **<type>**.
<type>	Type of address of octet in integer format (See *3GPP TS 24.008*). Usually, it is one of the following three values: 129 Unknown type

	145	International type (contains the character "+")
	161	National type
<text>	Integer type. The field of maximum length **<tlength>** in current TE character set specified by **AT+CSCS**.	
<err>	Error codes. For more details, please refer to ***Table 11***.	

7.3. AT+CPBR Read Phonebook Entries

This command reads phonebook entries in location number range **<index1>... <index2>** from the current phonebook memory storage selected with **AT+CPBS**. If **<index2>** is omitted, only location **<index1>** will be returned.

AT+CPBR Read Phonebook Entries	
Test Command **AT+CPBR=?**	Response **+CPBR: (**list of supported **<index>**s**),<nlength>**,**<tlength>** **OK**
Write Command **AT+CPBR=<index1>[,<index2>]**	Response **[+CPBF: <index1>,<number>,<type>,<text>]** **[[...]** **[+CPBF: <index2>,<number>,<type>,<text>]]** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	Depends on the storage of phonebook entries.
Characteristics	/
Reference 3GPP 27.007	

Parameter

<index>	Integer type. Location numbers of phonebook memory.
<nlength>	Integer type. The maximum length of field **<number>**.
<tlength>	Integer type. The maximum length of field **<text>**.
<index1>	Integer type. The first phonebook record to be read.
<index2>	Integer type. The last phonebook record to be read.

<type>	Type of address octet in integer format (See *3GPP TS 24.008 [8] subclause 10.5.4.7*). Usually, it is one of the following three values: 129 Unknown type 145 International type (contains the character "+") 161 National type
<text>	String type. The field of maximum length **<tlength>** in current TE character set specified by **AT+CSCS**.
<err>	Error codes. For more details, please refer to ***Table 11***.

7.4. AT+CPBS Select Phonebook Memory Storage

The Write Command selects phonebook memory storage **<storage>**, which is used by other phonebook related commands. The Read Command returns currently selected memory, and, when supported by manufacturer, the number of used locations and the total number of locations in the memory.

AT+CPBS Select Phonebook Memory Storage	
Test Command **AT+CPBS=?**	Response **+CPBS: (**list of supported **<storage>**s**)** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Read Command **AT+CPBS?**	Response **+CPBS: <storage>[,<used>,<total>]** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Write Command **AT+CPBS=<storage>**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**

Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP 27.007	

Parameter

<storage>	String type. Values reserved by the present document. “DC” MT dialed calls list "EN" (U)SIM (or MT) emergency number “FD” (U)SIM fixdialing-phonebook (**AT+CPBW** operation needs the authority of PIN2) “LD” (U)SIM last-dialing-phonebook “MC” MT missed (unanswered) calls list “ME” MT phonebook "ON" (U)SIM own numbers (MSISDNs) list “RC” MT received calls list “SM” (U)SIM phonebook
<used>	Integer type. The total number of used locations in selected memory.
<total>	Integer type. The total number of locations in selected memory.
<err>	Error codes. For more details, please refer to ***Table 11***.

7.5. AT+CPBW Write Phonebook Entry

The Write Command writes phonebook entry in location number **<index>** in the current phonebook memory storage selected with **AT+CPBS**. It can also delete a phonebook entry in location number **<index>**.

AT+CPBW Write Phonebook Entry	
Test Command **AT+CPBW=?**	Response **+CPBW: (**range of supported **<index>**s**),<nlength>,**(list of supported **<type>**s**),<tlength>** **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Write Command **AT+CPBW=[<index>][,<number>[,<ty**	Response **OK**

pe>[,<text>]]]	Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP 27.007	

Parameter

<index>	Integer type. In the range of location numbers of phonebook memory.
<nlength>	Integer type. The maximum length of field **<number>**.
<tlength>	Integer type. The maximum length of field **<text>**.
<number>	String type. Phone number of format specified by **<type>**.
<type>	Type of address octet in integer format (See *3GPP TS 24.008 [8] subclause 10.5.4.7*). Usually, it is one of the following three values: 129 Unknown type 145 International type (contains the character "+") 161 National type
<text>	String type field of maximum length **<tlength>** in current TE character set specified by **AT+CSCS**.
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CSCS="GSM"
OK
AT+CPBW=10,"15021012496",129,"QUECTEL"
OK                                  //Make a new phonebook entry at location 10.
AT+CPBW=10                          //Delete entry at location 10.
OK
```

8 Short Message Service Commands

8.1. AT+CSMS Select Message Service

This command selects message service **<service>** and queries the types of messages supported by MT.

AT+CSMS Select Message Service	
Test Command **AT+CSMS=?**	Response **+CSMS: (**list of supported **<service>**s**)** **OK**
Read Command **AT+CSMS?**	Response **+CSMS: <service>,<mt>,<mo>,<bm>** **OK**
Write Command **AT+CSMS=<service>**	Response **+CSMS: <mt>,<mo>,<bm>** **OK** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<service>	Integer type. Type of message service. 0 *3GPP TS 23.040* and *3GPP TS 23.041* (the syntax of SMS AT commands is compatible with *3GPP TS 27.005 Phase 2 version 4.7.0*; Phase 2+ features which do not require new command syntax can be supported, e.g. correct routing of messages with new Phase 2+ data coding schemes). 1 *3GPP TS 23.040* and *3GPP TS 23.041* (the syntax of SMS AT commands is

	compatible with *3GPP TS 27.005 Phase 2+ version*; the requirement of **<service>** setting 1 is mentioned under corresponding command descriptions).
<mt>	Integer type. Mobile terminated messages. 0 Type not supported 1 Type supported
<mo>	Integer type. Mobile originated messages. 0 Type not supported 1 Type supported
<bm>	Integer type. Broadcast type messages. 0 Type not supported 1 Type supported
<err>	Error codes. For more details, please refer to ***Table 12*.**

Example

```
AT+CSMS=?                    //Test command
+CSMS: (0,1)

OK
AT+CSMS=1                    //Set type of message service to 1.
+CSMS: 1,1,1

OK
AT+CSMS?                     //Read command
+CSMS: 1,1,1,1

OK
```

8.2. AT+CMGF Message Format

This command specifies the input and output format of the short messages. **<mode>** indicates the format of messages used with send, list, read and write message commands and unsolicited result codes resulting from received messages.

The format of messages can be either PDU mode (entire TP data units used) or text mode (headers and body of the messages given as separate parameters). Text mode uses the value of parameter **<chset>** specified by command **AT+CSCS** to inform the character set to be used in the message body in the TA-TE interface.

AT+CMGF Message Format	
Test Command	Response
AT+CMGF=?	**+CMGF: (**list of supported **<mode>**s**)**

	OK
Read Command **AT+CMGF?**	Response **+CMGF: <mode>** **OK**
Write Command **AT+CMGF[=<mode>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<mode>	Integer type. 0 PDU mode 1 Text mode

8.3. AT+CSCA Service Center Address

The Write Command updates the SMSC address when mobile originated SMS are transmitted. In text mode, the setting is used by Write Command. In PDU mode, setting is used by the same command, but only when the length of the SMSC address is coded into the **<pdu>** parameter which equals zero.

AT+CSCA Service Center Address	
Test Command **AT+CSCA=?**	Response **OK**
Read Command **AT+CSCA?**	Response **+CSCA: <sca>,<tosca>** **OK**
Write Command **AT+CSCA=<sca>[,<tosca>]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.

Reference
3GPP TS 27.005

Parameter

<sca>	Service center address. *3GPP TS 24.011* 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 command **AT+CSCS** in *3GPP TS 27.007*). The type of address is given by **<tosca>**.
<tosca>	Type of service center address. 3GPP TS 24.011 RP SC address Type-of-Address octet in integer format (refer to **<toda>** by default).

Example

```
AT+CSCA="+8613800210500",145          //Set SMSC address.
OK
AT+CSCA?                              //Query SMSC address.
+CSCA: "+8613800210500",145

OK
```

8.4. AT+CPMS Preferred Message Storage

This command selects memory storages **<mem1>**, **<mem2>** and **<mem3>** to be used for reading, writing, etc.

AT+CPMS Preferred Message Storage	
Test Command **AT+CPMS=?**	Response **+CPMS: (**list of supported **<mem1>**s**),(**list of supported **<mem2>**s**),(**list of supported **<mem3>**s**)** **OK**
Read Command **AT+CPMS?**	Response **+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3>** **OK**
Write Command **AT+CPMS=<mem1>[,<mem2>[,<mem3>]]**	Response **+CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3>**

	OK If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.
Reference 3GPP TS 27.005	

Parameter

<mem1>	String type. Messages to be read and deleted from this memory storage. "SM" (U)SIM message storage "ME" Mobile equipment message storage "MT" Same as "ME" storage "SR" SMS status report storage location
<mem2>	String type. Messages will be written and sent to this memory storage. "SM" (U)SIM message storage "ME" Mobile equipment message storage "MT" Same as "ME" storage "SR" SMS status report storage location
<mem3>	String type. Received messages will be placed in this memory storage if routing to PC is not set (**AT+CNMI**). "SM" (U)SIM message storage "ME" Mobile equipment message storage "MT" Same as "ME" storage "SR" SMS status report storage location
<usedx>	Integer type. The number of current messages in **<memx>**.
<totalx>	Integer type. The total number of messages which can be stored in **<memx>**.
<err>	Error codes. For more details, please refer to ***Table 12***.

Example

```
AT+CPMS?                              //Query the current SMS message storage.
+CPMS: "ME",0,127,"ME",0,127,"ME",0,127

OK
AT+CPMS="SM","SM","SM"                //Set SMS message storage as "SM".
+CPMS: 0,50,0,50,0,50

OK
AT+CPMS?                              //Query the current SMS message storage.
```

```
+CPMS: "SM",0,50,"SM",0,50,"SM",0,50

OK
```

8.5. AT+CMGD Delete Messages

This command deletes short messages from the preferred message storage **<mem1>** location **<index>**. If **<delflag>** is presented and not set to 0, the ME should ignore **<index>** and follow the rules of **<delflag>** shown as below.

AT+CMGD Delete Messages	
Test Command **AT+CMGD=?**	Response **+CMGD: (**range of supported **<index>**s**),(**range of supported **<delflag>**s**)** **OK**
Write Command **AT+CMGD=<index>[,<delflag>]**	Response MT deletes message from preferred message storage **<mem1>** location **<index>**. **OK** If there is any error related to MT functionality: **+CMS ERROR:<err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<index>	Integer type value in the range of location numbers supported by the associated memory.
<delflag>	Integer type. Delete flag. 0 Delete the message specified in **<index>** 1 Delete all read messages from **<mem1>** storage 2 Delete all read messages from **<mem1>** storage and sent mobile originated messages 3 Delete all read messages from **<mem1>** storage, sent and unsent mobile originated messages 4 Delete all messages from **<mem1>** storage
<err>	Error codes. For more details, please refer to ***Table 12***.

Example

```
AT+CMGD=1                    //Delete the message specified in <index>=1.
OK
AT+CMGD=1,4                  //Delete all messages from <mem1> storage.
OK
```

8.6. AT+CMGL List Messages

This command returns messages with status value **<stat>** from preferred message storage **<mem1>** to the TE. If the status of the message is "REC UNREAD", the status in the storage changes to "REC READ". When executing command **AT+CMGL** without status value **<stat>**, it will report the list of SMS with "REC UNREAD" status.

AT+CMGL List Messages	
Test Command **AT+CMGL=?**	Response **+CMGL: (**list of supported **<stat>**s**)** **OK**
Write Command **AT+CMGL[=<stat>]**	Response If in text mode (**AT+CMGF=1**) and the command is executed successfully: For SMS-SUBMITs and/or SMS-DELIVERs: **+CMGL: <index>,<stat>,<oa/da>,[<alpha>],[<scts>][,<toa/toda>,<length>]<CR><LF><data>[<CR><LF>]** **[...]** For SMS-STATUS-REPORTs: **+CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[<CR><LF>]** **[...]** For SMS-COMMANDs: **+CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF>]** **[…]** For CBM storage: **+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[<CR><LF>]** **[...]** **OK**

	If in PDU mode (**AT+CMGF=0**) and the command is executed successfully: **+CMGL: <index>,<stat>,[<alpha>],<length><CR><LF><pdu>[<CR><LF>]** **[...]** **OK** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	300 ms. Note: Operation of **<stat>** depends on the storage of listed messages.
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<stat> Integer type in PDU mode, or string type in text mode. The status of message in memory; Defined values:

PDU mode	Text mode	Explanation
0	"REC UNREAD"	Received unread messages
1	"REC READ"	Received read messages
2	"STO UNSENT"	Stored unsent messages
3	"STO SENT"	Stored sent messages
4	"ALL"	All messages

<index> Integer type. In the range of location numbers supported by the associated memory

<da> Destination Address. *3GPP TS 23.040* TP-Destination-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 command **AT+CSCS** in *3GPP TS 27.007*); type of address is given by **<toda>**.

<oa> Originating address. *3GPP TS 23.040* TP-Originating-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 command **AT+CSCS** in *TS 27.007*); type of address is given by **<tooa>**.

<alpha> String type alphanumeric representation of **<da>** or **<oa>** corresponding to the entry found in MT phonebook; implementation of this feature is manufacturer-specified; the used character set should be the one selected with command Select TE Character Set **AT+CSCS** (see definition of this command in *3GPP TS 27.007*).

<scts> Service center time stamp. *3GPP TS 23.040* TP-Service-Centre-Time-Stamp in time-string format (refer to **<dt>**).

<toda>	Type of recipient address. *3GPP TS 24.011* TP-Recipient-Address Type-of-Address octet in integer format.
<tooa>	Type of originating address. *3GPP TS 24.011* TP-Originating-Address Type-of-Address octet in integer format (refer to **<toda>** by default).
<length>	Integer type. Message length. The length of the message body **<data>** in text mode (**AT+CMGF=1**); or the length of the actual TP data unit in octets in PDU mode (**AT+CMGF=0**) (i.e. the RP layer SMSC address octets are not counted in the length).
<data>	In the case of SMS: *3GPP TS 23.040* TP-User-Data in text mode responses; format: - If **<dcs>**, indicates that *3GPP TS 23.038* GSM 7-bit default alphabet is used and **<fo>** indicates that *3GPP TS 23.040* TP-User-Data-Header-Indication is not set. - If TE character set other than "HEX" (refer to **AT+CSCS** command in *3GPP TS 27.007*): ME/TA converts GSM alphabet into current TE character set according to rules in *3GPP TS 27.007 Annex A*. - If TE character set is "HEX": ME/TA converts each 7-bit character of GSM 7 bit default alphabet into two IRA character long hexadecimal number (e.g. character Π (GSM 7 bit default alphabet 23) is presented as 17 (IRA 49 and 55)). - If **<dcs>**, indicates that 8-bit or UCS2 data coding scheme is used, or **<fo>** indicates that *3GPP TS 23.040* TP-User-Data-Header-Indication is set: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). In the case of CBS: *3GPP TS 23.041* CBM Content of Message in text mode responses; format: - If **<dcs>**, indicates that *3GPP TS 23.038* GSM 7-bit default alphabet is used: - If TE character set other than "HEX" (refer to **AT+CSCS** command in *3GPP TS27.007*): ME/TA converts GSM alphabet into current TE character set according to rules of ***Annex A*** in *3GPP TS 27.007*. - If TE character set is "HEX": ME/TA converts each 7-bit character of the GSM 7-bit default alphabet into two IRA character long hexadecimal number.
<pdu>	In the case of SMS: *3GPP TS 24.011* SC address followed by *3GPP TS 23.040* TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)) 3GPP TS 27.007
<fo>	Depends on the command or result code: first octet of *3GPP TS 23.040 [3]* SMS-DELIVER, SMS-SUBMIT (default 17), SMS-STATUS-REPORT, or SMS-COMMAND (default 2) in integer format.
<mr>	*3GPP TS 23.040 [3]* TP-Message-Reference in integer format
<ra>	*3GPP TS 23.040 [3]* TP-Recipient-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 command +CSCS in *3GPP TS 27.007 [9]*); type of address given by **<tora>**
<tora>	*3GPP TS 24.011 [6]* TP-Recipient-Address Type-of-Address octet in integer format (refer to **<toda>** by default)
<scts>	*3GPP TS 23.040 [3]* TP-Service-Centre-Time-Stamp in time-string format (refer to

	<dt>)
<dt>	*3GPP TS 23.040 [3]* TP-Discharge-Time in time-string format: "yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone. E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals "94/05/06,22:10:00+08".
<st>	*3GPP TS 23.040 [3]* TP-Status in integer format.
<ct>	*3GPP TS 23.040 [3]* TP-Command-Type in integer format (default 0)
<sn>	*3GPP TS 23.041 [4]* CBM Serial Number in integer format.
<mid>	*3GPP TS 23.041 [4]* CBM Message Identifier in integer format.
<page>	*3GPP TS 23.041 [4]* CBM Page Parameter bits 4–7 in integer format.
<pages>	*3GPP TS 23.041 [4]* CBM Page Parameter bits 0–3 in integer format.
<err>	Error codes. For more details, please refer to ***Table 12***.

Example

```
AT+CMGF=1                          //Set SMS message format as text mode.
OK
AT+CMGL="ALL"                      //List all messages from message storage.
+CMGL: 1,"STO UNSENT","",,

<This is a test from Quectel>

+CMGL: 2,"STO UNSENT","",,

<This is a test from Quectel>

OK
```

8.7. AT+CMGR Read Messages

The command returns SMS message with location value **<index>** from message storage **<mem1>** to the TE. If status of the message is "REC UNREAD", status in the storage will change to "REC READ".

AT+CMGR Read Messages	
Test Command **AT+CMGR=?**	Response **OK**
Write Command **AT+CMGR=<index>**	Response If in text mode (**AT+CMGF=1**) and the command is executed successfully: For SMS-DELIVER: **+CMGR: <stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>** **OK**

	For SMS-SUBMIT: **+CMGR: <stat>,<da>,[<alpha>][,<toda>,<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>]<CR><LF><data>** **OK** For SMS-STATUS-REPORTs: **+CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>** **OK** For SMS-COMMANDs: **+CMGR: <stat>,<fo>,<ct>[,<pid>,[<mn>],[<da>],[<toda>],<length><CR><LF><cdata>]** **OK** For CBM storage: **+CMGR: <stat>,<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>** **OK** If in PDU mode (**AT+CMGF=0**) and command is executed successfully: **+CMGR: <stat>,[<alpha>],<length><CR><LF><pdu>** **OK** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	Depends on the length of message content.
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<index>	Integer type. In the range of location numbers supported by the associated memory.
<stat>	Integer type in PDU mode, or string type in text mode. The status of message in

memory; Defined values:

PDU mode	Text mode	Explanation
0	"REC UNREAD"	Received unread messages
1	"REC READ"	Received read messages
2	"STO UNSENT"	Stored unsent messages
3	"STO SENT"	Stored sent messages
4	"ALL"	All messages

<alpha> String type alphanumeric representation of **<da>** or **<oa>** corresponding to the entry found in MT phonebook. Implementation of this feature is manufacturer specified. The used character set should be the one selected with **AT+CSCS** command (see definition of this command in *3GPP TS 27.007*).

<da> Destination address. *3GPP TS 23.040* TP-Destination-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*). The type of address is given by **<toda>**.

<oa> Originating address. *3GPP TS 23.040* TP-Originating-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*). The type of address is given by **<tooa>**.

<scts> Service center time stamp. *3GPP TS 23.040* TP-Service-Centre-Time-Stamp in time-string format (refer to **<dt>**).

<fo> First octet. Depending on the command or result code: First octet of *3GPP TS 23.040* SMS-DELIVER, SMS-SUBMIT (default 17), SMS-STATUS-REPORT, or SMS-COMMAND in integer format. If a valid value has been entered once, the parameter can be omitted.

<pid> Protocol identifier. *3GPP TS 23.040* TP-Protocol-Identifier in integer format (default 0).

<dcs> Data coding scheme. Depending on the command or result code: *3GPP TS 23.038* SMS Data Coding Scheme (default 0), or Cell Broadcast Data Coding Scheme in integer format.

<vp> Validity period. Depending on SMS-SUBMIT **<fo>** setting: *3GPP TS 23.040* TP-Validity-Period either in integer format or in time-string format (refer to **<dt>**).

<mn> Message number. *3GPP TS 23.040* TP-Message-Number in integer format.

<mr> Message reference. *3GPP TS 23.040* TP-Message-Reference in integer format.

<ra> Recipient address. *3GPP TS 23.040* TP-Recipient-Address Address-Value field in string format. BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (refer to **AT+CSCS** command). The type of address is given by **<tora>**.

<tora> Type of recipient address. *3GPP TS 24.011* TP-Recipient-Address Type-of-Address octet in integer format (refer to **<toda>** by default).

<toda> Type of destination address. *3GPP TS 24.011* TP-Destination-Address Type-of-Address octet in integer format.

<tooa> Type of originating address. *3GPP TS 24.011* TP-Originating-Address Type-of-Address octet in integer format (refer to **<toda>** by default).

<sca>	Service center address. 3GPP TS 24.011 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*). The type of address is given by **<tosca>**.
<tosca>	Type of service center address. *3GPP TS 24.011* RP SC address Type-of-Address octet in integer format (refer to **<toda>** by default).
<length>	Integer type. Message length. In 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).
<data>	The text of short message.
<pdu>	In the case of SMS: *3GPP TS 24.011* SC address followed by *3GPP TS 23.040* TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)).
<dt>	*3GPP TS 23.040 [3]* TP-Discharge-Time in time-string format: "yy/MM/dd,hh:mm:ss±zz", during which characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone. E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals "94/05/06,22:10:00+08".
<st>	*3GPP TS 23.040 [3]* TP-Status in integer format.
<ct>	*3GPP TS 23.040 [3]* TP-Command-Type in integer format (default 0)
<sn>	*3GPP TS 23.041 [4]* CBM Serial Number in integer format.
<page>	*3GPP TS 23.041 [4]* CBM Page Parameter bits 4–7 in integer format.
<pages>	*3GPP TS 23.041 [4]* CBM Page Parameter bits 0–3 in integer format.
<cdata>	*3GPP TS 23.040 [3]* TP-Command-Data in text mode responses; ME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65))
<err>	Error codes. For more details, please refer to ***Table 12***.

Example

```
+CMTI: "SM",3                                   //Indicate that new message has been received and saved
                                                  to <index> = 3 of "SM".
AT+CSDH=1
OK
AT+CMGR=3                                       //Read message
+CMGR: "REC UNREAD","+8615021012496",,"13/12/13,15:06:37+32",145,4,0,0,"+8613800210500",145,27
<This is a test from Quectel>

OK
```

8.8. AT+CMGS Send Messages

This command sends a short message from TE to the network (SMS-SUBMIT). After executing the Write Command, wait for the prompt **>** and then start to write the message. After that, press **CTRL** + **Z** to indicate the ending of PDU and begin to send the message. Sending can be cancelled by pressing **ESC**. Abortion is acknowledged with **OK**, though the message will not be sent. The message reference **<mr>** is returned to the TE on successful message delivery. The value can be used to identify message upon unsolicited delivery status report result code.

AT+CMGS Send Messages	
Test Command **AT+CMGS=?**	Response **OK**
Write Command 1) If in text mode (**AT+CMGF=1**): **AT+CMGS=<da>[,<toda>]<CR>** text is entered (**Ctrl** + **Z/ ESC**) 2) If in PDU mode (**AT+CMGF=0**): **AT+CMGS=<length><CR>** PDU is given (**Ctrl** + **Z/ ESC**)	Response **+CMGS: <mr>** **OK** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	120 s, determined by the network.
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<da>	Destination address. *3GPP TS 23.040* TP-Destination-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 command **AT+CSCS** in *3GPP TS 27.007*); type of address is given by **<toda>**.
<toda>	Type of destination address. *3GPP TS 24.011* TP-Destination-Address Type-of-Address octet in integer format.
<length>	Integer type. Message length. In the text mode (**AT+CMGF=1**), the length of the message body 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).
<mr>	Message reference. *3GPP TS 23.040* TP-Message-Reference in integer format.
<err>	Error codes. For more details, please refer to ***Table 12***.

Example

```
AT+CMGF=1                                   //Set SMS message format to text mode.
OK
AT+CSCS="GSM"                               //Set character set to GSM which is used by the TE.
OK
AT+CMGS="15021012496"
> <This is a test from Quectel>             //Enter in text (CTRL+Z to send message, ESC to quit without sending).

+CMGS: 247

OK
```

8.9. AT+CMMS Send More Messages

The Writer Command controls the continuity of SMS relay protocol link. When feature is enabled (and supported by network) multiple messages can be sent much faster as link is kept open.

AT+CMMS Send More Messages	
Test Command **AT+CMMS=?**	Response **+CMMS: (**range of supported **<n>**s**)** **OK**
Read Command **AT+CMMS?**	Response **+CMMS: <n>** **OK**
Write Command **AT+CMMS[=<n>]**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	120 s, determined by network.
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<n>	Integer type. 0 Feature disabled. 1 Keep enabled until the time between the response of the latest message sending command (**AT+CMGS**, **AT+CMSS**, etc.) and the next sending command exceeds 1–5 seconds (the exact value is up to ME implementation); then ME shall close the link and TA switches **<n>** back to 0 automatically. 2 Feature enabled. If the time between the response of the latest message sending command and the next sending command exceeds 1–5 seconds (the exact value is up to ME implementation), ME shall close the link but MT will not switch **<n>** back to 0 automatically.
<err>	Error codes. For more details, please refer to ***Table 12***.

NOTE

After the execution of the Read Command, a delay of 5–10 seconds is required before issuing the Write Command. Otherwise **+CMS ERROR: 500** may appear.

8.10. AT+CMGW Write Messages to Memory

This command stores short messages (either SMS-DELIVER or SMS-SUBMIT) to memory storage **<mem2>**, and then the memory location **<index>** of the stored message is returned. Message status will be set to "stored unsent" by default; but parameter **<stat>** also allows other status values to be given.

The entering of text is done similarly as specified in **AT+CMGS** Write Command.

AT+CMGW Write Messages to Memory	
Test Command **AT+CMGW=?**	Response **OK**
Write Command 1) If in text mode (**AT+CMGF=1**): **AT+CMGW=<oa/da>[,<tooa/toda>[,<stat>]]<CR>** text is specified (**Ctrl** + **Z/ ESC**) 2) If in PDU mode (**AT+CMGF=0**): **AT+CMGW=<length>[,<stat>]<CR>** PDU is given (**Ctrl** + **Z/ ESC**)	Response **+CMGW: <index>** **OK** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	300 ms

Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<da> Destination address. *3GPP TS 23.040* TP-Destination-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*). The type of address is given by **<toda>**.

<oa> Originating address. *3GPP TS 23.040* TP-Originating-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*). The type of address given by **<tooa>**.

<tooa> Type of originating address. *3GPP TS 24.011* TP-Originating-Address Type-of-Address octet in integer format (refer to **<toda>** by default).

<stat> Integer type in PDU mode, or string type in text mode. The status of message in memory; Defined values:

PDU mode	Text mode	Explanation
0	"REC UNREAD"	Received unread messages
1	"REC READ"	Received read messages
2	"STO UNSENT"	Stored unsent messages
3	"STO SENT"	Stored sent messages
4	"ALL"	All messages

<toda> Type of destination address. *3GPP TS 24.011* TP-Destination-Address Type-of-Address octet in integer format.

<length> Integer type. Message length. 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).

<pdu> In the case of SMS: *3GPP TS 24.011* SC address followed by *3GPP TS 23.04* TPDU in hexadecimal format: ME/TA converts each octet of TP data unit into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)).

<index> Integer type. Index of message in selected storage **<mem2>**.

<mem2> String type. Messages will be written and sent to this memory storage.

"SM" (U)SIM message storage
"ME" Mobile equipment message storage
"MT" Same as “ME” storage
"SR" SMS status report storage location

<err> Error codes. For more details, please refer to ***Table 12***.

Example

```
AT+CMGF=1                                   //Set SMS message format to text mode.
OK
AT+CSCS="GSM"                               //Set character set as GSM which is used by the TE.
OK
AT+CMGW="15021012496"
> <This is a test from Quectel>             //Enter in text. Use CTRL + Z to write message or ESC
                                            to quit without sending.
+CMGW: 4

OK
AT+CMGF=0                                   //Set SMS message format to PDU mode.
OK
AT+CMGW=18
> 0051FF00000008000A0500030002016D4B8BD5

+CMGW: 5

OK
```

8.11. AT+CMSS Send Messages from Storage

This command sends messages with location value **<index>** from preferred message storage **<mem2>** to the network (SMS-SUBMIT or SMS-COMMAND). If a new recipient address **<da>** is given for SMS-SUBMIT, it should be used instead of the one stored with the message. Reference value **<mr>** is returned to the TE on successful message delivery.

AT+CMSS Send Messages from Storage	
Test Command **AT+CMSS=?**	Response **OK**
Write Command **AT+CMSS=<index>[,<da>[,<toda>]]**	Response If in text mode (**AT+CMGF=1**) and the message is sent successfully: **+CMSS: <mr>[,<scts>]** **OK** If in PDU mode (**AT+CMGF=0**) and the message is sent successfully: **+CMSS: <mr>[,<ackpdu>]**

	OK If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	120 s, determined by network.
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<index>	Integer type in the range of location numbers supported by the associated memory.
<da>	Destination Address. *3GPP TS 23.040* TP-Destination-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 command **AT+CSCS** in *3GPP TS 27.007*); type of address is given by **<toda>**.
<toda>	Type of destination address. *3GPP TS 24.011* TP-Detination-Address Type-of-Address octet in integer format.
<mr>	Message reference. *3GPP TS 23.040* TP-Message-Reference in integer format.
<scts>	Service center time stamp. *3GPP TS 23.040* TP-Service-Centre-Time-Stamp in time-string format (refer to **<dt>**).
<ackpdu>	Format is same for **<pdu>** in case of SMS, but without *3GPP TS 24.011* SC address field and parameter shall be bounded by double quote characters like a normal string type parameter.
<mem2>	String type. Messages will be written and sent to this memory storage. "SM" (U)SIM message storage "ME" Mobile equipment message storage "MT" Same as "ME" storage "SR" SMS status report storage location
<err>	Error codes. For more details, please refer to ***Table 12***.

Example

```
AT+CMGF=1                          //Set SMS message format to text mode.
OK
AT+CSCS="GSM"                      //Set character set to GSM which is used by the TE.
OK
AT+CMGW="15021012496"
> Hello                            //Enter in text. Use CTRL+Z to send message or ESC
                                   to quit without sending.
+CMGW: 4

OK
```

```
AT+CMSS=4                    //Send the message of index 4 from memory storage.
+CMSS: 54

OK
```

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

This command confirms successful receipt of a new message (SMS-DELIVER or SMS-STATUS-REPORT) routed directly to the TE. If the UE does not receive acknowledgement within required time (network timeout), it will send an **RP-ERROR** message to the network. The UE will automatically disable routing to the TE by setting both **<mt>** and **<ds>** values of **AT+CNMI** to 0.

AT+CNMA New Message Acknowledgement to UE/TE	
Test Command **AT+CNMA=?**	Response If in text mode (**AT+CMGF=1**): **OK** If in PDU mode (**AT+CMGF=0**): **+CNMA: (**list of supported **<n>**s**)** **OK**
Execution Command If in text mode (**AT+CMGF=1**): **AT+CNMA**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Write Command If in PDU mode (**AT+CMGF=0**): **AT+CNMA=<n>[,<length>[<CR>** **PDU is given<ctrl-Z/ESC>]]**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<n>	String type. Parameter required only for PDU mode 0 Command operates similarly as in text mode 1 Send positive (RP-ACK) acknowledgement to the network. Accepted only in PDU mode. 2 Send negative (RP-ERROR) acknowledgement to the network. Accepted only in PDU mode.
<length>	Integer type. Message length. The length of the message body **<data>** (or **<cdata>**) in characters in the text mode (**AT+CMGF=1**), or the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length) in PDU mode (**AT+CMGF=0**).
<err>	Error codes. For more details, please refer to ***Table 12***.

NOTE

The Execution and Write Commands shall only be used when **AT+CSMS** parameter **<service>** equals 1 (phase 2+) and an appropriate URC has been issued by the MT, i.e.:
+CMT for **<mt>** = 2 incoming message classes 0, 1, 3 and none;
+CMT for **<mt>** = 3 incoming message classes 0 and 3;
+CDS for **<ds>** = 1.

Example

```
AT+CSMS=1
OK
AT+CNMI=1,2,0,0,0
OK
AT+CMGF=1
OK
AT+CSDH=1
OK
+CMT: "+8615021012496",,"13/03/18,17:07:21+32",145,4,0,0,"+8613800551500",145,28
This is a test from Quectel.          //Short message is outputted directly when SMS is incoming.
AT+CNMA                               //Send ACK to the network.
OK
AT+CNMA
+CMS ERROR: 340                       //The second time return error; it needs ACK only once.
```

8.13. AT+CNMI New Message Indications to TE

This command selects the procedure on how receiving of new messages from the network is indicated to the TE when TE is active, e.g. DTR is at low level (ON). If TE is inactive (e.g. DTR is at high level (OFF)), message receiving should be done as specified in *3GPP TS 23.038 [2]*.

AT+CNMI SMS Event Reporting Configuration	
Test Command **AT+CNMI=?**	Response **+CNMI: (**range of supported **<mode>**s**),(**range of supported **<mt>**s**),(**list of supported **<bm>**s**),(**range of supported **<ds>**s**),(**list of supported **<bfr>**s**)** **OK**
Read Command **AT+CNMI?**	Response **+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr>** **OK**
Write Command **AT+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.
Reference 3GPP TS 27.005	

Parameter

<mode>	Integer type.	
	0	Buffer unsolicited result codes in the TA. If TA result code buffer is full, indications can be buffered in some other place or the oldest indications may be discarded and replaced with the new received indications.
	1	Discard indication and reject new received message unsolicited result codes when TA-TE link is reserved (e.g. in data mode). Otherwise forward them directly to the TE.
	2	Buffer unsolicited result codes in the TA when TA-TE link is reserved (e.g. in data mode) and flush them to the TE after reservation. Otherwise forward them directly to the TE.

<mt>	Integer type. The rules for storing received SMs depend on its data coding scheme (refer to *3GPPTS 23.038 [2]*), preferred memory storage (**AT+CPMS**) setting and the value is: 0 No SMS-DELIVER indications are routed to TE. 1 If SMS-DELIVER is stored into ME/TA, indication of the memory location is routed to the TE by using unsolicited result code: **+CMTI: <mem>,<index>** 2 SMS-DELIVERs (except class 2) are routed directly to the TE using unsolicited result **code: +CMT: [<alpha>],<length><CR><LF><pdu>** (PDU mode enabled) or **+CMT: <oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>** (text mode enabled; about the parameters in italics, please refer to **AT+CSDH**). Class 2 messages result in indication as defined in **<mt>**=1. 3 Class 3 SMS-DELIVERs are routed directly to TE by using unsolicited result codes defined in **<mt>**=2. Messages of other classes result in indication as defined in **<mt>**=1.
<bm>	Integer type. The rules for storing received CBMs depend on its data coding scheme (refer to *3GPP TS 23.038 [2]*), the setting of Select CBM Types (**AT+CSCB**); and the value is: 0 No CBM indications are routed to the TE. 2 New CBMs are routed directly to the TE using unsolicited result code: **+CBM: <length><CR><LF><pdu>** (PDU mode enabled); or **+CBM: <sn>,<mid>,<dcs>, <page>,<pages><CR><LF><data>** (text mode enabled).
<ds>	Integer type. 0 No SMS-STATUS-REPORTs are routed to the TE. 1 SMS-STATUS-REPORTs are routed to the TE using unsolicited result code: **+CDS: <length><CR><LF><pdu>** (PDU mode) or **+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>** (text mode) 2 If SMS-STATUS-REPORT is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code: **+CDSI: <mem>,<index>**
<bfr>	Integer type. 0 TA buffer of unsolicited result codes defined within this command is flushed to the TE when **<mode>** 1 or 2 is specified (**OK** response shall be given before flushing the codes). 1 TA buffer of unsolicited result codes defined within this command is cleared when **<mode>** 1 or 2 is specified.
<err>	Error codes. For more details, please refer to ***Table 12***.

NOTE

Unsolicited result codes:

+CMTI: <mem>,<index>	Indicate that new message has been received
+CMT: [<alpha>],<length><CR><LF><pdu>	Short message is outputted directly
+CBM: <length><CR><LF><pdu>	Cell broadcast message is outputted directly

Example

```
AT+CMGF=1                    //Set SMS message format as text mode.
```

```
OK
AT+CSCS="GSM"                    //Set character set as GSM which is used by the TE.
OK
AT+CNMI=1,2,0,1,0                //Set SMS-DELIVERs are routed directly to the TE.
OK
AT+CSDH=1                        //Show text mode parameters
OK
+CMT: "+8615021012496",,"13/03/18,17:07:21+32",145,4,0,0,"+8613800551500",145,28
This is a test from Quectel.     //Short message is outputted directly when an SMS is incoming.
```

8.14. AT+CSCB Select Cell Broadcast Message Types

This command selects which types of CBMs are to be received by the ME.

AT+CSCB Select Cell Broadcast Message Types	
Test Command **AT+CSCB=?**	Response **+CSCB: (**list of supported **<mode>**s**)** **OK**
Read Command **AT+CSCB?**	Response **+CSCB: <mode>,<mids>,<dcss>** **OK**
Write Command **AT+CSCB=<mode>[,mids>[,<dcss>]]**	Response **OK** If there is any error related to MT functionality: **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<mode>	Integer type. 0 Message types specified in **<mids>** and **<dcss>** are accepted 1 Message types specified in **<mids>** and **<dcss>** are not accepted
<mids>	String type. All different possible combinations of CBM message identifiers (refer to **<mid>**) (default is empty string), e.g. "0,1,5,320–478,922".

<dcss>	String type. All different possible combinations of CBM data coding schemes (refer to **<dcs>**) (default is empty string), e.g. "0–3,5".
<err>	Error codes. For more details, please refer to ***Table 12***.

8.15. AT+CSDH Show Text Mode Parameters

This command controls whether detailed header information is shown in text mode result codes.

AT+CSDH Show Text Mode Parameters	
Test Command **AT+CSDH=?**	Response **+CSDH: (**list of supported **<show>**s**)** **OK**
Read Command **AT+CSDH?**	Response **+CSDH: <show>** **OK**
Write Command **AT+CSDH=[<show>]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	
Reference 3GPP TS 27.005	/

Parameter

<show>	Integer type. 0 Do not show header values defined in commands **AT+CSCA** and **AT+CSMP** (**<sca>**, **<tosca>**, **<fo>**, **<vp>**, **<pid>** and **<dcs>**) nor **<length>**, **<toda>** or **<tooa>** in **+CMT**, **+CMGL**, **+CMGR** result codes for SMS-DELIVERs and SMS-SUBMITs in text mode; for SMS-COMMANDs, in **+CMGR** result code, do not show **<pid>**, **<mn>**, **<da>**, **<toda>**, **<length>** or **<cdata>**. 1 Show the values in result codes

Example

```
AT+CSDH=0                                   //Set to disable the presenting of text mode parameters
OK
```

```
AT+CMGR=2
+CMGR: "STO UNSENT" ,"",

<This is a test from Quectel>

OK
AT+CSDH=1                                   //Set to enable the presenting of text mode parameters
OK
AT+CMGR=2
+CMGR: "STO UNSENT","",,128,17,0,0,143,"+8613800551500",145,18

<This is a test from Quectel>

OK
```

8.16. AT+CSMP Set Text Mode Parameters

This command sets values for additional parameters needed when a short message is sent to the network or placed in a storage in text mode.

AT+CSMP Set Text Mode Parameters	
Test Command **AT+CSMP=?**	Response **OK**
Read Command **AT+CSMP?**	Response **+CSMP: <fo>,<vp>,<pid>,<dcs>** **OK**
Write Command **AT+CSMP=<fo>[,<vp>[,<pid>[,<dcs>]]]**	Response MT selects values for additional parameters needed when SM is sent to the network or placed in a storage when text mode is selected (**AT+CMGF=1**). It is possible to set the validity period starting from when the SMS is received by the SMSC (**<vp>** ranges from 0 to 255) or define the absolute time of the validity period termination (**<vp>** is a string). **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<fo>	First octet. Depending on the command or result code: first octet of *3GPP TS 23.040 [3]* SMS-DELIVER, SMS-SUBMIT (default 17), SMS-STATUS-REPORT, SMS-COMMAND in integer format. If a valid value has been entered once, parameter can be omitted.
<vp>	Validity period. Depend on SMS-SUBMIT **<fo>** setting: *3GPP TS 23.040 [3]* TP-Validity-Period either in integer format or in time-string format (refer to **<dt>**). Default: 167.
<pid>	Protocol identifier. 3GPP TS 23.040 *[3]* TP-Protocol-Identifier in integer format (default 0).
<dcs>	Data coding scheme. Depending on the command or result code: *3GPP TS 23.038 [2]* SMS Data Coding Scheme (default: 0), or Cell Broadcast Data Coding Scheme in integer format.

9 Packet Domain Commands

9.1. AT+CGATT PS Attach or Detach

The Write Command attaches the MT to, or detaches the MT from, the Packet Domain service. After the command has completed, the MT remains in V.250 command state. If MT is already in the requested state, the command will be ignored and the **OK** response will be returned. If the requested state cannot be achieved, an **ERROR** or **+CME ERROR** response will be returned.

AT+CGATT PS Attach or Detach	
Test Command **AT+CGATT=?**	Response **+CGATT: (**list of supported **<state>**s**)** **OK**
Read Command **AT+CGATT?**	Response **+CGATT: <state>** **OK**
Write Command **AT+CGATT=<state>**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	140 s, determined by the network.
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<state>	Integer type. The state of PS attachment.	
	0	Detached
	1	Attached

<err>	Other values are reserved and will result in an **ERROR** response to the Write Command Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CGATT=1                  //Attach to PS service.
OK
AT+CGATT=0                  //Detach from PS service.
OK
AT+CGATT?                   //Query the current PS service state.
+CGATT: 0

OK
```

9.2. AT+CGDCONT Define PDP Contexts

The Write Command specifies PDP context parameters for a specific context **<cid>**. A special form of the Write Command (**AT+CGDCONT=<cid>**) causes the values for context **<cid>** to become undefined. It is not allowed to change the definition of an already activated context.

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

AT+CGDCONT Define PDP Contexts	
Test Command **AT+CGDCONT=?**	Response **+CGDCONT: (**range of supported **<cid>**s**),<PDP_type>,<APN>,<PDP_addr>,(**range of supported **<d_comp>**s**),(**range of supported **<h_comp>**s**),(**list of supported **<IPv4AddrAlloc>**s**),(**list of supported **<request_type>**s**)** **OK**
Read Command **AT+CGDCONT?**	Response **+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>,<IPv4AddrAlloc>,<request_type>** **[…]** **OK**
Write Command **AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4AddrAlloc>[,<request_type>]]]]]]]**	Response **OK** Or **ERROR**

Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<cid> Integer type. PDP context identifier. 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) is returned by the test form of the command. Range: 1–42.

<PDP_type> String type. Packet data protocol type, a string parameter which specifies the type of packet data protocol.

"IP" Internet protocol (*IETF STD 5 [103]*)
"PPP" Point to Point Protocol (*IETF STD 51 [104]*)
"IPV6" Internet Protocol, version 6 (see *RFC 2460 [106]*)
"IPV4V6" Virtual **<PDP_type>** introduced to handle dual IP stack UE capability. (See *3GPP TS 24.301 [83]*)

<APN> String type. Access point name, a logical name used to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested.

<PDP_addr> String type. Identifies the MT in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested. The allocated address may be read using the **AT+CGPADDR**.

<d_comp> Integer type. Controls PDP data compression (applicable for SNDCP only) (refer to *3GPP TS 44.065 [61]*).

0 Off
1 On (manufacturer preferred compression)
2 V.42bis
3 V.44 (Not supported currently)

<h_comp> Integer type. Controls PDP header compression (see *3GPP TS 44.065 [61]* and *3GPP TS 25.323 [62]*).

0 Off
1 On (manufacturer preferred compression)
2 RFC1144 [105] (applicable for SNDCP only)
3 RFC2507 [107]
4 RFC3095 [108] (applicable for PDCP only)

<IPv4AddrAlloc> Integer type. Controls how the MT/TA requests to get the IPv4 address information.

0 IPv4 address allocation through NAS signaling
1 IPv4 address allocated through DHCP

<request_type>	Integer type. Indicates the type of PDP context activation request for the PDP context. 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.

9.3. AT+CGQREQ Quality of Service Profile (Requested)

This command allows the TE to specify the quality of service profile that is used when the MT activates a PDP context.

The Write Command specifies a profile for the context **<cid>**. A special form of the Write Command, **AT+CGQREQ=<cid>**, causes the requested profile for context number **<cid>** to become undefined. The Read Command returns the current settings for each defined context. Details can be found in *3GPP TS 23.107*.

AT+CGQREQ Quality of Service Profile (Requested)	
Test Command **AT+CGQREQ=?**	Response **+CGQREQ: <PDP_type>,(**range of supported **<precedence>**s**),(**range of supported **<delay>**s**),(**range of supported **<reliability>**s**),(**range of supported **<peak>**s**),(**list of supported **<mean>**s**)** **OK**
Read Command **AT+CGQREQ?**	Response **[+CGQREQ: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>]** **[+CGQREQ: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>** **[…]]** **OK**
Write Command **AT+CGQREQ=<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]**	Response **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately.

	The configurations will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<cid> Integer type. Specify a particular PDP context definition (see **AT+CGDCONT**).

<PDP_type> String type. Packet Data Protocol type.

"IP" Internet protocol (*IETF STD 5 [103]*)

"PPP" Point to Point Protocol (*IETF STD 51 [104]*)

"IPV6" Internet Protocol, version 6 (see *RFC 2460 [106]*)

"IPV4V6" Virtual **<PDP_type>** introduced to handle dual IP stack UE capability. (See *3GPP TS 24.301 [83]*)

<precedence> Integer type. Specify the precedence class.

0 Network subscribed value

1 High Priority. Service commitments shall be maintained ahead of precedence classes 2 and 3

2 Normal priority. Service commitments should be maintained ahead of precedence class 3

3 Low priority. Service commitments should be maintained

<delay> Integer type. Specify the delay class. This parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the network. For the details, please refer to ***Table 5***.

0 Network subscribed value

1–4 Please refer to ***Table 5***.

<reliability> Integer type. Specify the reliability class.

0 Network subscribed value

1 Non real-time traffic and error-sensitive application that cannot cope with data loss

2 Non real-time traffic and error-sensitive application that can cope with infrequent data loss

3 Non real-time traffic and error-sensitive application that can cope with data loss, GMM/SM, and SMS

4 Real-time traffic and error-sensitive application that can cope with data loss

5 Real-time traffic and error non-sensitive application that can cope with data loss

<peak> Integer type. Specify the peak throughput class, in octets per second.

0 Network subscribed value

1 Up to 1 000 (8 kbit/s)

2 Up to 2 000 (16 kbit/s)

3 Up to 4 000 (32 kbit/s)

4 Up to 8 000 (64 kbit/s)

5 Up to 16 000 (128 kbit/s)

6 Up to 32 000 (256 kbit/s)

7 Up to 64 000 (512 kbit/s)

	8 Up to 128 000 (1024 kbit/s) 9 Up to 256 000 (2048 kbit/s)
<mean>	Integer type. Specify the mean throughput class, in octets per hour. 0 Network subscribed value 1 100 (about 0.22 bit/s) 2 200 (about 0.44 bit/s) 3 500 (about 1.11 bit/s) 4 1 000 (about 2.2 bit/s) 5 2 000 (about 4.4 bit/s) 6 5 000 (about 11.1 bit/s) 7 10 000 (about 22 bit/s) 8 20 000 (about 44 bit/s) 9 50 000 (about 111 bit/s) 10 100 000 (about 0.22 kbit/s) 11 200 000 (about 0.44 kbit/s) 12 500 000 (about 1.11 kbit/s) 13 1000 000 (about 2.2 kbit/s) 14 2 000 000 (about 4.4 kbit/s) 15 5 000 000 (about 11.1 kbit/s) 16 10 000 000 (about 22 kbit/s) 17 20 000 000 (about 44 kbit/s) 18 50 000 000 (about 111 kbit/s) 31 Best effort
<err>	Error codes. For more details, please refer to ***Table 11***.

Table 5: Delay Class

SDU Size	Delay Class	Mean Transfer Delay	95 Percentile
128 octets	1 (Predictive)	< 0.5	< 1.5
	2 (Predictive)	< 5	< 25
	3 (Predictive)	< 50	< 250
	4 (Best Effort)	Unspecified	
1024 octets	1 (Predictive)	< 0.5	< 1.5
	2 (Predictive)	< 5	< 25
	3 (Predictive)	< 50	< 250
	4 (Best Effort)	Unspecified	

9.4. AT+CGQMIN Quality of Service Profile (Minimum Acceptable)

This command allows TE to specify a minimum acceptable profile which is checked by MT against the negotiated profile when the PDP context is activated. The Write Command specifies a profile for the context identified by the context identification parameter **<cid>**.

A special form of the Write Command, **AT+CGQMIN=<cid>** causes the minimum acceptable profile for context number **<cid>** to become undefined. In this case no check is made against the negotiated profile. The Read Command returns the current settings for each defined context.

AT+CGQMIN Quality of Service Profile (Minimum Acceptable)	
Test Command **AT+CGQMIN=?**	Response **+CGQMIN: <PDP_type>,(**range of supported **<precedence>**s**),(**list of supported **<delay>**s**),(**range of supported **<reliability>**s**),(**range of supported **<peak>**s**),(**range of supported **<mean>**s**)** **[…]** **OK**
Read Command **AT+CGQMIN?**	Response **[+CGQMIN: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>]** **[…]** **OK**
Write Command **AT+CGQMIN=<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]**	Response **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<cid>	Integer type. Specify a particular PDP context definition (see **AT+CGDCONT**).
<PDP_type>	String type. Packet data protocol type. "IP" Internet protocol (*IETF STD 5 [103]*)

	"PPP"	Point to Point Protocol (*IETF STD 51 [104]*)
	"IPV6"	Internet Protocol, version 6 (see *RFC 2460 [106]*)
	"IPV4V6"	Virtual **<PDP_type>** introduced to handle dual IP stack UE capability. (See *3GPP TS 24.301 [83]*)
<precedence>	Integer type. Specify the precedence class.	
	0	Network subscribed value
	1	High Priority. Service commitments shall be maintained ahead of precedence classes 2 and 3
	2	Normal priority. Service commitments should be maintained ahead of precedence class 3
	3	Low priority. Service commitments should be maintained
<delay>	Integer type. Specify the delay class. This parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the network. For the detail please refer to ***Table 5***.	
	0	Network subscribed value
<reliability>	Integer type. Specify the reliability class.	
	0	Network subscribed value
	1	Non real-time traffic and error-sensitive application that cannot cope with data loss
	2	Non real-time traffic and error-sensitive application that can cope with infrequent data loss
	3	Non real-time traffic and error-sensitive application that can cope with data loss, GMM/SM, and SMS
	4	Real-time traffic and error-sensitive application that can cope with data loss
	5	Real-time traffic and error non-sensitive application that can cope with data loss
<peak>	Integer type. Specify the peak throughput class, in octets per second.	
	0	Network subscribed value
	1	Up to 1 000 (8 kbit/s)
	2	Up to 2 000 (16 kbit/s)
	3	Up to 4 000 (32 kbit/s)
	4	Up to 8 000 (64 kbit/s)
	5	Up to 16 000 (128 kbit/s)
	6	Up to 32 000 (256 kbit/s)
	7	Up to 64 000 (512 kbit/s)
	8	Up to 128 000 (1024 kbit/s)
	9	Up to 256 000 (2048 kbit/s)
<mean>	Integer type. Specify the mean throughput class, in octets per second.	
	0	Network subscribed value
	1	100 (about 0.22 bit/s)
	2	200 (about 0.44 bit/s)
	3	500 (about 1.11 bit/s)
	4	1 000 (about 2.2 bit/s)
	5	2 000 (about 4.4 bit/s)

	6	5 000 (about 11.1 bit/s)
	7	10 000 (about 22 bit/s)
	8	20 000 (about 44 bit/s)
	9	50 000 (about 111 bit/s)
	10	100 000 (about 0.22 kbit/s)
	11	200 000 (about 0.44 kbit/s)
	12	500 000 (about 1.11 kbit/s)
	13	1000 000 (about 2.2 kbit/s)
	14	2 000 000 (about 4.4 kbit/s)
	15	5 000 000 (about 11.1 kbit/s)
	16	10 000 000 (about 22 kbit/s)
	17	20 000 000 (about 44 kbit/s)
	18	50 000 000 (about 111 kbit/s)
	31	Best effort
<err>	Error codes. For more details, please refer to ***Table 11***.	

9.5. AT+CGACT Activate or Deactivate PDP Contexts

This command activates or deactivates the specified PDP context(s). After the command has completed, the MT will remain in V.250 command state. If any PDP context is already in the requested state, the state for that context will remain unchanged. If MT is not PS attached when the activation form of the command is executed, MT will first perform a PS attach and then attempt to activate the specified contexts. If there is no **<cid>** specifying a particular context, it will activate or deactivate all defined contexts.

AT+CGACT Activate or Deactivate PDP Contexts	
Test Command **AT+CGACT=?**	Response **+CGACT: (**list of supported **<state>**s**)** **OK**
Read Command **AT+CGACT?**	Response **+CGACT: <cid>,<state>** **[…]** **OK**
Write Command **AT+CGACT=<state>,<cid>**	Response **OK** Or **NO CARRIER** If there is any error related to MT functionality: **+CME ERROR: <err>**

Maximum Response Time	150 s, determined by network.
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<state>	Integer type. Indicates the state of PDP context activation. 0 Deactivated 1 Activated
<cid>	Integer type. Specify a particular PDP context definition (see **AT+CGDCONT**)
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CGDCONT=4,"IP","UNINET"          //Define a PDP context.
OK
AT+CGACT=1,4                        //Activated the PDP.
OK
AT+CGACT?                           //Query the current PDP context state.
+CGACT: 1,1
+CGACT: 2,0
+CGACT: 3,0
+CGACT: 4,1
…

OK
AT+CGACT=0,4                        //Deactivated the PDP.
OK
```

9.6. AT+CGDATA Enter Data State

The Write Command causes the MT to perform whatever actions that are necessary to establish communication between the TE and the network using one or more packet domain PDP types. This may include performing a PS attach and one or more PDP context activations. Any commands following the **AT+CGDATA** in the AT command line shall not be processed by MT.

If the **<L2P>** value is unacceptable to MT, MT shall return an **ERROR** or **+CME ERROR**. Otherwise, the MT issues the intermediate result code **CONNECT** and enters V.250 online data state. After data transfer is completed, and the layer 2 protocol termination procedure has been completed successfully, the V.250

command state is re-entered and the MT returns the final result code **OK**.

AT+CGDATA Enter Data State	
Test Command **AT+CGDATA=?**	Response **+CGDATA: (**list of supported **<L2P>**s**)** **OK**
Write Command **AT+CGDATA=<L2P>,<cid>**	Response **CONNECT** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<L2P>	String type. Indicates the layer 2 protocol to be used between TE and MT: "PPP" Point to Point protocol for a PDP such as IP
<cid>	Integer type. Specify a particular PDP context definition (see **AT+CGDCONT**).
<err>	Error codes. For more details, please refer to ***Table 11***.

9.7. AT+CGPADDR Show PDP Addresses

The Execution/Write 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.

AT+CGPADDR Show PDP Address	
Test Command **AT+CGPADDR=?**	Response **+CGPADDR: (**list of defined **<cid>**s**)** **OK**
Execution/Write Command **AT+CGPADDR=[<cid>[,<cid>[,…]]]**	Response **+CGPADDR: <cid>,<PDP_addr>** **[…]**

	OK Or **ERROR**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<cid>	Integer type. Specify a particular PDP context definition (see **AT+CGDCONT**).
<PDP_addr>	String type. Identifies the MT in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by the **AT+CGDCONT** command when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by **<cid>**. **<PDP_addr>** is omitted if no address is available.

Example

```
AT+CGDCONT=1,"IP","UNINET"          //Define a PDP context.
OK
AT+CGACT=1,1                        //Activated the PDP.
OK
AT+CGPADDR=1                        //Show the PDP address.
+CGPADDR: 1,"10.76.51.180"

OK
```

9.8. AT+CGREG GPRS Network Registration Status

This command queries the network registration status and controls the presentation of an unsolicited result code **+CGREG: <stat>** when **<n>**=1 and there is a change in the MT's GPRS network registration status in GERAN/UTRAN, or unsolicited result code **+CGREG: <stat>[,[<lac>],[<ci>],[<AcT>]]** when **<n>**=2 and there is a change of the network cell in GERAN/UTRAN.

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

Read Command **AT+CGREG?**	Response **+CGREG: <n>,<stat>[,[<lac>],[<ci>],[<AcT>]]** **OK**
Write Command **AT+CGREG=[<n>]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved by executing **AT&W** after this command is issued.
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. 0 Disable network registration unsolicited result code 1 Enable network registration unsolicited result code **+CGREG:<stat>** 2 Enable network registration and location information unsolicited result code: **+CGREG: <stat>[,<lac>,<ci>[,<AcT>]]**
<stat>	Integer type. Indicate the GPRS registration status. 0 Not registered, MT is not currently searching an operator to register to. The UE is in GMM state GMM-NULL or GMM-DEREGISTERED-INITIATED. The GPRS service is disabled; the UE is allowed to attach for GPRS if requested by the user. 1 Registered, home network. The UE is in GMM state GMM-REGISTERED or GMM-ROUTING-AREA-UPDATING-INITIATED INITIATED on the home PLMN. 2 Not registered, but MT is currently trying to attach or searching an operator to register to. The UE is in GMM state GMM-DEREGISTERED or GMM-REGISTERED-INITIATED. The GPRS service is enabled, but an allowable PLMN is currently not available. The UE will start a GPRS attach as soon as an allowable PLMN is available. 3 Registration denied. The UE is in GMM state GMM-NULL. The GPRS service is disabled; and the UE is not allowed to attach for GPRS if requested by the user. 4 Unknown (e.g. out of GERAN/UTRAN coverage) 5 Registered, roaming
<lac>	String type. Two bytes location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)
<ci>	String type. Four byte (UMTS/LTE) cell ID in hexadecimal format.
<AcT>	Integer type. Access technology selected. 2 UTRAN 4 UTRAN W/HSDPA

5	UTRAN W/HSUPA
6	UTRAN W/HSDPA and HSUPA

Example

```
AT+CGREG=2
OK
AT+CGATT=0
OK

+CGREG: 2
AT+CGATT=1
OK

+CGREG: 2,1,"D5D5","8054BBF",6
```

9.9. AT+CGEREP Packet Domain Event Reporting

This command enables/disables sending of unsolicited result codes **+CGEV: XXX** from MT to TE in the case of certain events occurring in the Packet Domain MT or the network. **<mode>** controls the processing of unsolicited result codes specified within this command. **<bfr>** controls the effect on buffered codes when **<mode>** 1 or 2 is specified.

AT+CGEREP Packet Domain Event Reporting	
Test Command **AT+CGEREP=?**	Response **+CGEREP: (**range of supported **<mode>**s**),(**list of supported **<bfr>**s**)** **OK**
Read Command **AT+CGEREP?**	Response **+CGEREP: <mode>,<bfr>** **OK** Or **ERROR**
Write Command **AT+CGEREP=[<mode>[,<bfr>]]**	Response **OK** Or **ERROR**
Execution Command **AT+CGEREP**	Response **OK**

Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<mode> Integer type.

0 Buffer unsolicited result codes in the MT; if MT result code buffer is full, the oldest ones can be discarded. No codes are forwarded to the TE.

1 Discard unsolicited result codes when MT-TE link is reserved (e.g. in on-line data mode); otherwise forward them directly to the TE.

2 Buffer unsolicited result codes in the MT when MT-TE link is reserved (e.g. in on-line data mode) and flush them to the TE when MT-TE link becomes available; otherwise forward them directly to the TE.

<bfr> Integer type.

0 MT buffer of unsolicited result codes defined within this command is cleaned when **<mode>** 1 or 2 is specified.

1 MT buffer of unsolicited result codes defined within this command is flushed to the TE when **<mode>** 1 or 2 is specified (**OK** response shall be given before flushing the codes).

NOTES

The unsolicited result codes and the corresponding events are defined as follows:

1. **+CGEV: REJECT <PDP_type>,<PDP_addr>**: A network request for PDP context activation occurred when the MT was unable to report it to the TE with a **+CRING** unsolicited result code and was automatically rejected.
   Note: This event is not applicable for EPS and 5GS.
2. **+CGEV: NW REACT <PDP_type>,<PDP_addr>,[<cid>]**: The network has requested a context reactivation. The **<cid>** used to reactivate the context is provided if known to the MT.
   Note: This event is not applicable for EPS.
3. **+CGEV: NW DEACT <PDP_type>,<PDP_addr>,[<cid>]**: The network has forced a context deactivation. The **<cid>** used to activate the context is provided if known to the MT.
4. **+CGEV: ME DEACT <PDP_type>,<PDP_addr>,[<cid>]**: The mobile equipment has forced a context deactivation. The **<cid>** used to activate the context is provided if known to the MT.
5. **+CGEV: NW DETACH**: The network has forced a Packet Domain detach. This implies that all active contexts have been deactivated. These are not reported separately.
6. **+CGEV: ME DETACH**: The mobile equipment has forced a Packet Domain detach. This implies that all active contexts have been deactivated. These are not reported separately.
7. **+CGEV: NW CLASS <class>**: The network has forced a change of MS class. The highest available class is reported (see **AT+CGCLASS**).

8. **+CGEV: ME CLASS <class>**: The mobile equipment has forced a change of MS class. The highest available class is reported (see **AT+CGCLASS**).
9. **+CGEV: PDN ACT <cid>**: Activated a context. The context represents a PDN connection in LTE or a Primary PDP context in GSM/UMTS.
10. **+CGEV: PDN DEACT <cid>**: Deactivated a context. The context represents a PDN connection in LTE or a Primary PDP context in GSM/UMTS.

Parameters are described as follows:

<PDP_type>	Srting type. Packet data protocol type. A string parameter which specifies the type of packet data protocol. "IP" IPv4 "PPP" PPP "IPV6" IPv6 "IPV4V6" IPv4v6
<PDP_addr>	String type. Identifies the MT in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the TE during the PDP.
<cid>	Integer type. PDP context identifier. Specify 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) is returned by the test form of **AT+CGDCONT**.
<class>	String type. Indicate the GPRS mobile class. A Class A (highest) B Class B C Class C in GPRS and circuit switched alternate mode CG Class C in GPRS only mode CC Class C in circuit switched only mode (lowest)

Example

```
AT+CGEREP=?             //Test command
+CGEREP: (0-2),(0,1)

OK
AT+CGEREP?
+CGEREP: 0,0

OK
AT+CGEREP=2,1
OK
AT+CGACT=1,2            //Activated a context.
OK

+CGEV: PDN ACT2
AT+CGACT=0,2            //Deactivated a context.
```

OK

+CGEV: PDN DEACT2

9.10. AT+CGSMS Select Service for MO SMS Messages

This command specifies the service or service preference that the MT will use to send MO (mobile originated) SMS messages.

AT+CGSMS Select Service for MO SMS Messages	
Test Command **AT+CGSMS=?**	Response **+CGSMS: (**range of currently available **<service>**s**)** **OK**
Read Command **AT+CGSMS?**	Response **+CGSMS: <service>** **OK**
Write Command **AT+CGSMS=<service>**	Response **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<service>	Integer type. Indicates the service or service preference to be used. 0 Packet domain 1 Circuit switched 2 Packet domain preferred (use circuit switched if GPRS not available) 3 Circuit switch preferred (use Packet Domain if circuit switched not available)
<err>	Error codes. For more details, please refer to ***Table 11***.

9.11. AT+CEREG EPS Network Registration Status

This command queries the network registration status and controls the presentation of an unsolicited result code **+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.

AT+CEREG EPS Network Registration Status	
Test Command **AT+CEREG=?**	Response **+CEREG: (**range of supported **<n>**s**)** **OK**
Read Command **AT+CEREG?**	Response **+CEREG: <n>,<stat>[,<tac>,<ci>[,<AcT>]]** **OK**
Write Command **AT+CEREG=[<n>]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved by executing **AT&W** after this command is issued.
Reference 3GPP TS 27.007	

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>[,<lac>,<ci>[,<AcT>]]**
<stat>	Integer type. Indicate the EPS registration status. 0 Not registered, MT is not currently searching an operator to register to 1 Registered, home network 2 Not registered, but MT is currently trying to attach or searching an operator to register to 3 Registration denied 4 Unknown (e.g. out of E-UTRAN coverage) 5 Registered, roaming

<tac>	String type. Two-byte tracking area code in hexadecimal format.
<ci>	String type. Four-byte (E-UTRAN) cell ID in hexadecimal format.
<AcT>	Access technology selected. 7 E-UTRAN

9.12. AT+QGDCNT Packet Data Counter

This command allows the application to check how much bytes are sent to or received by the MT.

AT+QGDCNT Packet Data Counter	
Test Command **AT+QGDCNT=?**	Response **+QGDCNT: (**list of supported **<op>**s**)** **OK**
Read Command **AT+QGDCNT?**	Response **+QGDCNT: <bytes_sent>,<bytes_recv>** **OK**
Write Command **AT+QGDCNT=<op>**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference	

Parameter

<op>	Integer type. The operation on the data counter. 0 Reset the data counter 1 Save results of the data counter to NVM. If results need to be automatically saved, please refer to **AT+QAUGDCNT**
<bytes_sent>	Integer type. The amount of sent bytes.
<bytes_recv>	Integer type. The amount of received bytes.
<err>	Error codes. For more details, please refer to ***Table 11***.

NOTE

When the MT is powered on, **<bytes_sent>** and **<bytes_recv>** will be loaded from results of the data counter in NVM. The default result in NVM is 0.

Example

```
AT+QGDCNT=?          //Test command.
+QGDCNT: (0,1)

OK
AT+QGDCNT?           //Query the current bytes sent and received.
+QGDCNT: 3832,4618

OK
AT+QGDCNT=1          //Save the results to NVM.
OK
AT+QGDCNT=0          //Reset counter.
OK
```

9.13. AT+QAUGDCNT Auto Save Packet Data Counter

This command allows **AT+QGDCNT** to save results to NVM automatically.

AT+QAUGDCNT Auto Save Packet Data Counter	
Test Command **AT+QAUGDCNT=?**	Response **+QAUGDCNT: (**list of supported **<value>**s**)** **OK**
Read Command **AT+QAUGDCNT?**	Response **+QAUGDCNT: <value>** **OK**
Write Command **AT+QAUGDCNT=<value>**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms

Characteristics	/
Reference	

Parameter

<value>	Integer type. The parameter is the time-interval for **AT+QGDCNT** to save results to NVM automatically. If it is set to 0, auto-save feature would be disabled. Range: 0, 30–65535; Default: 0; Unit: second.
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+QAUGDCNT=?          //Test command.
+QAUGDCNT: (0,30-65535)

OK
AT+QAUGDCNT=35         //Set <value> to 35.
OK
AT+QAUGDCNT?           //Query the interval of auto-save.
+QAUGDCNT: 35

OK
```

10 Supplementary Service Commands

10.1. AT+CCFC Call Forwarding Number and Conditions Control

This command allows control of the call forwarding supplementary service according to *3GPP TS 22.082 [4]*. Registration, erasure, activation, deactivation and status query are supported.

AT+CCFC Call Forwarding Number and Conditions Control	
Test Command **AT+CCFC=?**	Response **+CCFC: (**range of supported **<reason>**s**)** **OK**
Write Command **AT+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<subaddr>[,<satype>[,<time>]]]]]]**	Response If **<mode>** is not equal to 2 and the command is executed successfully: **OK** If **<mode>**=2 and the command is executed successfully (only in connection with **<reason>**=0–3): For registered call forwarding numbers: **+CCFC: <status>,<class1>[,<number>,<type>[,<subaddr>,<satype>[,<time>]]]** **[+CCFC: <status>,<class2>[,<number>,<type>[,<subaddr>,<satype>[,<time>]]]** **[...]]** **OK** If no call forwarding number is registered (and therefore all classes are inactive): **+CCFC: <status>,<class>** **OK**

	If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<reason> Integer type.
- 0 Unconditional
- 1 Mobile busy
- 2 No reply
- 3 Not reachable
- 4 All call forwarding (see *3GPP TS 22.030 [19]*)
- 5 All conditional call forwarding (see *3GPP TS 22.030 [19]*)

<mode> Integer type.
- 0 Disable
- 1 Enable
- 2 Query status
- 3 Registration
- 4 Erasure

<number> String type. Phone number of forwarding address in format specified by **<type>**.

<type> Integer type. Type of address (refer *3GPP TS 24.008 [8] subclause 10.5.4.7*). Default: 145 when dialing string includes international access code character "+"; otherwise 129.

<subaddr> String type. Sub-address in the format specified by **<satype>**.

<satype> Integer type. Type of sub-address octet (refer to *3GPP TS 24.008 [8] subclause 10.5.4.8*). Default: 128.

<classx> Integer type. Each represents a class of information.
- 1 Voice (telephony)
- 2 Data (refers to all bearer services; and this may only refer to some bearer services if TA does not support values 16, 32, 64 and 128 with **<mode>**=2)
- 4 Fax (facsimile services)
- 7 Voice, data and fax
- 8 Short message service
- 16 Data circuit synchronization
- 32 Data circuit asynchronization
- 64 Dedicated packet access
- 128 Dedicated PAD access

<time> Integer type. When "no reply", "all call forwarding" or "all conditional call forwarding" is enabled or queried, this gives the time to wait before call is forwarded. Range: 1–30. Default 20. Unit: second.

<status>	Integer type. 0 Not active 1 Active
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CCFC=0,3,"15021012496"          //Register the destination number for unconditional call
OK                                   forwarding (CFU).
AT+CCFC=0,2                        //Query the status of CFU without specifying <class>.
+CCFC: 1,1,"+8615021012496",145,,,

OK
AT+CCFC=0,4                        //Erase the registered CFU destination number.
OK
AT+CCFC=0,2                        //Query the status and there is no destination number.
+CCFC: 0,255

OK
```

10.2. AT+CCWA Call Waiting Control

This command allows control of the call waiting supplementary service according to *3GPP TS 22.083 [5]*. Activation, deactivation and status query are supported.

AT+CCWA Call Waiting Control	
Test Command **AT+CCWA=?**	Response **+CCWA: (**list of supported **<n>**s**)** **OK**
Read Command **AT+CCWA?**	Response **+CCWA: <n>** **OK**
Write Command **AT+CCWA=[<n>[,<mode>[,<class>]]]**	Response If **<mode>** is not equal to 2 and the command is executed successfully: **OK** If **<mode>**=2 and the command is executed successfully: **+CCWA: <status>,<class1>** **[<CR><LF>+CCWA: <status>,<class2>**

	[...]] **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. 0 Disable presentation of an unsolicited result code 1 Enable presentation of an unsolicited result code
<mode>	Integer type. When **<mode>** is omitted, network is not interrogated. 0 Disable 1 Enable 2 Query status
<classx>	Integer type. Each integer represents a class of information. 1 Voice (telephony) 2 Data (refers to all bearer services; and this may only refer to some bearer services if TA does not support values 16, 32, 64 and 128 with **<mode>**=2) 4 Fax (facsimile services) 7 Voice, data and fax 8 Short message service 16 Data circuit synchronization 32 Data circuit asynchronization 64 Dedicated packet access 128 Dedicated PAD access
<status>	Integer type. 0 Not active 1 Active
<number>	String type. Phone number of calling address in format specified by **<type>**.
<type>	Type of address octet in integer format. 129 Unknown type (IDSN format number) 145 International number type (ISDN format)
<alpha>	Optional string type alphanumeric representation of **<number>** corresponding to the entry found in phonebook. Used character set should be the one selected with command select TE character set **AT+CSCS**.
<CLI_validity>	Integer type. Provide details why **<number>** does not contain a calling party BCD number (see *3GPP TS 24.008 [8] subclause 10.5.4.30*).

	0 CLI valid 1 CLI has been withheld by the originator (see *3GPP TS 24.008 [8] table 10.5.135a/3GPP TS 24.008* code "Reject by user") 2 CLI is not available due to interworking problems or limitations of originating network (see *3GPP TS 24.008 [8] table 10.5.135a/3GPP TS 24.008* code "Interaction with other service") 3 CLI is not available due to calling party being of type payphone (see *3GPP TS 24.008 [8] table 10.5.135a/3GPP TS 24.008* code "Coin line/payphone") 4 CLI is not available due to other reasons (see *3GPP TS 24.008 [8] table 10.5.135a/3GPP TS 24.008* code "Unavailable") When CLI is not available (**<CLI_validity>** equals to 2, 3 or 4), **<number>** shall be an empty string ("") and **<type>** value will not be significant. Nevertheless, TA may return the recommended value 128 for **<type>** (TON/NPI unknown in accordance with 3*GPP TS 24.008 [8] subclause 10.5.4.7*). When CLI has been withheld by the originator, (**<CLI_validity>**=1) and the CLIP is provisioned with the "override category" option (see *3GPP TS 22.081 [3] and 3GPP TS 23.081 [40]*), **<number>** and **<type>** is provided. Otherwise, TA shall return the same setting for **<number>** and **<type>** as if the CLI was not available.
<subaddr>	String type. Subaddress of format specified by **<satype>**.
<satype>	Integer type. Subaddress octet (see *3GPP TS 24.008 [8] subclause 10.5.4.8*).
<priority>	Optional digit type parameter indicating that the eMLPP priority level of the incoming call. The priority level values are as defined in eMLPP specification *3GPP TS 22.067 [54]*.
<err>	Error codes. For more details, please refer to ***Table 11***.

NOTES

1. **<status>**=0 should be returned only if the service is not active for any **<class>** i.e. **+CCWA: 0,7** will be returned in this case.
2. When **<mode>**=2, all active call waiting classes will be reported. In this mode the command is aborted by pressing any key.
3. Unsolicited result code:
   When the presentation call waiting at the MT is enabled (and call waiting is enabled) and a terminating call set up during an established call, an unsolicited result code is returned:
   +CCWA: <number>,<type>,<class>[,<alpha>][,<CLI_validity>[,<subaddr>,<satype>[,<priority>]]]

Example

```
AT+CCWA=1,1                    //Enable presentation of an unsolicited result code.
OK
ATD10086;                      //Establish a call.
OK
```

+CCWA: "02154450293",129,1	//Indication of a call that has been waiting.

10.3. AT+CHLD Call Related Supplementary Services

This command allows the control of the following call related services:

- A call can be temporarily disconnected from the MT but the connection is retained by the network;
- Multiparty conversation (conference calls);
- The served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.

Calls can be put on hold, recovered, released and added to a conversation, and transferred similarly as defined in *3GPP TS 22.030 [19]*.

This is based on the GSM/UMTS supplementary services HOLD (Call Hold; see *3GPP TS 22.083 [5] clause 2* and *3GPP TS 24.610 [135]*), MPTY (MultiParty; see *3GPP TS 22.084 [22]*) and ECT (Explicit Call Transfer; see *3GPP TS 22.091 [30]* and *3GPP TS 24.629 [139]*). The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards. Call Hold, MultiParty and Explicit Call Transfer are only applicable to teleservice 11.

AT+CHLD Call Related Supplementary Services	
Test Command **AT+CHLD=?**	Response **+CHLD: (**list of supported **<n>**s**)** **OK**
Write Command **AT+CHLD=[<n>]**	Response **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. If it is ignored in Write Command, value 2 will be used. 0 Terminate all held calls or UDUB (User Determined User Busy) for a waiting call. If a

	call is waiting, terminate the waiting call. Otherwise, terminate all held calls (if any) 1 Terminate all active calls (if any) and accept the other call (waiting call or held call). 1X Terminate the specific call number X (X = 1–7) 2 Place all active calls on hold (if any) and accept the other call (waiting call or held call) as the active call. 2X Place all active calls except call X (X = 1–7) on hold 3 Add the held call to the active calls 4 Connect the two calls and disconnects the subscriber from both calls (ECT)
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
ATD10086;                                   //Establish a call.
OK

+CCWA: "02154450293",129,1                  //Indication of a call that has been waiting.
AT+CHLD=2                                   //Place the active call on hold and accept the waiting call as
                                              the active call.
OK
AT+CLCC
+CLCC: 1,0,1,0,0,"10086",129                //The first call is on hold.

+CLCC: 2,1,0,0,0,"02154450293",129          //The second call is active.

OK
AT+CHLD=21                                  //Place the active call except call X = 1 on hold.
OK
AT+CLCC
+CLCC: 1,0,0,0,0,"10086",129                //The first call is active.

+CLCC: 2,1,1,0,1,"02154450293",129          //The second call is on hold.

OK
AT+CHLD=3                                   //Add a held call to the active calls in order to set up a
                                              conference (multiparty) call.
OK
AT+CLCC
+CLCC: 1,0,0,0,1,"10086",129
+CLCC: 2,1,0,0,1,"02154450293",129

OK
```

10.4. AT+CLIP Calling Line Identification Presentation

This command refers to the GSM/UMTS supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call.

The Write Command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network: When **<n>**=1, the presentation of the calling line identity at the TE is enabled and when the calling subscriber allows, the unsolicited result code **+CLIP: <number>,<type>[,<subaddr>,<satype>[,[<alpha>][,<CLI_validity>]]]** is returned after every **RING** (or **+CRING: <type>**; refer to **AT+CRC**) result code sent from TA to TE. It is manufacturer specific if this response is used when normal voice call is answered. The unsolicited result code **+CLIP** does not support numbers of the SIP URI format; When **<n>**=0, the presentation of the calling line identity at the TE with unsolicited result code **+CLIP** is disabled.

AT+CLIP Calling Line Identification Presentation	
Test Command **AT+CLIP=?**	Response **+CLIP: (**list of supported **<n>**s**)** **OK**
Read Command **AT+CLIP?**	Response **+CLIP: <n>,<m>** **OK**
Write Command **AT+CLIP=[<n>]**	Response MT enables or disables the presentation of the calling line identity (CLI) at the TE. It has no effect on the execution of the supplementary service CLIP in the network. **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	15 s, determined by network.
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. Configures/shows the result code presentation status to the TE. 0 Disable unsolicited result codes

	1 Enable unsolicited result codes
<m>	Integer type. The subscriber CLIP service status in the network. 0 CLIP not provisioned 1 CLIP provisioned 2 Unknown (e.g. no network, etc.)
<number>	String type. Phone number calling address in format specified by **<type>**.
<subaddr>	String type. Sub-address of format specified by **<satype>**.
<satype>	Type of sub-address octet in integer format (see *3GPP TS 24.008 [8] subclause 10.5.4.8*)
<type>	Type of address octet in integer format. 129 Unknown type (IDSN format) 145 International number type (ISDN format) 161 National number
<alpha>	Optional string type alphanumeric representation of **<number>** corresponding to the entry found in phonebook. Used character set should be the one selected with command select TE character set **AT+CSCS**.
<CLI_validity>	Integer type. Provide details why **<number>** does not contain a calling party BCD number (see *3GPP TS 24.008 [8] subclause 10.5.4.30*). 0 CLI valid 1 CLI has been withheld by the originator (see *3GPP TS 24.008 [8] table 10.5.135a/3GPP TS 24.008* code "Reject by user") 2 CLI is not available due to interworking problems or limitations of originating network (see *3GPP TS 24.008 [8] table 10.5.135a/3GPP TS 24.008* code "Interaction with other service") 3 CLI is not available due to calling party being of type payphone (see *3GPP TS 24.008 [8] table 10.5.135a/3GPP TS 24.008* code "Coin line/payphone") 4 CLI is not available due to other reasons (see *3GPP TS 24.008 [8] table 10.5.135a/3GPP TS 24.008* code "Unavailable") When CLI is not available (**<CLI_validity>** equals to 2, 3 or 4), **<number>** shall be an empty string ("") and **<type>** value will not be significant. Nevertheless, TA may return the recommended value 128 for **<type>** (TON/NPI unknown in accordance with 3*GPP TS 24.008 [8] subclause 10.5.4.7*). When CLI has been withheld by the originator, (**<CLI_validity>**=1) and the CLIP is provisioned with the "override category" option (see *3GPP TS 22.081 [3] and 3GPP TS 23.081 [40]*), **<number>** and **<type>** is provided. Otherwise, TA shall return the same setting for **<number>** and **<type>** as if the CLI was not available.
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CPBW=1,"02151082965",129,"QUECTEL"
OK
AT+CLIP=1
OK
```

```
RING
##0

+CLIP: "02151082965",129,,,"QUECTEL",0
```

10.5. AT+CLIR Calling Line Identification Restriction

This command refers to the CLIR supplementary service (Calling Line Identification Restriction) according to *3GPP TS 22.081 [3]* and the OIR supplementary service (Originating Identification Restriction) according to *3GPP TS 24.607 [119]* that allows a calling subscriber to enable or disable the presentation of the calling line identity (CLI) to the called party when originating a call.

The Write Command overrides the CLIR subscription (default is restricted or allowed) when temporary mode is provisioned as a default adjustment for all following outgoing calls. This adjustment can be revoked by using the opposite command.

AT+CLIR Calling Line Identification Restriction	
Test Command **AT+CLIR=?**	Response **+CLIR: (**range of supported **<n>**s**)** **OK**
Read Command **AT+CLIR?**	Response **+CLIR: <n>,<m>** **OK**
Write Command **AT+CLIR=<n>**	Response **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	15 s, determined by network.
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. Sets the adjustment for outgoing calls. 0 Presentation indicator is used according to the subscription of the CLIR service

	1	CLIR invocation
	2	CLIR suppression
<m>	Integer type. Shows the subscriber CLIR service status in the network.	
	0	CLIR not provisioned
	1	CLIR provisioned in permanent mode
	2	Unknown (e.g. no network, etc.)
	3	CLIR temporary mode presentation restricted
	4	CLIR temporary mode presentation allowed
<err>	Error codes. For more details, please refer to ***Table 11***.	

10.6. AT+COLP Connected Line Identification Presentation

This command enables/disables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobile originated call, referring to the GSM/UMTS supplementary service COLP (Connected Line Identification Presentation).

The Write Command enables or disables the presentation of the COL (Connected Line) at the TE for a mobile originating a call. It has no effect on the execution of the supplementary service COLR in the network. When **<n>**=1, the presentation of the connected line identity at the TE enabled and when the called subscriber allows the intermediate result code, **+COLP: <number>,<type>[,<subaddr>,<satype>[,<alpha>]]** is returned from TA to TE before any **AT+CR** or V.25ter responses. It is manufacturer specific if this response is used when normal voice call is established. The intermediate result code **+COLP** does not support numbers of the SIP URI format

AT+COLP Connected Line Identification Presentation	
Test Command **AT+COLP=?**	Response **+COLP: (**list of supported **<n>**s**)** **OK**
Read Command **AT+COLP?**	Response **+COLP: <n>,<m>** **OK**
Write Command **AT+COLP=[<n>]**	Response **OK**
Maximum Response Time	15 s, determined by network.
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. Sets/presents the result code presentation status in the MT. 0 Disable 1 Enable
<m>	Integer type. Parameter presents the subscriber COLP service status in the network. 0 COLP not provisioned 1 COLP provisioned 2 Unknown (e.g. no network, etc.)
<number>	String type. Phone number calling address in format specified by **<type>**.
<type>	Integer type. Type of address octet in integer format. 129 Unknown type (IDSN format number) 145 International number type (ISDN format)
<subaddr>	String type. Sub-address of format specified by **<satype>**.
<satype>	Type of sub-address octet in integer format (see *3GPP TS 24.008 [8] subclause 10.5.4.8*).
<alpha>	Optional string type alphanumeric representation of **<number>** corresponding to the entry found in phonebook. Used character set should be the one selected with command select TE character set **AT+CSCS**.

Example

```
AT+CPBW=1,"02151082965",129,"QUECTEL"
OK
AT+COLP=1
OK
ATD02151082965;
+COLP: "02151082965",129,,,"QUECTEL"

OK
```

10.7. AT+CSSN Supplementary Service Notifications

The Write Command enables/disables the presentation of notification result codes from TA to TE.

When **<n>**=1 and a supplementary service notification is received after a mobile originated call setup, the intermediate result code **+CSSI: <code1>[,[<index>][,<SS_code>]]** is sent to TE before any other MO call setup result codes.

When **<m>**=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, or when a forward check supplementary service notification is received, unsolicited result code **+CSSU: <code2>[,<index>[,[<number>],[<type>][,[<subaddr>],[<satype>]][,<SS_code>]]]** is

sent to TE.

AT+CSSN Supplementary Service Notifications	
Test Command **AT+CSSN=?**	Response **+CSSN: (**list of supported **<n>**s**),(**list of supported **<m>**s**)** **OK**
Read Command **AT+CSSN?**	Response **+CSSN: <n>,<m>** **OK**
Write Command **AT+CSSN=<n>[,<m>]**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. Sets/shows the **+CSSI** intermediate result code presentation status to the TE. 0 Disable 1 Enable
<m>	Integer type. Sets/shows the **+CSSU** unsolicited result code presentation status to the TE. 0 Disable 1 Enable
<code1>	Integer type. It is manufacturer specified and supports the following codes: 0 Unconditional call forwarding is active 1 Some of the conditional call forwarding are active 2 Call has been forwarded 3 Call is waiting 5 Outgoing calls are barred
<code2>	Integer type. It is manufacturer specific and supports the following codes: 0 This is a forwarded call (MT call setup) 2 Call has been put on hold (during a voice call) 3 Call has been retrieved (during a voice call) 5 Call on hold has been released (during a voice call)

	10 Additional incoming call forwarded
<err>	Error codes. For more details, please refer to ***Table 11***.

10.8. AT+CUSD Unstructured Supplementary Service Data

This command allows control of the Unstructured Supplementary Service Data (USSD) according to *3GPP TS 22.090 [23]*, *3GPP TS 24.090 [148] and 3GPP TS 24.390 [131]*. Both network and mobile initiated operations are supported.

<n> disables/enables the presentation of an unsolicited result code. The value **<n>**=2 cancels an ongoing USSD session. For a USSD response from the network, or a network initiated operation, the format is: **+CUSD: <m>[,<rspstr>,[<dcs>]]**.

When **<reqstr>** is given, a mobile initiated USSD string or a response USSD string to a network initiated operation is sent to the network. The response USSD string from the network is returned in a subsequent **+CUSD** URC.

AT+CUSD Unstructured Supplementary Service Data	
Test Command **AT+CUSD=?**	Response **+CUSD: (**range of supported **<n>**s**)** **OK**
Read Command **AT+CUSD?**	Response **+CUSD: <n>** **OK**
Write Command **AT+CUSD=[<n>[,<reqstr>[,<dcs>]]]**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	120 s, determined by the network.
Characteristics	The command takes effect after rebooting. The configurations will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. Sets/presents the result code presentation status to the TE. 0 Disable the result code presentation to the TE 1 Enable the result code presentation to the TE 2 Cancel session (not applicable to Read Command response)
<reqstr>	String type. Unstructured Supplementary Service Data (USSD) to be sent to the network. If this parameter is omitted, network is not interrogated.
<rspstr>	String type. Unstructured Supplementary Service Data (USSD) received from the network
<dcs>	Integer type. Indicates Cell Broadcast Data Coding Scheme (see *3GPP TS 23.038 [25]*). Default: 15.
<m>	Integer type. USSD response from the network or the network initiated operation. 0 No further user action required (network initiated USSD Notify, or no further information needed after mobile initiated operation) 1 Further user action required (network initiated USSD Request, or further information needed after mobile initiated operation) 2 USSD terminated by network 3 Another local client has responded 4 Operation not supported 5 Network time out
<err>	Error codes. For more details, please refer to ***Table 11***.

11 Audio Commands

NOTE

Audio related commands are supported by EG512R-EA only.

11.1. AT+CLVL Loudspeaker Volume Level Selection

This command selects the volume level of the internal loudspeaker of the MT.

AT+CLVL Loudspeaker Volume Level Selection	
Test Command **AT+CLVL=?**	Response **+CLVL: (**list of supported **<level>**s**)** **OK**
Read Command **AT+CLVL?**	Response **+CLVL: <level>** **OK** Or **ERROR**
Write Command **AT+CLVL=<level>**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<level>	Integer type. Volume level with manufacturer specific range (Smallest value represents the lowest sound level). Range: 0–5. Default: 3.
<err>	Error codes. For more details, please refer to ***Table 11***.

11.2. AT+CMUT Mute Control

This command enables/disables the uplink voice muting during a voice call.

AT+CMUT Mute Control	
Test Command **AT+CMUT=?**	Response **+CMUT: (**list of supported **<n>**s**)** **OK**
Read Command **AT+CMUT?**	Response **+CMUT: <n>** **OK**
Write Command **AT+CMUT=<n>**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations will be saved automatically.
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type. 0 Mute off 1 Mute on
<err>	Error codes. For more details, please refer to ***Table 11***.

11.3. AT+QAUDLOOP Enable/Disable Audio Loop Test

This command enables/disables audio loop test.

AT+QAUDLOOP Enable/Disable Audio Loop Test	
Test Command **AT+QAUDLOOP=?**	Response **+QAUDLOOP: (**list of supported **<enable>**s**)** **OK**
Read Command **AT+QAUDLOOP?**	Response **+QAUDLOOP: <enable>** **OK**
Write Command **AT+QAUDLOOP=<enable>**	Response **OK** Or **ERROR**
Maximum Response Time	300ms
Characteristics	The command takes effect immediately. The configuration will not be saved.

Parameter

<enable>	Integer type. Enable or disable audio loop test. 0 Disable audio loop test 1 Enable audio loop test

11.4. AT+VTS DTMF and Tone Generation

This command sends ASCII characters which cause MSC to transmit DTMF tones to a remote subscriber. This command can only be operated in a voice call.

AT+VTS DTMF and Tone Generation	
Test Command **AT+VTS=?**	Response **+VTS: (**list of supported **<DTMF_string>**s**),(**range of supported **<duration>**s**)** **OK**

Write Command **AT+VTS=<DTMF_string>[,<duration>]**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	Depends on the length of **<DTMF_string>** and **<duration>**.
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<DTMF_string>	String type. ASCII characters in the set 0–9, #, *, A, B, C, D. The string should be enclosed in quotation marks ("..."). When sending multiple tones at a time, the time interval of two tones **<interval>** can be specified by **AT+VTD**. The maximal length of the string is 31 bytes.
<duration>	Integer type. The duration of each tone in 10 ms with tolerance. Range: 0–255. If the duration is less than the minimum time specified by the network, the actual duration will be the network specified time. If this parameter is omitted, **<duration>** is specified by **AT+VTD**.
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
ATD12345678900;                 //Dial.
OK
//Call connected
AT+VTS="1"                      //The remote caller can hear the DTMF tone.
OK
AT+VTS="1234567890A"            //Send multiple tones at a time.
OK
```

11.5. AT+VTD Set Tone Duration

This command sets the duration of DTMF tones. It can also set time interval of two tones when sending multiple tones at a time.

AT+VTD Set Tone Duration	
Test Command **AT+VTD=?**	Response **+VTD: (**range of supported **<duration>**s**),(**range of supported **<interval>**s**)** **OK**
Read Command **AT+VTD?**	Response **+VTD: <duration>,<interval>** **OK**
Write Command **AT+VTD=<duration>[,<interval>]**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The parameters will not be saved.
Reference 3GPP TS 27.007	

Parameter

<duration>	Integer type. The duration tone in 1/10 seconds with tolerance. Range: 0–255. Default: 3. If the duration is less than the minimum time specified by the network, the actual duration will be network specified time.
<interval>	Integer type. The time interval of two tones when sending multiple tones at a time by **AT+VTS**. Range: 0–255. Default: 0. Unit: 0.1 second.
<err>	Error codes. For more details, please refer to ***Table 11***.

11.6. AT+QAUDMOD* Set Audio Mode

This command sets the audio mode required for the connected device.

AT+QAUDMOD* Set Audio Mode	
Test Command **AT+QAUDMOD=?**	Response **+QAUDMOD: (**range of supported **<mode>**s**)** **OK**
Read command **AT+QAUDMOD?**	Response **+QAUDMOD: <mode>** **OK**
Write Command **AT+QAUDMOD=<mode>**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300ms
Characteristics	The command takes effect immediately. The parameters will not be saved.
Reference Quectel	

Parameter

<mode>	Integer type. The current audio mode. 0 Echo canceller, noise suppressor, digital gain and calibration parameter for handset 1 Echo canceller, noise suppressor, digital gain and calibration parameter for headset 2 Echo canceller, noise suppressor, digital gain and calibration parameter for speaker 3 Turn off all audio processing functions
<err>	Error codes. For more details, please refer to ***Table 11***.

11.7. AT+QDAI Digital Audio Interface Configuration

This command configures the digital audio interface. When there is no codec on board, please define the PCM formats. In the following conditions, the MT can be used directly with default settings (master mode, short-synchronization, 2048 kHz clock frequency, 16-bit liner data format, 8 kHz sampling rate).

AT+QDAI Digital Audio Interface Configuration	
Test Command **AT+QDAI=?**	Response **+QDAI: (**list of supported **<io>**s**),(**list of supported **<mode>**s**),(**list of supported **<fsync>**s**),(**range of supported **<clock>**s**),(**list of supported **<format>**s**),(**list of supported **<sample>**s**),(**range of supported **<num_slots>**s**),(**range of supported **<slot_mapping0>**s**),(**range of supported **<slot_mapping1>**s**)** **OK**
Read Command **AT+QDAI?**	Response **+QDAI: <io>[,<mode>,<fsync>,<clock>,<format>,<sample>,<num_slots>,<slot_mapping0>[,<slot_mapping1>]]** **OK**
Write Command **AT+QDAI=<io>[,<mode>,<fsync>,<clock>[,<format>[,<sample>[,<num_slots>,<slot_mapping0>[,<slot_mapping1>]]]]]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting. The configurations will be saved automatically.
Reference Quectel	

Parameter

<io>	x Unused (1–6 can be set)
<mode>	Integer type. 0 Master mode 1 Slave mode
<fsync>	Integer type. 0 Primary mode (short-synchronization) 1 Auxiliary mode (long-synchronization)
<clock>	Integer type. Clock frequency.

	0 128 kHz 1 256 kHz 2 512 kHz 3 1024 kHz 4 2048 kHz 5 4096 kHz
<format>	Integer type. Data format. 0 16-bit linear
<sample>	Integer type. 0 8 kHz 1 16 kHz
<num_slots>	Integer type. 1 Number of slot 2 Number of slot (Set to 2 when use **<slot_mappinp1>**)
<slot_mapping0>	Integer type. Slot mapping value. Range: 1–16.
<slot_mapping1>	Integer type. Slot mapping value. Range: 2–16.

NOTES

1. 4096 kHz clock frequency is only applicable for 16 kHz sampling rate.
2. 128 kHz clock frequency is not supported.
3. Bit per frame = **<clock>/<sample>**. For example, if **<clock>** is 2048 kHz and **<sample>** is 8 kHz, bit per frame will be 256. Bit per frame should be greater than 16.
4. When slave mode is selected, master and synchronization clock should be provided for the MT.
5. When a recommended codec is selected and 16 kHz sampling rate is desired, please input **<sample>**. Currently the MT only supports 16 kHz (**AT+QDAI=x,0,0,5,0,1**).

Example

```
AT+QDAI=?                    //Query the range.
+QDAI: x,(0,1),(0,1),(0-5),(0),(0,1),(1-2),(1-16),(2-16)

OK
AT+QDAI?                     //Query the current interface configuration.
+QDAI: x,0,0,4,0,0,1,1

OK
AT+QDAI=x,1,0,4,0,0,1,1      //Set AUX PCM interface to slave, short-sync, 8 kHz sample, 2048kHz
                               BCLK.
OK
AT+QDAI=x,0,0,4,0,1,1,1      //Configure one slot.

OK
AT+QDAI=x,0,0,4,0,1,2,1,3    //Configure two slots.
```

OK

11.8. AT+QSIDET Set Side Tone Gain in Current Mode

This command sets the side tone gain value in current mode.

AT+QSIDET Set Side Tone Gain in Current Mode	
Test Command **AT+QSIDET=?**	Response **+QSIDET: (**range of supported **<st_gain>**s**)** **OK**
Read Command **AT+QSIDET?**	Response **+QSIDET: <st_gain>** **OK**
Write Command **AT+QSIDET=<st_gain>**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will not be saved.
Reference Quectel	

Parameter

<st_gain>	Integer type. Side tone gain in current mode. Range: 0–65535. Default value may be different in different audio modes.

NOTE

This command will be valid only after audio loop test is enabled by **AT+QAUDLOOP=1**.

11.9. AT+QMIC Set Uplink Gains of Microphone

This command sets the uplink gains of microphone.

AT+QMIC Set Uplink Gains of Microphone	
Test Command **AT+QMIC=?**	Response **+QMIC: (**range of supported **<txgain>**s**),(**range of supported **<txdgain>**s**)** **OK**
Read Command **AT+QMIC?**	Response **+QMIC: <tx_gain>,<txdgain>** **OK**
Write Command **AT+QMIC=<txgain>[,<txdgain>]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	It will take effect on next call. The parameters will not be saved.

Parameter

<txgain>	Integer type. Uplink codec gain. Range: 0–65535. The default value may be different in different audio modes.
<txdgain>	Integer type. Uplink digital gain. Range: 0–65535. The default value may be different in different audio modes.

11.10. AT+QIIC IIC Read and Write

This command configures the codec via IIC interface.

AT+QIIC IIC Read and Write	
Test Command **AT+QIIC=?**	Response **+QIIC: (**list of supported **<rw>**s**),(**list of supported **<device>**s**),(**list of supported **<addr>**s**),(**list of supported **<bytes>**s**),(**list of supported **<value>**s**)**

	OK
Write Command **AT+QIIC=<rw>,<device>,<addr>,<bytes>[,<value>]**	Response If all configuration parameters are specified: **OK** If all configuration parameters are omitted: **+QIIC: <value>** **OK**
Maximum Response Time	300ms
Characteristics	The command takes effect immediately. The configurations will not be saved.

Parameter

<rw>	Integer type. 0 Write command 1 Read command
<device>	Hex integer type. 0–0xFF 7-bit device address
<addr>	Hex Integer type. 0–0xFF Register address
<bytes>	Integer type. 1 Read bytes 2 Write bytes
<value>	Hex integer type. 0–0xFFFF Data value

Example

```
AT+QIIC=1,0x18,15,1,38      //Read 2-byte register content of the register's location: slave address: 0x18, register address: 15.
+QIIC: 0x0026

OK
AT+QIIC=0,0x18,15,2,38      //Write 2-byte register content of the register's location: slave address: 0x18, register address: 15.
OK
```

12 Hardware Related Commands

12.1. AT+QPOWD Power off

This command powers off the MT. The UE will return **OK** immediately when the command is executed. Then the UE will deactivate the network. After it is completed, the UE outputs **POWERED DOWN** message and enters into power-off state. The maximum time for unregistering network is 60 seconds. To avoid data loss, the power supply for the module cannot be disconnected before the URC **POWERED DOWN** is outputted.

AT+QPOWD Power off	
Test Command **AT+QPOWD=?**	Response **+QPOWD: (**list of supported **<n>**s**)** **OK**
Write Command **AT+QPOWD=[<n>]**	Response **OK** **POWERED DOWN**
Maximum Response Time	300 ms
Characteristics	/
Reference	

Parameter

<n>	Integer type. 0 Power off immediately 1 Power off normally

12.2. AT+CCLK Clock

This command sets or queries the real time clock (RTC) of the MT. The current setting is retained until the MT is totally disconnected from the power supply.

AT+CCLK Clock	
Test Command **AT+CCLK=?**	Response **OK**
Read Command **AT+CCLK?**	Response **+CCLK: <time>** **OK**
Write Command **AT+CCLK=<time>**	Response **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<time>	String type. The format is "yy/MM/dd,hh:mm:ss±zz", indicating year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range: -48...+56). E.g. May 6th, 1994, 22:10:00 GMT+2 hours equals "94/05/06,22:10:00+08".
<err>	Error codes. For more details, please refer to ***Table 11***.

Example

```
AT+CCLK?                          //Query the local time.
+CCLK: "08/01/04,00:19:43+00"

OK
```

12.3. AT+QADC Read ADC Value

This command reads the voltage value of ADC channel.

AT+QADC Read ADC Value	
Test Command **AT+QADC=?**	Response **+QADC: (**range of supported **<port>**s**)** **OK**
Read Command **AT+QADC=<port>**	Response **+QADC: <status>,<value>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<port>	Integer type. Channel number of the ADC. 0 ADC channel 0 1 ADC channel 1 2 ADC channel 2
<status>	Integer type. Indication to whether the ADC value read is successful. 0 Failed 1 Successful
<value>	Integer type. The voltage of specified ADC channel. Unit: mV.

12.4. AT+QSCLK Sleep Mode Setting

This command controls whether MT enters sleep mode. When entering into sleep mode is enabled, the MT can directly enter sleep mode.

AT+QSCLK Sleep Mode Setting	
Test Command **AT+QSCLK=?**	Response **+QSCLK: (**list of supported **<n>**s**)** **OK**
Read Command **AT+QSCLK?**	Response **+QSCLK: <n>,<saved>**

	OK
Write Command **AT+QSCLK=<n>[,<saved>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference Quectel	

Parameter

<n>	Integer type. Slow clock mode.	
	0	Disable sleep mode
	1	Enable sleep mode. It is controlled by DTR.
<saved>	Integer type. Whether to save the configuration into NVM.	
	0	Not save
	1	Save

12.5. AT+QTEMP Get the Temperature of MT

This command gets the temperature of MT.

AT+QTEMP Get the Temperature of MT	
Test Command **AT+QTEMP=?**	Response **OK**
Execution Command **AT+QTEMP**	Response **[+QTEMP: <sensor>,<temp>]** **[…]** **OK**
Characteristics	/
Reference Quectel	

Parameter

<sensor>	String type. Sensor type.	
	"aoss0-usr"	Type of the first detection points on modem
	"mdm-q6-usr"	Type of the second detection points on modem

	"ipa-usr"	Type of the third detection points on modem
	"cpu0-a7-usr"	Type of the forty detection points on modem
	"mdm-core-usr"	Type of the fifth detection points on modem
	"xo-therm-usr"	Type of XO crystal
	"pa-therm2-usr"	Type of PA chip
	"sdx-case-therm-usr"	Type of BB chip
	"ambient-therm-usr"	Type of NTC
<temp>	Integer type. Temperature value. Unit: °C.	

Example

```
AT+QTEMP

+QTEMP: "aoss-usr","32"

+QTEMP: "mdm-q6-usr","33"

+QTEMP: "ddrss-usr","33"

+QTEMP: "cpu-usr","33"

+QTEMP: "mdm-core-usr","33"

+QTEMP: "xo-therm-adc","30"

+QTEMP: "pa-therm1-adc","24"

+QTEMP: "mdm-case-therm-adc","31"

OK
```

12.6. AT+QAGPIO Set the AP Or PMU GPIO Output Value

This command sets the AP or PMU GPIO output value.

AT+QAGPIO	**Set The AP Or PMU GPIO Output Value**
Test Command **AT+QAGPIO=?**	Response **+QAGPIO: (**list of supported **<type>**s**),<GPIO>,(**list of supported **<value>**s**)** **OK**

Write Command **AT+QAGPIO=<type>,<GPIO>,<value>**	Response **OK**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately; The configurations will be saved automatically.

Parameter

<type>	Integer type. Set up the AP or PMU. 0 AP 1 PMU
<GPIO>	Integer type. The GPIO number.
<value>	Integer type. GPIO output value. 0 Set the GPIO output low 1 Set the GPIO output high

NOTE

PMU GPIO range is 1–11.

Example

```
AT+QAGPIO=?                    //Test command.
+QAGPIO: (0,1),<GPIO>,(0,1)

OK
AT+QAGPIO=0,105,1              //Set the AP gpio_105 output high.
OK

AT+QAGPIO=1,8,0                //Set the PMU gpio_8 output low.
OK
```

12.7. AT+QSAR Enable/Disable the SAR Power Backoff

This command enables or disables the SAR power backoff.

AT+QSAR* Enable/Disable the SAR Power Backoff	
Test Command **AT+QSAR=?**	Response **+QSAR: (**rang of supported **<level>**s**),(**list of supported **<saved>**s**)** **OK**
Read Command **AT+QSAR?**	Response **+QSAR: <level>** **OK**
Write Command **AT+QSAR=<level>[,<saved>]**	Response **OK** Or **ERROR** If there is an error related to ME functionality: **+CME ERROR: <err>**
Maximum Response Time	/
Characteristics	/
Reference	/

Parameter

<level>	Integer type. 0 Disable SAR power backoff. 1–8 SAR power backoff level. The value of the power backoff is determined by **AT+QCFG="sarcfg"**.
<saved>	Integer type. Whether to save the configuration into NVM. 0 Not save 1 Save
<err>	Error codes. For more details, please refer to ***Table 11***.

12.8. AT+QETH RGMII Extended Configuration

12.8.1. AT+QETH=? AT+QETH Test Command

AT+QETH RGMII Extended Configuration	
Test command **AT+QETH=?**	Response List the settings supported currently: **+QETH: "rgmii",(**list of supported **<status>**s**),(**list of supported **<voltage>**s**),(**range of supported **<mode>**s**),(**range of supported **<profileID>**s**)** **+QETH: "ipptmac",<host_mac_addr>** **+QETH: "routing",(**list of supported **<option>**s**),(**list of supported **<ip_version>**s**),<dest_ip_addr>,(**range of supported **<profileID>**s**)** **+QETH: "mac_address",<rgmii_mac_addr>** **+QETH: "speed",(**list of supported **<speed>**s**)** **+QETH: "an",(**list of supported **<status>**s**)** **+QETH: "dm",(**list of supported **<mode>**s**)** **OK**

NOTE

Only EG512R-EA supports **AT+QETH** related commands.

12.8.2. AT+QETH="rgmii" Query/Enable/Disable RGMII

This command queries/enables/disables RGMII.

AT+QETH="rgmii" Query/Enable/Disable RGMII	
Write Command **AT+QETH="rgmii"[,<status>,<voltage>[,<mode>[,<profileID>]]]**	Response: 1. If **<status>**, **<voltage>**, **<mode>** or **<profileID>** are omitted, query the current configuration: 1) If RGMII is disabled: **+QETH: "RGMII","disable",0,-1** **+QETH: "RGMII",0,1** **+QETH: "RGMII",0,2** **+QETH: "RGMII",0,3** **+QETH: "RGMII",0,4** **OK** 2) If RGMII is enabled, but there is no any data call: **+QETH: "RGMII","enable",0,-1** **+QETH: "RGMII",0,1**

	+QETH: "RGMII",0,2 **+QETH: "RGMII",0,3** **+QETH: "RGMII",0,4** **OK** 3) If data call (COMMON mode) is performed with the first APN: **+QETH: "RGMII","enable",0,0** **+QETH: "RGMII",1,1** **+QETH: "RGMII",0,2** **+QETH: "RGMII",0,3** **+QETH: "RGMII",0,4** **OK** 4) If data call (IPPassthrough mode) is performed with the first APN: **+QETH: "RGMII","enable",0,1** **+QETH: "RGMII",1,1** **+QETH: "RGMII",0,2** **+QETH: "RGMII",0,3** **+QETH: "RGMII",0,4** **OK** 2. If **<mode>** and **<profileID>** are omitted, enable or disable RGMII, without data call: **OK** 3. If **<profileID>** is omitted, enable RGMII, with specified mode and default profile or disable all RGMII data call in the current mode: **OK** 4. If all parameters are specified, enable or disable RGMII, with specified mode and specified profile: **OK** 5. If there is any error: **ERROR**
Maximum Response Time	20 s
Characteristics	This command takes effect immediately; For information about whether the configuration will be saved automatically, refer to the notes below.

Parameter

<status>	String type. RGMII status.	
	"enable"	Enable RGMII function
	"disable"	Disable RGMII function
<voltage>	Integer type. RGMII voltage mode.	
	0	Indicate that the TX Strength of RGMII is 1.8V.
	1	Indicate that the TX Strength of RGMII is 2.5V
<mode>	Integer type. RGMII mode.	
	-1	Empty mode (no any data call)
	0	Call RGMII with COMMON-RGMII mode
	1	Call RGMII with IPPassthrough-RGMII mode
<profileID>	Integer type. Profile ID of RGMII data call.	
	1–8	The APN number used in RGMII data call. It is used in combination with **AT+CGDCONT**.

NOTES

1. The two modes COMMON and IPPassthrough are mutually exclusive and cannot be enabled at the same time. If you need to enable the other, please disable the current one first.
2. When data call is performed with the second, third and fourth channels, the configuration for enabling/disabling RGMII will not be saved (that is, RGMII configuration will not work after the module is rebooted), but APN setting will be saved automatically; when data call is performed with the first channel, the configuration will be saved automatically, that is, the configuration will still work after the module is rebooted.
3. Before enabling IPPassthrough mode, you need to configure the MAC address through **AT+QETH="ipptmac",<mac_addr>**.
4. Calling the command to perform data call for the first time will enable the corresponding RGMII mode and APN's first data call. Calling this command to perform data call for the second and third times will cause that the second and third data calls are performed. If you call this command for multiple times to perform data call without specifying the APN, the default APN of 1, 2, 3 and 4 will be used (up to 4 channels are supported at the same time).
6. Details of the read command are as follows:
   +QETH: "RGMII",<status>,<voltage>,<mode>
   +QETH: "RGMII",<Line1 call status(0:disable 1:enable)**>,<Line1 profileID>**
   +QETH: "RGMII",<Line2 call status(0:disable 1:enable)**>,<Line2 profileID>**
   +QETH: "RGMII",<Line3 call status(0:disable 1:enable)**>,<Line3 profileID>**
   +QETH: "RGMII",<Line4 call status(0:disable 1:enable)**>,<Line4 profileID>**
   OK

Example

```
AT+QETH="rgmii"                    //Query the status of RGMII.
+QETH: "RGMII","disable",0,-1
```

```
+QETH: "RGMII",0,1
+QETH: "RGMII",0,2
+QETH: "RGMII",0,3
+QETH: "RGMII",0,4

OK

AT+QETH=”rgmii”,”enable”,1                  //Enable RGMII without data call.
OK

AT+QETH=”rgmii”,”enable”,1,0                //Enable RGMII data call of COMMON mode and perform data call with the default APN.

OK

AT+QETH=”rgmii”,”enable”,1,0,1              //Enable RGMII data call of COMMON mode and perform data call with the first APN.

OK

AT+QETH=”rgmii”,”enable”,1,1                //Enable RGMII data call of IPPassthrough mode and perform data call with the default APN.

OK

AT+QETH=”rgmii”,”enable”,1,1,1              //Enable RGMII data call of IPPassthrough mode and perform data call with the first APN.

OK
```

12.8.3. AT+QETH="ipptmac" Set IPPassthrough-RGMII MAC Address

This command sets IPPassthrough-RGMII MAC address.

AT+QETH="ipptmac" Set IPPassthrough-RGMII MAC Address	
Write Command **AT+QETH="ipptmac"[,<host_mac_addr>]**	Response If <host_mac_addr> is omitted, query the current configuration: **+QETH: "ipptmac",<host_mac_addr>** **OK** If no any omitted, configure the mac address for RGMII: **OK** If any error, return: **ERROR**
Maximum Response Time	100 ms

Characteristics	This command takes effect at enabling RGMII data call of IPPassthrough mode next time; The configuration will be saved automatically.

Parameter

<host_mac_addr>	String type. Mac address of the device connected to the module.

Example

```
AT+QETH="ipptmac", a1:b2:c3:d4:e5:f6    //Set the current MAC address of IPPassthrough mode.
OK

AT+QETH="ipptmac"                       //Query the current MAC address of IPPassthrough mode.
+QETH: " ipptmac ", a1:b2:c3:d4:e5:f6

OK
```

12.8.4. AT+QETH="routing" Set Routing Rules for Multiple Data Call

This command is used to set the routing rules of the multiple data call.

AT+QETH="routing" Set Routing Rules for Multiple Data Call	
Write Command **AT+QETH="routing"[,<option>,<IP_version>,<dest_IP_addr>,<profileID>]**	Response: If **<option>**, **<IP_version>**, **<dest_IP_addr>** and **<profileID>** is omitted, query the current route: **+QETH: route IPv4:** **……** **+QETH: route IPv6:** **……** **OK** If all parameters are specified, set the current route: **OK** If there is any error: **ERROR**
Maximum Response Time	200 ms
Characteristics	The command takes effect immediately; The configuration will not be saved.

Parameter

<option>	String type. Option type. add add route del del route
<IP_version>	Integer type. IP version. 4 IPv4 6 IPv6
<dest_IP_addr>	String type. Destination IP address. 8.8.8.8 IPv4 example 240C::6666 IPv6 example
<profileID>	Integer type. RGMII data call profileID. 1–8 The APN sequence number used by the data call connection specified by the current route rule.

Example

```
AT+QETH="routing"                          //Query the current route list.
+QETH: route IPv4:
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         10.151.9.244    0.0.0.0         UG    0      0        0 rmnet_data0
10.151.9.240    *               255.255.255.248 U     0      0        0 rmnet_data0
61.132.163.68   *               255.255.255.255 UH    10     0        0 rmnet_data0
192.168.225.0   *               255.255.255.0   U     0      0        0 bridge0
202.102.213.68  *               255.255.255.255 UH    10     0        0 rmnet_data0
+QETH: route IPv6:
Kernel IPv6 routing table
Destination  Next Hop     Flags Metric Ref Use Iface
::1/128   ::    U    256 1    0    lo
240e:46:4088::4088/128   ::    U    10   1    0    rmnet_data0
240e:46:4888::4888/128   ::    U    10   1    0    rmnet_data0
240e:9a:114:20dc::/64    ::    U    1024     1    0    bridge0
fe80::/64     ::    U    256 1    0    bridge0
fe80::/64     ::    U    256 1    0    rmnet_data0
::/0 ::    U    256 1    0    rmnet_data0
::/0 ::    !n   -1   1    1    lo
::1/128   ::    Un   0    2    0    lo
240e:9a:114:20dc::/128   ::    Un   0    2    0    rmnet_data0
240e:9a:114:20dc:6c57:8d2d:6bcd:7dca/128   ::    Un   0    2    0    rmnet_data0
fe80::/128    ::    Un   0    2    0    bridge0
fe80::/128    ::    Un   0    2    0    rmnet_data0
fe80::1a20:8c46:9e00:c3ea/128    ::    Un   0    3    1    rmnet_data0
fe80::cc53:9ff:fe13:1b87/128  ::    Un   0    2    0    bridge0
```

```
ff00::/8  ::    U    256 2    37   bridge0
ff00::/8  ::    U    256 2    7    rmnet_data0
::/0  ::    !n   -1   1    1    lo

OK

AT+QETH="routing",add,4,8.8.8.8,3          //Add a route to route list.
OK
```

12.8.5. AT+QETH="mac_address" Query RGMII Interface MAC Address

This command is used to query RGMII interface MAC address.

AT+QETH="mac_address" Query RGMII Interface MAC Address	
Query Command **AT+QETH="mac_address"**	Response **+QETH: "mac_address",<RGMII_MAC_address>** **OK**
Maximum Response Time	200 ms
Characteristics	/

Parameter

<RGMII_MAC_address>	String type. MAC address of RGMII interface of the module.

Example

```
AT+QETH="mac_address"                  //Query the MAC address of RGMII interface.
+QETH: "mac_address",06:EA:9F:31:49:28

OK
```

12.8.6. AT+QETH="speed" Set the Speed for RGMII

This command configures the speed for RGMII.

AT+QETH="speed" Set the Speed for RGMII	
Write Command **AT+QETH="speed"[,<speed>]**	Response If **<speed>** is omitted, query the current configuration: **+QETH: "speed",<speed>** **OK**

	If **<speed>** is specified, configure the speed for RGMII: **OK** If there is any error: **ERROR**
Maximum Response Time	100 ms
Characteristics	This command takes effect after RGMII function is restarted; The configuration will be saved automatically.

Parameter

<speed>	String type. RGMII speed.	
	"0M"	Auto negotiation speed (will be set to 1000M automatically)
	"10M"	10 Mbps Ethernet
	"100M"	100 Mbps Ethernet
	"1000M"	1000 Mbps Ethernet

Example

```
AT+QETH="speed"                    //Query the current configuration.
+QETH: "speed","0M"

OK

AT+QETH="speed","100M"             //Set RGMII speed to 100M.
OK
```

12.8.7. AT+QETH="an" Enable or Disable Auto-negotiation for RGMII

This command enables or disables the auto-negotiation status for RGMII.

AT+QETH="an" Enable or Disable Auto-negotiation for RGMII	
Write Command **AT+QETH="an"[,<status>]**	Response If **<status>** is omitted, query the current configuration: **+QETH: "an",<status>** **OK** If **<status>** is specified, enable or disable RGMII auto-negotiation: **OK**

	If there is any error: **ERROR**
Maximum Response Time	100 ms
Characteristics	This command takes effect after RGMII function is restarted; The configuration will be saved automatically.

Parameter

<status>	String type. RGMII auto-negotiation status.	
	"on"	Indicate that the RGMII is working at auto-negotiation mode.
	"off"	Indicate that the RGMII is working at non-auto-negotiation mode.

Example

```
AT+QETH="an"                    //Query the current configuration.
+QETH: "an","on"

OK

AT+QETH="an","off"              //Disable RGMII auto negotiation.
OK
```

12.8.8. AT+QETH="dm" Set the Duplex Mode for RGMII

This command sets the duplex mode for RGMII.

AT+QETH="dm" Set the Duplex Mode for RGMII	
Write Command **AT+QETH="dm"[,<mode>]**	Response If **<mode>** is omitted, query the current configuration: **+QETH: "dm",<mode>** **OK** If **<mode>** is specified, set the duplex mode for RGMII: **OK** If there is any error: **ERROR**
Maximum Response Time	100 ms
Characteristics	This command takes effect after RGMII function is restarted; The configuration will be saved automatically.

Parameter

<mode>	String type. RGMII duplex mode.	
	"full"	Indicate that the RGMII is working at full duplex mode.
	"half"	Indicate that the RGMII is working at half duplex mode.

Example

```
AT+QETH="dm"                    //Query the current configuration.
+QETH: "dm","full"

OK

AT+QETH="dm","half"             //Set half duplex mode for RGMII.
OK
```

13 Appendix A References

13.1. References

Table 6: Related Documents

SN	Document Name	Remark
[1]	V.25ter	Serial asynchronous automatic dialing and control
[2]	3GPP TS 27.007	Digital cellular telecommunications (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; AT command set for User Equipment (UE)
[3]	3GPP TS 27.005	Digital cellular telecommunications (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Use of Data Terminal Equipment–Data Circuit terminating Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)

Table 7: Terms and Abbreviations

Abbreviation	Description
AMR	Adaptive Multi-Rate
APN	Access Point Name
ADC	Analog To Digital Converter
AMF	Access and Mobility Management Function
BAOC	Bar All Outgoing Calls
BER	Bit Error Rate
BOIC	Bar Outgoing International Calls
BS	Base Station

CBM	Cell Broadcast Message
CCIP	Calling Line Identification Presentation
CSD	Circuit Switch Data
DCD	Dynamic Content Delivery
DCE	Data Communication Equipment
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
DTR	Data Terminal Ready
DRB	Data Radio Bearer
ECC	Emergency Call Codes
ECT	Explicit Call Transfer supplementary service
EN-DC	E-UTRA NR Dual Connectivity
E-RAB	E-UTRAN Radio Access Bearer
eMBB	Enhanced mobile broadband
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
IRA	International Reference Alphabet
IWF	InterWorking Function
ME	Mobile Equipment
mmWave	Millimeter Wave
MS	Mobile Station
MSC	Mobile Switching Center
mMTC	Massive connections
MT	Mobile Terminal
NVM	Non-Volatile Memory

NSSAI	Network Slice Selection Assistance Information
PDN	Public Data Network
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PSC	Primary Synchronization Code
QoS	Quality of Service
RAN	Radio Access Network
RGMII	Reduced Gigabit Media Independent Interface
RLP	Radio Link Protocol
RP	Relay Protocol
RRC	Radio Resource Control
RTS/CTS	Request To Send/Clear To Send
SAR	Specific Absorption Rate
SGSN	Serving GPRS Support Node
SM	Short Message
SMS	Short Message Service
SMSC	Short Message Service Center
SA	Standalone
TA	Terminal Adapter
TCP	Transmission Control Protocol
TE	Terminal Equipment
UCS	Universal Coded Character Set
UDP	User Datagram Protocol
UE	User Equipment
URC	Unsolicited Result Code
URLLC	Low latency and high reliability

13.2. Factory Default Settings Restorable with AT&F

Table 8: Factory Default Settings Restorable with AT&F

AT Command	Parameters	Factory Defaults
ATE	**<value>**	1
ATQ	**<n>**	0
ATS0	**<n>**	0
ATS3	**<n>**	13
ATS4	**<n>**	10
ATS5	**<n>**	8
ATS6	**<n>**	2
ATS7	**<n>**	0
ATS8	**<n>**	2
ATS10	**<n>**	15
ATV	**<value>**	1
ATX	**<value>**	4
AT+CREG	**<n>**	0
AT+CGREG	**<n>**	0
AT+CBST	**<speed>,<name>,<ce>**	0,0,1
AT+CMEE	**<n>**	1
AT+CSCS	**<chset>**	"GSM"
AT+CSTA	**<type>**	129
AT+CR	**<mode>**	0
AT+CRC	**<mode>**	0
AT+CSMS	**<service>,<mt>,<mo>,<bm>**	0,1,1,1

AT+CMGF	**<mode>**	0
AT+CSMP	**<fo>,<vp>,<pid>,<dcs>**	17,167,0,0
AT+CSDH	**<show>**	0
AT+CSCB	**<mode>,<mids>,<dcss>**	0,"",""
AT+CPMS	**<mem1>,<mem2>,<mem3>**	"ME","ME","ME"
AT+CNMI	**<mode>,<mt>,<bm>,<ds>,<bfr>**	2,1,0,0,0
AT+CMMS	**<n>**	0
AT+CVHU	**<mode>**	0
AT+CLIP	**<n>**	0
AT+COLP	**<n>**	0
AT+CLIR	**<n>**	0
AT+CSSN	**<n><m>**	0,0
AT+CTZR	**<reporting>**	0
AT+CPBS	**<storage>**	SM
AT+CGEREP	**<mode>,<brf>**	0,0
AT+CEREG	**<n>**	0
AT+CCWA	**<n>**	0
AT+CUSD	**<mode>**	0
AT+CLVL	**<level>**	3
AT+QAUDMOD	**<mode>**	0
AT+QAUDLOOP	**<enable>**	0

13.3. AT Command Settings Storable with AT&W

Table 9: AT Command Settings Storable with AT&W

AT Command	Parameters	Display with AT&V
ATE	**<value>**	Yes
ATQ	**<n>**	Yes
ATS0	**<n>**	Yes
ATS7	**<n>**	Yes
ATS10	**<n>**	Yes
ATV	**<value>**	Yes
ATX	**<value>**	Yes
AT+CREG	**<n>**	No
AT+CGREG	**<n>**	No
AT+CEREG	**<n>**	No
AT+QSIMSTAT	**<enable>**	No

13.4. AT Command Settings Storable with ATZ

Table 10: AT Command Settings Storable with ATZ

AT Command	Parameters	Factory Defaults
ATE	**<value>**	1
ATQ	**<n>**	0
ATS0	**<n>**	0
ATS7	**<n>**	0

ATS10	**<n>**	15
ATV	**<value>**	1
ATX	**<value>**	4
AT+CREG	**<n>**	0
AT+CGREG	**<n>**	0
AT+CEREG	**<n>**	0

13.5. Summary of CME ERROR Codes

Final result code **+CME ERROR: <err>** indicates an error related to mobile equipment or network. The operation of **+CME ERROR: <err>** final result code is similar to the regular **ERROR** result code: if **+CME ERROR: <err>** is the result code for any of the commands in a command line, none of the following commands in the same command line is executed (neither **ERROR** nor **OK** result code shall be returned as a result of a completed command line execution).

The following table lists most of general and GRPS related error codes. For some GSM protocol failure cause described in GSM specifications, the corresponding error codes are not included.

Table 11: Different Coding Schemes of +CME ERROR: <err>

Code of <err>	Meaning
0	Phone failure
1	No connection to phone
2	Phone-adaptor link reserved
3	Operation not allowed
4	Operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	(U)SIM not inserted

11	(U)SIM PIN required
12	(U)SIM PUK required
13	(U)SIM failure
14	(U)SIM busy
15	(U)SIM wrong
16	Incorrect password
17	(U)SIM PIN2 required
18	(U)SIM PUK2 required
20	Memory full
21	Invalid index
22	Not found
23	Memory failure
24	Text string too long
25	Invalid characters in text string
26	Dial string too long
27	Invalid characters in dial string
30	No network service
31	Network timeout
32	Network not allowed - emergency calls only
40	Network personalization PIN required
41	Network personalization PUK required
42	Network subset personalization PIN required
43	Network subset personalization PUK required
44	Service provider personalization PIN required
45	Service provider personalization PUK required
46	Corporate personalization PIN required
47	Corporate personalization PUK required

13.6. Summary of CMS ERROR Codes

Final result code **+CMS ERROR: <err>** indicates an error related to message service failure. The operation is similar to **ERROR** result code. None of the following commands in the same command line is executed. Neither **ERROR** nor **OK** result code should be returned.

<err> values are mostly used by common message commands:

Table 12: Different Coding Schemes of +CMS ERROR: <err>

Code of <err>	Meaning
300	ME failure
301	SMS ME reserved
302	Operation not allowed
303	Operation not supported
304	Invalid PDU mode
305	Invalid text mode
310	(U)SIM not inserted
311	(U)SIM pin necessary
312	PH (U)SIM pin necessary
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong
316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)SIM PUK2 required
320	Memory failure
321	Invalid memory index
322	Memory full
330	SMSC address unknown

331	No network
332	Network timeout
500	Unknown
512	(U)SIM not ready
513	Message length exceeds
514	Invalid request parameters
515	ME storage failure
517	Invalid service mode
528	More message to send state error
529	MO SMS is not allowed
531	ME storage full

13.7. Summary of URC

Table 13: Summary of URC

Index	URC Display	Meaning	Condition
1	**+CREG: <stat>**	Indicate registration status of the MT	**AT+CREG=1**
2	**+CREG: <stat>[,<lac>,<ci>[,<AcT>]]**	After cell neighborhood changing shows whether the network has currently indicated the registration of the MT, with location area code	**AT+CREG=2**
3	**+CGREG: <stat>**	Indicate network registration status of the MT	**AT+CGREG=1**
4	**+CGREG: <stat>[,[<lac>],[<ci>],[<AcT>],[<rac>]]**	Indicate network registration and location information of the MT	**AT+CGREG=2**
5	**+CTZV: <tz>**	Time zone reporting	**AT+CTZR=1**
6	**+CTZE: <tz>,<dst>,<time>**	Extended time zone reporting	**AT+CTZR=2**
7	**+CMTI: <mem>,<index>**	New message is received, and saved to memory	See **AT+CNMI**
8	**+CMT: [<alpha>],<length><C**	New short message is received and	See **AT+CNMI**

	R><LF><pdu>	output directly to TE (PDU mode)	
9	**+CMT: <oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>**	New short message is received and output directly to TE (Text mode)	See **AT+CNMI**
10	**+CBM: <length><CR><LF><pdu>**	New CBM is received and output directly (PDU mode)	See **AT+CNMI**
11	**+CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>**	New CBM is received and output directly to TE (Text mode)	See **AT+CNMI**
12	**+CDS: <length><CR><LF><pdu>**	New CDS is received and output directly (PDU mode)	See **AT+CNMI**
13	**+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>**	New CDS is received and output directly to TE (Text mode)	See **AT+CNMI**
14	**+CDSI: <mem>,<index>**	New message status report is received, and saved to memory	See **AT+CNMI**
15	**+COLP: <number>,<type>,[<subaddr>],[<satype>],[<alpha>]**	The presentation of the COL (connected line) at the TE for a mobile originated call	**AT+COLP=1**
16	**+CLIP: <number>,<type>,[subaddr],[satype],[<alpha>],<CLI validity>**	Mobile terminating call indication	**AT+CLIP=1**
17	**+CRING: <type>**	An incoming call is indicated to the TE with unsolicited result code instead of the normal RING	**AT+CRC=1**
18	**+CCWA: <number>,<type>,<class>[,<alpha>]**	Call waiting indication	**AT+CCWA=1,1**
19	**+CSSI: <code1>**	Shows the +CSSI intermediate result code presentation status to the TE	**AT+CSSN=1**
20	**+CSSU: <code2>**	Shows the +CSSU unsolicited result code presentation status to the TE	**AT+CSSN=<n>,1**
21	**RDY**	MT initialization is successful	N/A
22	**+CFUN: 1**	All function of the MT is available	N/A
23	**+CPIN: <state>**	(U)SIM card pin state	N/A
24	**+QIND: SMS DONE**	SMS initialization finished	N/A
25	**+QIND: PB DONE**	Phonebook initialization finished	N/A
26	**POWERED DOWN**	Module power down	**AT+QPOWD**
27	**+CGEV: REJECT <PDP_type>,<PDP_addr>**	A network request for PDP activation, and was automatically rejected.	**AT+CGEREP=2,1**

28	**+CGEV: NW REACT <PDP_type>,<PDP_addr>,[<cid>]**	The network request PDP reactivation	**AT+CGEREP=2,1**
29	**+CGEV: NW DEACT <PDP_type>,<PDP_addr>,[<cid>]**	The network has forced a context deactivation	**AT+CGEREP=2,1**
30	**+CGEV: ME DEACT <PDP_type>,<PDP_addr>,[<cid>]**	The ME has forced a context deactivation.	**AT+CGEREP=2,1**
31	**+CGEV: NW DETACH**	The network has forced a Packet Domain detach.	**AT+CGEREP=2,1**
32	**+CGEV: ME DETACH**	The mobile equipment has forced a Packet Domain detach.	**AT+CGEREP=2,1**
33	**+CGEV: NW CLASS <class>**	The network has forced a change of MS class.	**AT+CGEREP=2,1**
34	**+CGEV: ME CLASS <class>**	The mobile equipment has forced a change of MS class.	**AT+CGEREP=2,1**
35	**+QTEMP: <sensor>,<temp>**	Temperature information	See **AT+QTEMP**

13.8. SMS Character Sets Conversions

In *3GPP TS 23.038* DCS (Data Coding Scheme) defined three kinds of alphabets in SMS, GSM 7-bit default alphabet, 8-bit data and UCS2 (16-bit). **AT+CSMP** can set the DCS in text mode (**AT+CMGF=1**). In text mode, DCS (Data Coding Scheme) and **AT+CSCS** determine the way of SMS text input or output.

Table 14: The Way of SMS Text Input or Output

DCS	AT+CSCS	The Way of SMS Text Input or Output
GSM 7-bit	GSM	Input or output GSM character sets.
GSM 7-bit	IRA	Input or output IRA character sets. Input: UE will convert IRA characters to GSM characters. Output: UE will convert GSM characters to IRA characters.
GSM 7-bit	UCS2	Input or output a hex string similar to PDU mode. So only support characters '0'-'9' and 'A'-'F'. Input: UE will convert the UCS2 hex string to GSM characters. Output: UE will convert the GSM characters to UCS2 hex string.
UCS2	-	Ignore the value of AT+CSCS, input or output a hex string similar to PDU mode. So only support characters '0'-'9' and 'A'-'F'.
8-bit	-	Ignore the value of AT+CSCS, input or output a hex string similar to PDU mode. So only support characters '0'-'9' and 'A'-'F'.

When DCS = GSM 7-bit, the input or output needs conversion. The detailed conversion tables are shown as below.

Table 15: The Input Conversions Table (DCS=GSM 7-bit and AT+CSCS="GSM")

No.	0	1	2	3	4	5	6	7
0	00	10	20	30	40	50	60	70
1	01	11	21	31	41	51	61	71
2	02	12	22	32	42	52	62	72
3	03	13	23	33	43	53	63	73
4	04	14	24	34	44	54	64	74
5	05	15	25	35	45	55	65	75
6	06	16	26	36	46	56	66	76
7	07	17	27	37	47	57	67	77
8	08	18	28	38	48	58	68	78
9	09	19	29	39	49	59	69	79
A	0A	Submit	2A	3A	4A	5A	6A	7A
B	0B	Cancel	2B	3B	4B	5B	6B	7B
C	0C	1C	2C	3C	4C	5C	6C	7C
D	0D	1A	2D	3D	4D	5D	6D	7D
E	0E	1E	2E	3E	4E	5E	6E	7E
F	0F	1F	2F	3F	4F	5F	6F	7F

Table 16: The Output Conversions Table (DCS=GSM 7-bit and AT+CSCS="GSM")

No.	0	1	2	3	4	5	6	7
0	00	10	20	30	40	50	60	70
1	01	11	21	31	41	51	61	71

2	02	12	22	32	42	52	62	72
3	03	13	23	33	43	53	63	73
4	04	14	24	34	44	54	64	74
5	05	15	25	35	45	55	65	75
6	06	16	26	36	46	56	66	76
7	07	17	27	37	47	57	67	77
8	08	18	28	38	48	58	68	78
9	09	19	29	39	49	59	69	79
A	0D0A		2A	3A	4A	5A	6A	7A
B	0B		2B	3B	4B	5B	6B	7B
C	0C	1C	2C	3C	4C	5C	6C	7C
D	0D	1A	2D	3D	4D	5D	6D	7D
E	0E	1E	2E	3E	4E	5E	6E	7E
F	0F	1F	2F	3F	4F	5F	6F	7F

Table 17: GSM Extended Characters (GSM Encode)

No.	0	1	2	3	4	5	6	7
0					1B40			
1								
2								
3								
4		1B14						
5								
6								
7								
8			1B28					

9		1B29					
A							
B							
C			1B3C				
D			1B3D				
E			1B3E				
F		1B2F					

Table 18: The Input Conversions Table (DCS = GSM 7-bit and AT+CSCS="IRA")

No.	0	1	2	3	4	5	6	7
0		20	20	30	00	50	20	70
1	20	20	21	31	41	51	61	71
2	20	20	22	32	42	52	62	72
3	20	20	23	33	43	53	63	73
4	20	20	02	34	44	54	64	74
5	20	20	25	35	45	55	65	75
6	20	20	26	36	46	56	66	76
7	20	20	27	37	47	57	67	77
8	backspace	20	28	38	48	58	68	78
9	20	20	29	39	49	59	69	79
A	0A	Submit	2A	3A	4A	5A	6A	7A
B	20	Cancel	2B	3B	4B	1B3C	6B	1B28
C	20	20	2C	3C	4C	1B2F	6C	1B40
D	0D	20	2D	3D	4D	1B3E	6D	1B29
E	20	20	2E	3E	4E	1B14	6E	1B3D
F	20	20	2F	3F	4F	11	6F	20

Table 19: IRA Extended Characters

No.	A	B	C	D	E	F
0	20	20	20	20	7F	20
1	40	20	20	5D	20	7D
2	20	20	20	20	20	08
3	01	20	20	20	20	20
4	24	20	5B	20	7B	20
5	03	20	0E	20	0F	20
6	20	20	1C	5C	1D	7C
7	5F	20	09	20	20	20
8	20	20	20	0B	04	0C
9	20	20	1F	20	05	06
A	20	20	20	20	20	20
B	20	20	20	20	20	20
C	20	20	20	5E	07	7E
D	20	20	20	20	20	20
E	20	20	20	20	20	20
F	20	60	20	1E	20	20

Table 20: The Output Conversions Table (DCS = GSM 7-bit and AT+CSCS="IRA")

No.	0	1	2	3	4	5	6	7
0	40	20	20	30	A1	50	BF	70
1	A3	5F	21	31	41	51	61	71
2	24	20	22	32	42	52	62	72
3	A5	20	23	33	43	53	63	73
4	E8	20	A4	34	44	54	64	74
5	E9	20	25	35	45	55	65	75

6	F9	20	26	36	46	56	66	76
7	EC	20	27	37	47	57	67	77
8	F2	20	28	38	48	58	68	78
9	C7	20	29	39	49	59	69	79
A	0D0A		2A	3A	4A	5A	6A	7A
B	D8		2B	3B	4B	C4	6B	E4
C	F8	C6	2C	3C	4C	D6	6C	F6
D	0D	E6	2D	3D	4D	D1	6D	F1
E	C5	DF	2E	3E	4E	DC	6E	FC
F	E5	C9	2F	3F	4F	A7	6F	E0

Table 21: GSM Extended Characters (ISO-8859-1/Unicode)

No.	0	1	2	3	4	5	6	7
0					7C			
1								
2								
3								
4		5E						
5								
6								
7								
8			7B					
9			7D					
A								
B								

C	5B
D	7E
E	5D
F	5C

Because the low 8-bit of UCS2 character is the same as the IRA character:

- The conversion table of DCS = GSM 7-bit and **AT+CSCS="UCS2"** is similar to **AT+CSCS="IRA"**.
- The conversion table of fmt = GSM 7-bit and **AT+CSCS="GSM"** is similar to **AT+CSCS="GSM"**.
- The conversion table of fmt = GSM 7-bit and **AT+CSCS="IRA"** is similar to **AT+CSCS="IRA"**.
- The conversion table of fmt = GSM 7-bit and **AT+CSCS="UCS2"** is similar to **AT+CSCS="IRA"**.

The difference is the way of SMS text input or output. Please refer to ***Table 14*** for more details.

13.9. Release Cause Report List of AT+CEER

Table 22: Release Cause Report List of AT+CEER

CS Internal Cause
No cause information available (default)
Phone is offline
No service available
Network release, no reason given
Received incoming call
Client ended call
UIM not present
Access attempt already in progress
Access failure, unknown source
Concur service not supported by network

No response received from network
GPS call ended for user call
SMS call ended for user call
Data call ended for emergency call
Rejected during redirect or handoff
Lower-layer ended call
Call origination request failed
Client rejected incoming call
Client rejected setup indication
Network ended call
No funds available
No service available
Full service not available
Maximum packet calls exceeded
Video connection lost
Video protocol closed after setup
Video protocol setup failure
Internal error
CS Network Cause
Unassigned/unallocated number
No route to destination
Channel unacceptable
Operator determined barring
Normal call clearing
User busy

No user responding
User alerting, no answer
Call rejected
Number changed
Non selected user clearing
Destination out of order
Invalid/incomplete number
Facility rejected
Response to status enquiry
Normal, unspecified
No circuit/channel available
Network out of order
Temporary failure
Switching equipment congestion
Access information discarded
Requested circuit/channel not available
Resources unavailable, unspecified
Quality of service unavailable
Requested facility not subscribed
Incoming calls barred within the CUG
Bearer capability not authorized
Bearer capability not available
Service/option not available
Bearer service not implemented
ACM >= ACM max

Requested facility not implemented
Only RDI bearer is available
Service/option not implemented
Invalid transaction identifier value
User not member of CUG
Incompatible destination
Invalid transit network selection
Semantically incorrect message
Invalid mandatory information
Message non-existent/not implemented
Message type not compatible with state
IE non-existent/not implemented
Conditional IE error
Message not compatible with state
Recovery on timer expiry
Protocol error, unspecified
Interworking, unspecified
CS Network Reject
IMSI unknown in HLR
Illegal MS
IMSI unknown in VLR
IMEI not accepted
Illegal ME
GPRS services not allowed
GPRS and non GPRS services not allowed

MS identity cannot be derived
Implicitly detached
PLMN not allowed
Location area not allowed
Roaming not allowed
GPRS services not allowed in PLMN
No suitable cells in location area
MSC temporary not reachable
Network failure
MAC failure
Synch failure
Congestion
GSM authentication unacceptable
Service option not supported
Requested service option not subscribed
Service option temporary out of order
Call cannot be identified
No PDP context activated
Semantically incorrect message
Invalid mandatory information
Message type non-existent
Message type not compatible with state
Information element non-existent
Message not compatible with state
RR release indication

RR random access failure
RRC release indication
RRC close session indication
RRC open session failure
Low level failure
Low level failure no redial allowed
Invalid SIM
No service
Timer T3230 expired
No cell available
Wrong state
Access class blocked
Abort message received
Other cause
Timer T303 expired
No resources
Release pending
Invalid user data
PS Internal Cause
Invalid connection identifier
Invalid NSAPI
Invalid primary NSAPI
PDP establish timeout
Invalid field
SNDCP failure

RAB setup failure
No GPRS context
PDP activate timeout
PDP modify timeout
PDP inactive max timeout
PDP lower layer error
PDP duplicate
Access technology change
PDP unknown reason
CS PS Network Cause
LLC or SNDCP failure
Insufficient resources
Missing or unknown APN
Unknown PDP address or PDP type
User authentication failed
Activation rejected by GGSN
Activation rejected, unspecified
Service option not supported
Requested service option not subscribed
Service option temporary out of order
NSAPI already used (not sent)
Regular deactivation
QoS not accepted
Network failure
Reactivation required

Feature not supported
Semantic error in the TFT operation
Syntactical error in the TFT operation
Unknown PDP context
PDP context without TFT already activated
Semantic errors in packet filter
Syntactical errors in packet filter
Invalid transaction identifier
Semantically incorrect message
Invalid mandatory information
Message non-existent/not implemented
Message type not compatible with state
IE non-existent/not implemented
Conditional IE error
Message not compatible with state
Protocol error, unspecified