RG520N&RG52xF&RG530F &RM520N&RM530N Series

AT Commands Manual

5G Module Series

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About the Document

Revision History

Version	Date	Author	Description
-	2022-02-21	Evan JIN/ Ozzy ANG/ Amos ZHANG/ Shaun DUAN/ Joseph WANG/ Pacifier WANG/ Wolf GUAN/ Westring LIU	Creation of the document
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1 Introduction

1.1. Scope of the Document

This document presents the AT command set supported by Quectel 5G modules.

Table 1: Applicable Modules

Module Series	Module
RG520N	RG520N Series
RG52xF	RG520F Series
	RG525F-NA
RG530F	RG530F Series
RM520N	RM520N Series
RM530N	RM530N-GL

1.2. Definitions

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

1.3. AT Command Syntax

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

AT commands implemented by Quectel 5G modules can be separated into three categories syntactically: "Basic", "S Parameter" and "Extended", as listed below, as listed below:

● **Basic Command**

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

● **S Parameter Syntax**

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

● **Extended Command**

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

Table 2: Type of AT Commands

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

Multiple commands can be placed on a single line using a semi-colon (**;**) between commands. 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 entered after the **AT** token, **OK** will be returned. If an invalid command is entered, **ERROR** will be returned.

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

1.4. AT Command Responses

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

Responses will be in the format of:

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

Or

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

1.5. Declaration of AT Command Examples

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

1.6. Supported Character Sets

The AT command interface of Quectel 5G modules default to the **GSM** character set. Quectel 5G modules support the following character sets:

- GSM format
- UCS2
- IRA

The character set can be configured and interrogated by using the **AT+CSCS** (*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 phone book entries text field.

1.7. AT Command Port

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

1.8. 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.

1.9. Module Turn-off Procedure

It is recommended to execute **AT+QPOWD** to turn 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 1 s to disconnect the power supply after the URC **POWERED DOWN** is outputted. If **POWERED DOWN** cannot be received within 65 s, the power supply shall be disconnected compulsorily.

1.10. Special Mark

Table 3: Special Mark

Mark	Definition
*	Unless otherwise specified, when an asterisk (*) is used after a function, feature, interface, pin name, AT command, or argument, it indicates that the function, feature, interface, pin, AT command, or argument is under development and currently not supported; and the asterisk (*) after a model indicates that the sample of such a model is currently unavailable.

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 MT firmware version.

Example

```
ATI
Quectel
RG520NNA
Revision: RG520NNAAAR01A01M4G

OK
```

2.2. AT+GMI   Request Manufacturer Identification

This Execution Command returns the manufacturer identification text. It is identical with **AT+CGMI** in *Chapter 2.5*.

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+GMM   Request MT Model Identification

This command returns the MT model identification text. It is identical with **AT+CGMM** in *Chapter 2.6*.

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.

2.4. AT+GMR   Request MT Firmware Revision Identification

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

AT+GMR Request MT 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, including line terminators, which should not exceed 2048 characters in the information text.

Example

AT+GMR **RG520NNAAAR01A01M4G** **OK**

2.5. AT+CGMI   Request Manufacturer Identification

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

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	

2.6. AT+CGMM   Request MT Model Identification

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

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.

2.7. 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**.

AT+CGMR Request MT Firmware Revision Identification	
Test Command **AT+CGMR=?**	Response **OK**
Execution Command	Response

AT+CGMR	<revision>
	OK
Maximum Response Time	300 ms
Characteristics	/
Reference **3GPP TS 27.007**	

Parameter

<revision>	String type. Revision of software release, including line terminators, which should not exceed 2048 characters in the information text.

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 **AT+CGSN** 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**.

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 *Chapter 12.2*).

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 Configurations

This command displays the current configurations of some AT command parameters (See *Table 4*), even including the single-letter AT command parameters which are not readable.

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

Table 4: 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 *Chapter 12.3*). The AT command settings are 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.
	<u>0</u> 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 *Chapter 12.4*).

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

ATZ Restore All AT Command Settings From User-defined Profile	
Execution Command **ATZ[<value>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/

Reference	
V.25ter	

Parameter

<value>	Integer type.
	<u>0</u> 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. Whether the result code is transmitted to the TE.
	<u>0</u> 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 5*.

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 5: 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. A/   Repeat Previous Command Line

This command repeats previous AT command line, and "**/**" acts as the line termination character.

A/ Repeat Previous Command Line	
Execution Command **A/**	Response Repeat the previous command
Characteristics	/
Reference V.25ter	

Example

ATI **Quectel** **RG520NNA** **Revision: RG520NNAAAR01A01M4G** **OK**	
A/	//Repeat the previous command.
Quectel **RG520NNA** **Revision: RG520NNAAAR01A01M4G** **OK**	

2.18. 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.

2.19. 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.

2.20. 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.

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

This command determines whether TA transmits particular result codes to TE. It also controls whether TA detects the presence of a dial tone when it begins dialing and the engaged tone (busy signal).

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** is returned, dial tone and busy detection are both disabled.
	1 Only **CONNECT<text>** is returned, dial tone and busy detection are both disabled.
	2 **CONNECT<text>** is returned, dial tone detection is enabled, and busy detection is disabled.
	3 **CONNECT<text>** is returned, dial tone detection is disabled, and busy detection is

enabled.

<u>4</u>   **CONNECT<text>** is returned, and dial tone and busy detection are both enabled.

2.22. 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 related to MT functionality: **+CME ERROR: <err>** **Or** ERROR
Maximum Response Time	15 s, determined by the network.
Characteristics	/
Reference **3GPP TS 27.007**	

Parameter

<fun>   Integer type. Functionality level.
    0   Minimum functionality
    <u>1</u>   Full functionality
    4   Disable both transmitting and receiving RF signals
<rst>   Integer type. Whether to reset UE.
    <u>0</u>   Do not reset the UE before setting it to **<fun>** power level.
    1   Reset UE. The device is fully functional after the reset. This value is available only for **<fun>**=1.
<err>   Error codes. For more details, see *Chapter 12.5*.

Example

AT+CFUN=0	//Switch 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 UE to full functionality.
OK	
+CPIN: SIM PIN	
AT+CPIN=1234	
OK	
+CPIN: READY	
+QUSIM: 1	
+QIND: PB DONE	
+QIND: SMS DONE	
AT+CPIN?	
+CPIN: READY	
OK	
AT+COPS?	
+COPS: 0,0,"CHINA MOBILE CMCC",7	//Operator is registered.
OK	

2.23. 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.
	<u>1</u> Enable result code and use numeric values.
	2 Enable result code and use verbose values.
<err>	Error codes. For more details, see *Chapter 12.5*.

Example

AT+CMEE=0	//Disable result code.
OK	
AT+CPIN?	
ERROR	//Only **ERROR** is 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	

2.24. AT+CSCS Select TE Character Set

This Write Command informs the MT which character set is used by the TE. This enables the MT 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. Character set.
	"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
```

2.25. 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
	"all" All ports

Example

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

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, see *Chapter 12.5*.

Example

AT+CPAS	
+CPAS: 0	//MT is ready.
OK	
RING	
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 **<text>** 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: <text>** **OK** Or

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

Parameter

\<text> Release cause text. Reason for the last call failure to setup or release (listed in *Chapter 12.9*). 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, see *Chapter 12.5*.

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: "risignaltype",(**list of supported **\<risignatype>**s**)** **+QCFG: "data_interface",(**list of supported **\<network>**s**),(**list of supported **\<diag>**s**)** **+QCFG: "pcie/mode",(**list of supported **\<mode>**s**)** **+QCFG: "usbspeed",(**list of supported **\<speed>**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, query 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 the module is rebooted. 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
	<u>24</u> Category 24
<err>	Error codes. For more details, see *Chapter 12.5*.

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, query 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 the module is rebooted. 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, see *Chapter 12.5*.	

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, query 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 the module is rebooted. 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, see *Chapter 12.5*.

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, query 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, see *Chapter 12.5*.	

3.3.5. AT+QCFG="risignaltype"　RI Signal Output Carrier

This command specifies the RI (ring indicator) signal output carrier.

AT+QCFG="risignaltype"	RI Signal Output Carrier
Write Command **AT+QCFG="risignaltype"[,<r isignatype>]**	Response If the optional parameter is omitted, query the current configuration: **+QCFG: "risignaltype",<risignatype>** **OK** If the optional parameter is specified, set the RI signal output carrier: **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

<risignaltype>	String type. RI signal output carrier.	
	"<u>respective</u>"	The ring indicator behaves on the port where URC is presented. For example, if a URC is presented on UART port, it is physical ring indicator. If URC is presented on USB port, it is virtual ring indicator. If URC is presented on USB AT port which does not support ring indicator, then there is no ring indicator. **AT+QURCCFG="urcport"** can get the port on which URC is presented.
	"physical"	No matter which port URC is presented on, URC only causes the behavior of physical ring indicator.
<err>	Error codes. For more details, see *Chapter 12.5*.	

3.3.6. AT+QCFG="data_interface"　Set Network Port/Diagnostic Port

Communication via PCIe/USB Interface

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

AT+QCFG="data_interface"	Set Network Port/Diagnostic Port Communication via 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 via USB/PCIe interface: **OK** **Or** **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration will be saved automatically.

Parameter

<network>	Integer type.
	<u>0</u> Set the network port communication via USB interface.
	1 Set the network port communication via PCIe interface.
<diag>	Integer type.
	<u>0</u> Set the diagnostic port communication via USB interface.

> **NOTE**
>
> 1. If the network port and diagnostic port communication is switched to PCIe through eFuse, this command is invalid, and the communication cannot be switched back to USB any longer.
> 2. If the network port is set to communicate via the USB interface, the PCIe interface is disabled. Therefore, if the network port is set to communicate via the USB interface, no AT port or diagnostic port communicates via the PCIe interface.
> 3. The PCIe switched by **AT+QCFG="data_interface"** is only applicable when the host is installed with the ARM system, and the USB interface of the module must be connected to the host.
> 4. The PCIe switched through eFuse supports upgrading firmware by connecting the host via the PCIe interface. However, the PCIE switched by **AT+QCFG="data_interface"** does not support upgrading by connecting the host via the PCIe interface, thus you need to upgrade firmware via the USB interface.
> 5. When the module needs to be rebooted (For example: 5 seconds after upgrading firmware via DFOTA, after upgrading by connecting the host, etc.), please ensure that the host and the module reboot synchronously, and the power-on time sequence keeps the same with that of the first

initialization.

6. It is not recommended to execute **AT+CFUN=1,1** to restart the module with the PCIe interface, which may cause the PCIe initialization time sequence error and then resulting in PCIe interface initialization failure; it is recommended to reset the module by hardware reset.

7. If the module or the host restarts, please make sure that the initialization time sequence of the PCIe interface is correct.

Example

AT+QCFG="data_interface" **+QCFG: "data_interface",0,0** **OK**	//Query the current configuration.
AT+QCFG="data_interface",1,0 **OK**	//Set the network port communication via PCIe interface, and diagnostic port communication via USB interface. AT commands can communicate via both the USB interface and the PCIe interface.

3.3.7. AT+QCFG="pcie/mode" Set PCIe RC/EP Mode

This command sets PCIe RC/EP mode.

AT+QCFG="pcie/mode" Set PCIe RC/EP Mode	
Write Command **AT+QCFG="pcie/mode"[,<mode>]**	Response If the optional parameter is omitted, query the current configuration: **+QCFG: "pcie/mode",<mode>** **OK** If the optional parameter is specified, set PCIe RC/EP mode: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	This command takes effect after the module is rebooted. The configuration will be saved automatically.

Parameter

<mode>	Integer type. PCIe RC or EP mode. <u>0</u> PCIe EP mode. 1 PCIe RC mode.

Example

```
AT+QCFG="pcie/mode"          //Query the current configuration.
+QCFG: "pcie/mode",0


OK
AT+QCFG="pcie/mode",1
OK
```

3.3.8. AT+QCFG="usbspeed" Set USB Speed Mode

This command sets USB speed mode when device is inserted in a USB 3.0 port.

AT+QCFG="usbspeed" Set USB Speed Mode	
Write Command **AT+QCFG="usbspeed"[,\<speed>]**	Response If the optional parameter is omitted, query the current configuration: **+QCFG: "usbspeed",\<speed>** **OK** If the optional parameter is specified, set USB speed mode: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	This command takes effect after the module is rebooted. The configuration will be saved automatically.

Parameter

\<speed>	String type. USB speed mode.
	"20" USB 2.0 high speed,480Mbps
	"311" USB 3.1 Gen1, 5Gbps
	"312" USB 3.1 Gen2, 10Gbps

Example

```
AT+QCFG="usbspeed"                    //Query the current configuration.
+QCFG: "usbspeed","312"


OK
AT+QCFG="usbspeed","20"
```

OK

3.4. AT+QINDCFG   URC Indication Configuration

This command controls URC indication.

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=<URC_type>[,<enable>[,<savetonvram>]]**	Response If the optional parameters are omitted, query the current configuration: **+QINDCFG: <URC_type>,<enable>** **OK** If the optional parameters are 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

<URC_type>	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 set it to ON, **+QIND: "csq",<rssi>,<ber>** is present.
	"smsfull" SMS storage full indication. Default: OFF. If set it to 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 the value is ON, **+QIND: "act",<actvalue>** is present.
	<actvalue> is a string type value. 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, **<actvalue>** would be "UNKNOWN".
	2. If the value is ON, the URC of "act" is reported immediately. Only when the network access technology changes, a new URC is reported.
<enable>	Integer type. URC indication is ON or OFF.
	0 OFF
	1 ON
<savetonvram>	Integer type. Whether to save configuration into NVM.
	0 Not save
	1 Save
<err>	Error codes. For more details, see *Chapter 12.5*.

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 (U)SIM card or active application in the UICC (GSM or (U)SIM) that is attached to MT.

AT+CIMI Request International Mobile Subscriber Identity (IMSI)	
Test Command **AT+CIMI=?**	Response **OK**
Execution Command **AT+CIMI**	Response **<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, see **Chapter 12.5**.

Example

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

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>[,<class>]** **[+CLCK: <status>[,<class>]]** **[...]** **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 (U)SIM/UICC card inserted in the currently selected card slot) (U)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 (U)SIM/UICC card (also referred in the present document as PH-FSIM) (MT asks password when other (U)SIM/UICC cards are inserted).
	"PN"	Network Personalization (see *3GPP TS 22.022*)
	"PU"	Network Subset Personalization (see *3GPP TS 22.022*)
	"PP"	Service Provider Personalization (see *3GPP TS 22.022*)
	"PC"	Corporate Personalization (see *3GPP TS 22.022*)
<mode>	Integer type.	
	0	Unlock
	1	Lock
	2	Query status
<password>	String type. Password.	
<class>	Integer type.	
	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+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.

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.

AT+CPIN Enter PIN	
Test Command **AT+CPIN=?**	Response **OK**
Read Command **AT+CPIN?**	Response **+CPIN: <code>** **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Write Command **AT+CPIN=<pin>[,<new_pin>]**	Response **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
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, see *Chapter 12.5*.

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

4.4. 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>,<pwdlength>)**s **OK**
Write Command **AT+CPWD=<fac>,<oldpwd>,<newpwd>**	Response **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 (U)SIM/UICC card) ((U)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)

	"P2" (U)SIM PIN2
\<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	

4.5. 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*.
\<response\>	Response to the command transferred by the (U)SIM to the MT in the format as described in *3GPP TS 51.011*.
\<err\>	Error codes. For more details, see **Chapter 12.5**.

Example

AT+CSIM=10,"80F2010112"
+CSIM: 40,"8410A0000000871002FF86FF0389FFFFFFFF9000"

OK

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*.
<data>	Information which should be written to the (U)SIM (hexadecimal character format; see **AT+CSCS**).
<pathId>	The directory path of an elementary file on a (U)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; see **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*). 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, see *Chapter 12.5*.

Example

```
AT+CRSM=214,28539,0,0,12,"FFFFFFFFFFFFFFFFFFFFFFFF"
+CRSM: 144,0,""

OK
```

4.7. AT+CCHO   Open Logical Channel

This command opens a logical channel. **<sessionid>** is to be used when you send commands with restricted UICC logical channel access **AT+CRLA** or generic UICC logical channel access **AT+CGLA**.

AT+CCHO Open Logical Channel	
Test Command **AT+CCHO=?**	Response **OK**
Write Command **AT+CCHO=<dfname>**	Response **+CCHO: <sessionid>** **OK** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will not be saved.
Reference 3GPP TS 31.101	

Parameter

<sessionid>	Integer type. A session ID to be used in order to target a specific application on the smart card (e.g. (U)SIM, WIM, ISIM) using logical channels mechanism.
<dfname>	All selectable applications in the UICC are referenced by a DF name coded on 1 to 16 bytes.
<err>	Error codes. For more details, see **Chapter 12.5**.

Example

```
AT+CCHO=?
OK
AT+CCHO="A0000000871002FF86FFFF89FFFFFFFF"          //Open logical channels.
+CCHO: 1

OK
```

4.8. AT+CCHC   Close Logical Channel

This command asks the ME to close a communication session with the active UICC. The ME shall close the previously opened logical channel. The TE will no longer be able to send commands on this logical channel. The UICC closes the logical channel when receiving this command.

AT+CCHC Close Logical Channel	
Test Command **AT+CCHC=?**	Response **OK**
Write Command **AT+CCHC=<sessionid>**	Response **OK** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will not be saved.
Reference 3GPP TS 31.101	

Parameter

<sessionid>	Integer type. A session ID to be used in order to target a specific application on the smart card (e.g. (U)SIM, WIM, ISIM) using logical channels mechanism.
<err>	Error codes. For more details, see **Chapter 12.5**.

Example

```
AT+CCHC=?
OK
AT+CCHC=1                              //Close logical channels.
OK
```

4.9. AT+CGLA   Generic UICC Logical Channel Access

This command allows a direct control of the currently selected UICC by a distant application on the TE. The TE shall then take care of processing UICC information within the frame specified by GSM/UMTS.

AT+CGLA Generic UICC Logical Channel Access	
Test Command **AT+CGLA=?**	Response **OK**

Write Command **AT+CGLA=<sessionid>,<length>,<command>**	Response **+CGLA: <length>,<response>** **OK** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will not be saved.
Reference 3GPP TS 31.101	

Parameter

<sessionid>	Integer type. This is the identifier of the session to be used in order to send the APDU commands to the UICC. It is mandatory in order to send commands to the UICC when targeting applications on the smart card using a logical channel other than the default channel (channel "0").
<length>	Integer type. Length of the characters that are sent to TE in **<command>** or **<response>** (two times the actual length of the command or response).
<command>	Command passed on by the MT to the UICC in the format as described in *3GPP TS 31.101* (hexadecimal character format; see **AT+CSCS**).
<response>	Response to the command passed on by the UICC to the MT in the format as described in *3GPP TS 31.101* (hexadecimal character format; see **AT+CSCS**).
<err>	Error codes. For more details, see *Chapter 12.5*.

> **NOTE**

Before using this command, the logical channel must be opened through **AT+CCHO=<dfname>**.

Example

```
AT+CGLA=?
OK
AT+CGLA= 1,10,"80F2010112"
+CGLA: 40,"8410A0000000871002FF86FFFF89FFFFFFFF9000"

OK
```

4.10. 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, see *Chapter 12.5*.

Example

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

OK

4.11. 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

OK

4.12. AT+QSIMDET   (U)SIM Card Detection

This command enables or disables (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 the module is rebooted. The configuration will be saved automatically.

Parameter

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

NOTE

Hot-swap function is invalid if the configured value of **<insert_level>** is inconsistent with hardware design.

Example

AT+QSIMDET=1,0　　　　//Set (U)SIM card detection pin level as low when (U)SIM card is inserted.
OK

<Remove (U)SIM card>

+CPIN: NOT READY

<Insert (U)SIM card>

+CPIN: READY

4.13. 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>,<inserted_status>** is 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. 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
```

4.14. 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   Operator 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. 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/EPS/5G 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 Operator Selection	
Test Command **AT+COPS=?**	Response **+COPS: [**list of supported **(<stat>,**long alphanumeric **<oper>,**short alphanumeric **<oper>,**numeric **<oper>**s**[,<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	Response

AT+COPS=<mode>[,<format> [,<oper>[,<AcT>]]]	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 **AT+COPS?** Read Command), and do not attempt registration/deregistration (**<oper>** and **<AcT>** fields are ignored). This value is invalid in the response of Read Command.
	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
	10　　　E-UTRAN connected to a 5GCN
	11　　　NR connected to 5GCN
	12　　　NG-RAN
	13　　　E-UTRAN-NR dual connectivity

| <err> | Error codes. For more details, see *Chapter 12.5*. |

Example

```
AT+COPS=?                           //List all current network operators.
+COPS: (1,"CHN-UNICOM","UNICOM","46001",2),(1,"CHN-UNICOM","UNICOM","46001",12),(3,"C
HINA MOBILE","CMCC","46000",7),(3,"CHN-CT","CT","46011",12),(3,"CHN-CT","CT","46011",7),(3,
"CHINA MOBILE","CMCC","46000",12),,(0-4),(0-2)

OK
AT+COPS?                            //Query the currently selected network operator.
+COPS: 0,0,"CHINA MOBILE",13

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	/

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. Indicate the 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>	Two bytes location area code in hexadecimal format.	
<ci>	28-bit (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
	7	E-UTRAN
	10	E-UTRAN connected to a 5GCN
	11	NR connected to 5GCN
	12	NG-RAN
	13	E-UTRAN-NR dual connectivity
<err>	Error codes. For more details, see *Chapter 12.5*.	

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+CGREG   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>],[<rac>]]** 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>],[<rac>]]** **OK**
Write Command **AT+CGREG=[<n>]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	/
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>],[<rac>]]
<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
5	Registered, roaming
<lac>	String type. Two-byte 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>	Access technology selected.
2	UTRAN
4	UTRAN W/HSDPA
5	UTRAN W/HSUPA
6	UTRAN W/HSDPA and HSUPA
<rac>	One byte routing area code in hexadecimal format.

Example

```
AT+CGREG=?
+CGREG: (0-2)

OK
AT+CGREG=2
OK
AT+CGREG?
+CGREG: 2,1,"D5D5","8054BBF",2,"0"

OK
+CGREG: 1,"D5D5","8054BBF",2,"0"
```

5.4. 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	/
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
	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
	13 E-UTRAN-NR dual connectivity

Example

```
AT+CEREG=?
+CEREG: (0-2)

OK
AT+CEREG=2
OK
```

AT+CEREG?
+CEREG: 2,1,"DE10","5A29C0B",7

OK
+CEREG: 1,"DE10","5A29C0B",7

5.5. AT+C5GREG   5GS Network Registration Status

This command queries the network registration status and controls the presentation of URC **+C5GREG: <stat>** when **<n>**=1 and there is a change in the MT's network registration status in 5GS, or URC **+C5GREG: <stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>]]** when **<n>**=2 and there is a change of the network cell in 5GS or the network provided an Allowed NSSAI. The parameters **<AcT>**, **<tac>**, **<ci>**, **<Allowed_NSSAI_length>** and **<Allowed_NSSAI>** are provided only if available.

AT+C5GREG 5GS Network Registration Status	
Test Command **AT+C5GREG=?**	Response **+C5GREG: (**range of supported **<n>**s**)** **OK**
Read Command **AT+C5GREG?**	Response **+C5GREG: <n>,<stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed _NSSAI_length>],[<Allowed_NSSAI>]]** **OK**
Write Command **AT+C5GREG=[<n>]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<n>	Integer type.
	0 Disable network registration unsolicited result code
	1 Enable network registration unsolicited result code **+C5GREG:<stat>**
	2 Enable network registration and location information unsolicited result code

	+C5GREG: <stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allo wed_NSSAI>]]	
<stat>	Integer type. Indicate the NR 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
	5	Registered, roaming
	8	Registered for emergency services only
<tac>	String type. Three-byte tracking area code in hexadecimal format.	
<ci>	String type. Five-byte (NR) cell ID in hexadecimal format.	
<AcT>	Integer type. Access technology selected.	
	10	E-UTRAN connected to a 5GCN
	11	NR connected to a 5GCN
<Allowed_NSSAI_length>		Integer type. Indicate the number of octets of the **<Allowed_NSSAI>** information element.
<Allowed_NSSAI>		String type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs received from the network. The **<Allowed_NSSAI>** is coded as a list of **<S-NSSAI>**s separated by colons. See **<S-NSSAI>** in *3GPP 27.007 subclause 10.1.1*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS**.

Example

```
AT+C5GREG=?
+C5GREG: (0-2)

OK
AT+C5GREG=2
OK
AT+C5GREG?
+C5GREG: 2,1,"690E0F","9013B004",11,4,"01.000000"

OK
+C5GREG: 1,"690E0F","9013B004",11,4,"01.000000"
```

5.6. AT+CGDCONT   Define PDP Contexts

This 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 configurations 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 **<data_comp>**s),(**range of supported **<head_comp>**s)[,(**list of supported **<IPv4_addr_alloc>**s)[,(**list of supported **<request_type>**s)[,(**list of supported **<P-SCF_discoverty>**s)[,(**list of supported **<IM_CN_Signalling_Flag_Ind>**s)[,(**list of supported **<NSLPI>**s)[,(**list of supported **<securePCO>**s)[,(**list of supported **<IPv4_MTU_discoverty>**s)[,(**list of supported **<Local_Addr_Ind>**s)[,(**list of supported **<Non-IP_MTU_discoverty>**s)[,(**list of supported **<Reliable_Data_Service>**s)[,(**list of supported **<SSC_mode>**s)[,(**list of supported **<S-NSSAI>**s)[,(**list of supported **<Pref_access_type>**s)[,(**list of supported **<RQos_ind>**s)[,(**list of supported **<MH6-PDU>**s)[,(**list of supported **<Always-on_req>**s)]]]]]]]]]]]]]]]]** **OK**
Read Command **AT+CGDCONT?**	Response **+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<data_comp>,<head_comp>[,<IPv4_addr_alloc>[,<request_type>[,<P-SCF_discoverty>[,<IM_CN_Signalling_Flag_Ind>[,<NSLPI>[,<securePCO>[,<IPv4_MTU_discoverty>[,<Local_Addr_Ind>[,<Non-IP_MTU_discoverty>[,<Reliable_Data_Service>[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>[,<RQos_ind>[,<MH6-PDU>[,<Always-on_req>]]]]]]]]]]]]]]]** **[…]** **OK**

Write Command	Response
+CGDCONT=[\<cid>[,\<PDP_type>[,\<APN>[,\<PDP_addr>[,\<d_comp>[,\<h_comp>[,\<IPv4AddrAlloc>[,\<request_type>[,\<P-CSCF_discovery>[,\<IM_CN_Signalling_Flag_Ind>[,\<NSLPI>[,\<securePCO>[,\<IPv4_MTU_discovery>[,\<Local_Addr_Ind>[,\<Non-IP_MTU_discovery>[,\<Reliable_Data_Service>[,\<SSC_mode>[,\<S-NSSAI>[,\<Pref_access_type>[,\<RQoS_ind>[,\<MH6-PDU>[,\<Always-on_req>]]]]]]]]]]]]]]]]]]]]]]	**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. A numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands. The range of supported 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" IPv4. Internet protocol (IETF STD 5)
	"PPP" Point to Point Protocol (IETF STD 51)
	"IPV6" Internet Protocol, version 6 (see RFC 2460)
	"IPV4V6" Virtual introduced to handle dual IP stack UE capability. (See *3GPP TS 24.301*)
\<APN>	String type. Access point name, which is 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. Identify 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**.
\<data_comp>	Integer type. Controls PDP data compression (applicable for SNDCP only) (see *3GPP TS 44.065*).
	<u>0</u> Off
	1 On (Manufacturer preferred compression)
	2 V.42bis
	3 V.44 (Not supported currently)

<head_comp>	Integer type. Control PDP header compression (see *3GPP TS 44.065 and 3GPP TS 25.323*).
	<u>0</u> Off
	1 On
	2 RFC1144
	3 RFC2507
	4 RFC3095

<IPv4_addr_alloc> Integer type. Control how the MT/TA requests to get the IPv4 address information.

    <u>0</u>   IPv4 address allocation through NAS signaling

    1   IPv4 address allocated through DHCP

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

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

    1   PDP context is for emergency bearer services.

<P-SCF_discoverty> Integer type. Influence how the MT/TA requests to get the P-CSCF address, see *3GPP TS 24.229 annex B and annex L*.

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

    1   Preference of P-CSCF address discovery through NAS signaling.

    2   Preference of P-CSCF address discovery through DHCP.

<IM_CN_Signalling_Flag_Ind> Integer type. Indicate to the network whether the PDP context is for IM CN subsystem-related signaling only or not.

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

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

<NSLPI> Integer type. Indicate the NAS signaling priority requested for this PDP context.

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

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

<securePCO> Integer type. Specify if security protected transmission of PCO is requested or not (applicable for EPS only, see *3GPP TS 23.401 subclause 6.5.1.2*).

    0   Security protected transmission of PCO is not requested

    1   Security protected transmission of PCO is requested

<IPv4_MTU_discoverty> Integer type. Influence how the MT/TA requests to get the IPv4 MTU size, see *3GPP TS 24.008 subclause 10.5.6.3*.

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

    1   Preference of IPv4 MTU size discovery through NAS signaling

<local_addr_ind> Integer type. Indicate to the network whether the MS supports local IP address in TFTs (see *3GPP TS 24.301* and *3GPP TS 24.008 subclause*

10.5.6.3).

	0	The MS does not support local IP address in TFTs
	1	That the MS supports local IP address in TFTs

<Non-IP_MTU_discoverty> Integer type. Influence how the MT/TA requests to get the Non-IP MTU size, see *3GPP TS 24.008 subclause 10.5.6.3*.

    0   Preference of Non-IP MTU size discovery not influenced by **AT+CGDCONT**

    1   Preference of Non-IP MTU size discovery through NAS signaling

<Reliable_Data_Service> Integer type. Indicate whether the UE is using Reliable Data Service for a PDN connection or not, see *3GPP TS 24.301* and *3GPP TS 24.008 subclause 10.5.6.3*.

    0   Reliable Data Service is not being used for the PDN connection

    1   Reliable Data Service is being used for the PDN connection

<SSC_mode> Integer type. Indicate the session and service continuity (SSC) mode for the PDU session in 5GS, see *3GPP TS 23.501*.

    0   The PDU session is associated with SSC mode 1

    1   The PDU session is associated with SSC mode 2

    2   The PDU session is associated with SSC mode 3

<S-NSSAI> String type in hexadecimal character format. Dependent of the form, the string can be separated by dot(s) and semicolon(s). This parameter is associated with the PDU session for identifying a network slice in 5GS, see *3GPP TS 23.501 and 3GPP TS 24.501*. For the format and the encoding of S-NSSAI, see also *3GPP TS 23.003*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS**. The parameter has one of the forms:

sst	only slice/service type (SST) is present
sst;mapped_sst	SST and mapped configured SST are present
sst.sd	SST and slice differentiator (SD) are present
sst.sd;mapped_sst	SST, SD and mapped configured SST are present
sst.sd;mapped_sst.mapped_sd	SST, SD, mapped configured SST and mapped configured SD are present

<Pref_access_type> Integer type. Indicate the preferred access type for the PDU session in 5GS, see *3GPP TS 23.501* and *3GPP TS 24.501*.

    0   The preferred access type is 3GPP access

    1   The preferred access type is non-3GPP access

<RQos_ind> Integer type. Indicate whether the UE supports reflective QoS for the PDU session, see *3GPP TS 23.501* and *3GPP TS 24.501*.

    0   Reflective QoS is not supported for the PDU session

    1   Reflective QoS is supported for the PDU session

<MH6-PDU> Integer type. Indicate whether the UE supports IPv6 multi-homing for the PDU session, see *3GPP TS 23.501* and *3GPP TS 24.501*.

    0   IPv6 multi-homing is not supported for the PDU session

    1   IPv6 multi-homing is supported for the PDU session

<Always-on_req> Integer type. Indicate whether the UE requests to establish the PDU session as an always-on PDU session, see *3GPP TS 24.501*.

0	always-on PDU session is not requested
1	always-on PDU session is requested

5.7. AT+C5GNSSAI   5GS NSSAI Setting

This command enables updating the default configuration NSSAI stored at MT.

AT+C5GNSSAI 5GS NSSAI Setting	
Test Command **AT+C5GNSSAI=?**	Response **+C5GNSSAI:** **(**range of supported **<default_configured_nssai_length>**s**),(**list of supported **<default_configured_nssai>**s**)**
Read Command **AT+C5GNSSAI?**	Response **+C5GNSSAI: [<dfl_nssai_len>,<dfl_config_nssai>]** **OK**
Write Command **AT+C5GNSSAI=<dfl_nssai_len>,<dfl_config_nssai>**	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

<dfl_nssai_len>	Integer type. Indicate the length in octets of the default configured NSSAI to be stored at the MT.
<dfl_config_nssai>	String type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of S-NSSAIs included in the default configured NSSAI to be stored by the MT. **<dfl_config_nssai>** is coded as a list of **<S-NSSAI>**s separated by colons. Refer **<S-NSSAI>** in *subclause 10.1.1*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS**.
<err>	Error codes. For more details, see *Chapter 12.5*.

> **NOTE**
>
> If the value is an empty string (""), no default configured NSSAI is stored at the MT.

5.8. AT+C5GNSSAIRDP   Read 5GS NSSAI Dynamic Parameters

This command returns the default configured NSSAI, rejected NSSAI for 3GPP access and rejected NSSAI for non-3GPP access stored at the MT.

AT+C5GNSSAIRDP Read 5GS NSSAI Dynamic Parameters	
Test Command **AT+C5GNSSAIRDP=?**	Response **+C5GNSSAIRDP: (**range of supported **<nssai_type>**s)**,(**list of supported **<plmn_id>**s) **OK**
Write Command **AT+C5GNSSAIRDP=<nssai_type>,<plmn_id>**	Response **[+C5GNSSAIRDP: [<default_configured_nssai_length>,<default_configured_nssai>[,<rejected_nssai_3gpp_length>,<rejected_nssai_3gpp>[,<rejected_nssai_non3gpp_length>,<rejected_nssai_non3gpp>]]]** **[+C5GNSSAIRDP: <plmn_id>[,<configured_nssai_length>,<configured_nssai>[,<allowed_nssai_3gpp_length>,<allowed_nssai_3gpp>,<allowed_nssai_non3gpp_length>,<allowed_nssai_non3gpp>]]** **[+C5GNSSAIRDP: <plmn_id>[,<configured_nssai_length>,<configured_nssai>[,<allowed_nssai_3gpp_length>,<allowed_nssai_3gpp>,<allowed_nssai_non3gpp_length>,<allowed_nssai_non3gpp>]]** **[...]]]]** **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<nssai_type>   Integer type. Specify the type of NSSAI to be returned.

	0	Return stored default configured NSSAI only
	1	Return stored default configured NSSAI and rejected NSSAI(s)
	2	Return stored default configured NSSAI, rejected NSSAI(s) and configured NSSAI(s)
	3	Return stored default configured NSSAI, rejected NSSAI(s), configured NSSAI(s) and allowed NSSAI(s)

<plmn_id>   String type. Indicate the MCC and MNC of the PLMN to which the NSSAI information applies. For the format and the encoding of the MCC and MNC, see *3GPP TS 23.003*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS**.

<default_configured_nssai_length>   Integer type. Indicate the length in octets of the default configured NSSAI stored at the MT.

<default_configured_nssai>   String type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of S-NSSAIs included in the default configured NSSAI stored at the MT for the PLMN. The **<default_configured_nssai>** is coded as a list of **<S-NSSAI>**s separated by colons. Refer **<S-NSSAI>** in *3GPP 27.007 subclause 10.1.1*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS.**

<rejected_nssai_3gpp_length>   Integer type. Indicate the length in octets of the rejected NSSAI associated with 3GPP access stored at the MT for the serving PLMN.

<rejected_nssai_3gpp>   String type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), colon(s) and hash(es). This parameter indicates the list of rejected S-NSSAIs associated with 3GPP access stored at the MT for the serving PLMN. The **<rejected_nssai_3gpp>** is coded as a list of rejected **<S-NSSAI>**s separated by colon. For the format and the encoding of **<S-NSSAI>**, see also *3GPP TS 23.003*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS**. The rejected S-NSSAI has one of the forms:

sst#cause   only slice/service type (SST) and reject cause are present

sst.sd#cause   SST and slice differentiator (SD) and reject cause are present

where cause is a cause value according to *3GPP TS 24.501 Table 9.11.3.46.1*.

<rejected_nssai_non3gpp_length>   Integer type. Indicate the length in octets of the rejected NSSAI associated with non-3GPP access stored at the MT for the serving PLMN.

<rejected_nssai_non3gpp>   String type in hexadecimal format. Dependent of the form, the string

can be separated by dot(s), colon(s) and hash(es). This parameter indicates the list of rejected S-NSSAIs associated with non-3GPP access stored at the MT for the serving PLMN. The **<rejected_nssai_non3gpp>** is coded as a list of rejected **<S-NSSAI>**s separated by colon. For the format and the encoding of **<S-NSSAI>**, see also *3GPP TS 23.003*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS**. The rejected S-NSSAI has one of the forms:

sst#cause	only slice/service type (SST) and reject cause are present
sst.sd#cause	SST and slice differentiator (SD) and reject cause are present

where cause is a cause value is according to *3GPP TS 24.501 table 9.11.3.46.1*.

<configured_nssai_length>	Integer type. Indicate the length in octets of the configured NSSAI stored at the MT for the PLMN identified by **<plmn_id>**.
<configured_nssai>	String type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of configured S-NSSAIs stored at the MT for the PLMN identified by **<plmn_id>**. The **<configured_nssai>** is coded as a list of **<S-NSSAI>**s separated by colons. Refer **<S-NSSAI>** in *3GPP 27.007 subclause 10.1.1*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS**.
<allowed_nssai_3gpp_length>	Integer type. Indicate the length in octets of the allowed NSSAI associated with 3GPP access stored at the MT for the PLMN identified by **<plmn_id>**.
<allowed_nssai_3gpp>	String type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs associated with 3GPP access stored at the MT for the PLMN identified by **<plmn_id>**. The **<allowed_nssai_3gpp>** is coded as a list of **<S-NSSAI>**s separated by colons. Refer **<S-NSSAI>** in *3GPP 27.007 subclause 10.1.1*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS**.
<allowed_nssai_non3gpp_length>	Integer type. Indicate the length in octets of the allowed NSSAI associated with non-3GPP access stored at the MT for the PLMN identified by **<plmn_id>**.
<allowed_nssai_non3gpp>	String type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs associated with non-3GPP access stored at the MT for the PLMN identified by **<plmn_id>**. The **<allowed_nssai_non3gpp>** is coded as a list of **<S-NSSAI>**s

separated by colons. Refer **<S-NSSAI>** in *3GPP 27.007 subclause 10.1.1*. This parameter shall not be subject to conventional character conversion as per **AT+CSCS**.

5.9. AT+CSQ   Signal Quality Report

This command indicates the received signal strength **<RSSI>** and the channel bit error rate **<ber>**. This Test Command returns values supported by MT. This 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, see **Chapter 12.5**.	

Example

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


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


OK
```

> **NOTE**
>
> 1.   After using network related commands such as **AT+CCWA** and **AT+CCFC**, it is recommended to wait
>   for 3 s before entering **AT+CSQ** so as to ensure that any network access required for the preceding
>   command has been finished.
> 2.   This command is not applicable to 5G.

5.10. AT+QRSRP   Report RSRP

The command queries and reports the RSRP of the current service network.

AT+QRSRP Report RSRP	
Test Command **AT+QRSRP=?**	Response **OK**
Execution Command **AT+QRSRP**	Response **+QRSRP: <PRX>,<DRX>,<RX2>,<RX3>,<sysmode>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<PRX>	Integer type. PRX path RSRP value. Range: -140 to -44 dBm.
<DRX>	Integer type. DRX path RSRP value. Range: -140 to -44 dBm.
<RX2>	Integer type. RX2 path RSRP value. Range: -140 to -44 dBm.
<RX3>	Integer type. RX3 path RSRP value. Range: -140 to -44 dBm.
<sysmode>	String type value indicating the service mode in which the MT will report the RSRP.
	LTE LTE mode

NR5G	5G NR mode

Example

AT+QRSRP   //Query RSRP.
+QRSRP: -101,-105,-105,-99,LTE

OK

> **NOTE**
>
> 1. This command is only supported in LTE and 5G NR.
> 2. Invalid value is displayed as -32768.

5.11. AT+QRSRQ   Report RSRQ

The command queries and reports the RSRQ of the current service network.

AT+QRSRQ Report RSRQ	
Test Command **AT+QRSRQ=?**	Response **OK**
Read Command **AT+QRSRQ**	Response **+QRSRQ: <PRX>,<DRX>,<RX2>,<RX3>,<sysmode>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<PRX>   Integer type. PRX path RSRQ value. Range: -20 to -3 dB.
<DRX>   Integer type. DRX path RSRQ value. Range: -20 to -3 dB.
<RX2>   Integer type. RX2 path RSRQ value. Range: -20 to -3 dB.
<RX3>   Integer type. RX3 path RSRQ value. Range: -20 to -3 dB.
<sysmode>   String type value indicating the service mode in which the MT will report the RSRQ.
        LTE   LTE mode
        NR5G   5G NR mode

Example

AT+QRSRQ   //Query RSRQ.
+QRSRQ: -16,-19,-19,-15,LTE

OK

NOTE

1. This command is only supported in LTE and 5G NR.
2. Invalid value is displayed as -32768.

5.12. AT+QSINR   Report SINR

The command queries and reports the SINR of the current service network.

AT+QSINR Report SINR	
Test Command **AT+QSINR=?**	Response **OK**
Read Command **AT+QSINR?**	Response **+QSINR: <PRX>,<DRX>,<RX2>,<RX3>,<sysmode>** **OK**
Execution Command **AT+QSINR**	Response **+QSINR: <PRX>,<DRX>,<RX2>,<RX3>,<sysmode>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<PRX>	Integer type. PRX path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G NR.
<DRX>	Integer type. DRX path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G NR.
<RX2>	Integer type. RX2 path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G NR.
<RX3>	Integer type. RX3 path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G NR.
<sysmode>	String type value indicating the service mode in which the MT will report the SINR.

LTE   LTE mode
NR5G   5G NR mode

Example

AT+QSINR	//Query SINR.
+QSINR: -3,-7,-1,-2,LTE	
OK	

> **NOTE**
>
> 1. This command is only supported in LTE and 5G NR.
> 2. Invalid value is displayed as -32768.

5.13. 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 Query the list of preferred operators: **AT+CPOL?**	Response **+CPOL: <index>,<format>,<oper>[,<GSM>,<GSM_compac t>,<UTRAN>,<E-UTRAN>,<NG-RAN>]** **[…]** **OK**
Write Command Edit the list of preferred operators: **AT+CPOL=<index>[,<format>[,<ope r>[<GSM>,<GSM_compact>,<UTRA N>,<E-UTRAN>,<NG-RAN>]]]**	Response **OK** Or **ERROR** If there is any error related to MT functionality: **+CME ERROR: <err>** If **<index>** is given but **<oper>** is omitted, the entry is deleted.
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS 27.007	

Parameter

<index>	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>**
<oper>	**<format>** indicates the format is alphanumeric or numeric (see **AT+COPS**)
<GSM>	Integer type. GSM access technology.
	0 Access technology is not selected
	1 Access technology is selected
<GSM_compact>	Integer type. GSM compact access technology.
	0 Access technology is not selected
	1 Access technology is selected
<UTRAN>	Integer type. UTRAN access technology.
	0 Access technology is not selected
	1 Access technology is selected
<E-UTRAN>	Integer type. E-UTRAN access technology.
	0 Access technology is not selected
	1 Access technology is selected
<NG-RAN>	Integer type. NG-RAN access technology.
	0 Access technology is not selected
	1 Access technology is selected
<err>	Error codes. For more details, see *Chapter 12.5*.

NOTE

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

5.14. 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 **AT+COPN=?**	Response **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

<numeric*n*>	String type. Operator names in numeric format (see **AT+COPS**).
<alpha*n*>	String type. Operator names in long alphanumeric format (see **AT+COPS**).
<err>	Error codes. For more details, see *Chapter 12.5*.

5.15. 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. Enable or disable automatic time zone update.
	<u>0</u> Disable
	1 Enable

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
```

5.16. AT+CTZR   Time Zone Reporting

This command controls the reporting of time zone change event. If reporting is enabled, 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. Disable or enable time zone reporting.
	<u>0</u> Disable time zone reporting of changed event
	1 Enable time zone reporting of changed event by unsolicited result code **+CTZV: <tz>**
	2 Enable extended time zone reporting by unsolicited result code **+CTZE: <tz>,<dst>,<time>**
<tz>	String type. 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. 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. Indicate 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). This parameter can be provided by the network when delivering time zone information and will be presented in the unsolicited result code of extended time zone reporting if 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.
```

5.17. 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, see *Chapter 12.5*.

> **NOTE**
>
> If the time has not been synchronized through network, the command returns **+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
```

5.18. AT+QNWINFO   Query Network Information

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

AT+QNWINFO Query Network Information	
Test Command **AT+QNWINFO=?**	Response **OK**

Execution Command **AT+QNWINFO**	Response **+QNWINFO: \<AcT\>,\<oper\>,\<band\>,\<channel\>** **[+QNWINFO: \<AcT\>,\<oper\>,\<band\>,\<channel\>]** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

\<AcT\>	String type. Access technology selected. "NONE" "WCDMA" "TDD LTE" "FDD LTE" "TDD NR5G" "FDD NR5G"
\<oper\>	Operator names in numeric format.
\<band\>	String type. Selected band. "WCDMA_I_2100" "WCDMA_II_1900" "WCDMA_III_1800" "WCDMA_IV_1700_US" "WCDMA_V_850" "WCDMA_VI_800" "WCDMA_VII_2600" "WCDMA_VIII_900" "WCDMA_IX_1700_JAPAN" "WCDMA_XI_1500" "WCDMA_XIX_850_JAPAN" "LTE BAND 1"–"LTE BAND 43" "LTE BAND 46"–"LTE BAND49" "LTE BAND 66"–"LTE BAND 68" "LTE BAND 71" "LTE BAND 125"–"LTE BAND 127" "LTE BAND 250" "LTE BAND 252" "LTE BAND 255" "NR5G BAND 1"–"NR5G BAND 3" "NR5G BAND 5" "NR5G BAND 7"–"NR5G BAND 8" "NR5G BAND 12"

	"NR5G BAND 14"
	"NR5G BAND 20"
	"NR5G BAND 25"
	"NR5G BAND 28"
	"NR5G BAND 34"
	"NR5G BAND 38"–"NR5G BAND 41"
	"NR5G BAND 48"
	"NR5G BAND 50"–"NR5G BAND 51"
	"NR5G BAND 65"–"NR5G BAND 66"
	"NR5G BAND 70"–"NR5G BAND 71"
	"NR5G BAND 74"–"NR5G BAND 86"
	"NR5G BAND 257"–"NR5G BAND 261"
<channel>	Integer type. Channel ID.

> **NOTE**
>
> If the devices have not been registered on a network, the command returns **+QNWINFO: No Service**. For 5G NSA, it returns both LTE and 5G NR information.

Example

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

OK
```

5.19. AT+QSPN   Query Service Provider Name

This command queries the service provider name.

AT+QSPN Query Service Provider Name	
Test Command **AT+QSPN=?**	Response **OK**
Execution Command AT+QSPN	Response **+QSPN: <FNN>,<SNN>,<SPN>,<alphabet>,<RPLMN>** **OK**
Maximum Response Time	300 ms

Characteristics	/

Parameter

\<FNN\>	String type. Full name of network.
\<SNN\>	String type. Shortened name of 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.

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

Example

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

OK
```

5.20. 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 SA mode: **+QENG: "servingcell",\<state\>,"NR5G-SA",\<duplex_mode\>,\<MCC\>,\<MNC\>,\<cellID\>,\<PCID\>,\<TAC\>,\<ARFCN\>,\<band\>,\<NR_DL_bandwidth\>,\<RSRP\>,\<RSRQ\>,\<SINR\>,\<sc**

---

	s>,<srxlev> OK In EN-DC mode: +QENG: "servingcell",<state> **+QENG: "LTE",<is_tdd>,<MCC>,<MNC>,<cellID>,<PCID>,<earfcn>,<freq_band_ind>,<UL_bandwidth>,<DL_bandwidth>,<TAC>,<RSRP>,<RSRQ>,<RSSI>,<SINR>,<CQI>,<tx_power>,<srxlev>** **+QENG: "NR5G-NSA",<MCC>,<MNC>,<PCID>,<RSRP>,<SINR>,<RSRQ>,<ARFCN>,<band>,<NR_DL_bandwidth>,<scs>** OK 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>** **OK** **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\>,\<PCID\>,\<RSRP\>,\<RSRQ\>,\<s_rxlev\> …] **OK**
Maximum Response Time	**300 ms**
Characteristics	/

Parameter

\<cell_type\>	String type. The information of different cells.
	"servingcell"　　The information of 3G/4G/5G 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/5G 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.
\<duplex_mode\>	String type. The 5G NR SA network mode.
	"TDD"
	"FDD"
\<is_tdd\>	String type. The LTE network mode.
	"TDD"
	"FDD"
\<MCC\>	16-bit unsigned integer. Mobile Country Code (first part of the PLMN code).
\<MNC\>	16-bit unsigned integer. Mobile Network Code (second part of the PLMN code).
\<ARFCN\>	Indicates the SA-ARFCN of the cell that was scanned.
\<band\>	32-bit unsigned integer. Frequency band in 5G NR SA network mode.
\<NR_DL_bandwidth\>	Integer type. DL bandwidth. (The value is only valid in RRC connected state.)
	0　　5 MHz
	1　　10 MHz
	2　　15 MHz
	3　　20 MHz
	4　　25 MHz
	5　　30 MHz

	6 40 MHz
	7 50 MHz
	8 60 MHz
	9 70 MHZ
	10 80 MHz
	11 90 MHz
	12 100 MHz
	13 200 MHz
	14 400 MHz
\<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.
\<cellID\>	Integer type. Cell ID. The parameter determines the 28-bit (UMTS, LTE) or 36-bit (5G NR) cell ID. Range: 0–0xFFFFFFFFF.
\<PCID\>	Number format. Physical cell ID.
\<uarfcn\>	The parameter determines the UTRA-ARFCN of the cell that was scanned.
\<earfcn\>	The parameter determines the E-UTRA-ARFCN of the cell that was scanned.
\<freq_band_ind\>	Integer type. 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 determines the primary scrambling code of the cell that was scanned.
\<RAC\>	Integer type. Routing Area Code. Range: 0–255.
\<RSCP\>	The parameter determines 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\>	16-bit signed integer.
	In LTE mode:
	It indicates the signal of LTE Reference Signal Received Power (see *3GPP 36.214*). Range: -140 to -44 dBm. The closer to -44, the better the signal is.

	The closer to -140, the worse the signal is.
	In 5G NR mode:
	It indicates the signal of 5G NR Reference Signal Received Power. Range: -140 to -44 dBm. The closer to -44, the better the signal is. The closer to -140, the worse the signal is.
<RSRQ>	In LTE mode:
	It indicates the signal of current LTE Reference Signal Received Quality (see *3GPP 36.214*). Range: -20 to -3 dB. The closer to -3, the better the signal is. The closer to -20, the worse the signal is.
	In 5G NR mode:
	It indicates the signal of current 5G NR Reference Signal Received Quality. Range: -20 to -3 dB. The closer to -3, the better the signal is. The closer to -20, the worse the signal is.
<RSSI>	LTE Received Signal Strength Indication.
<SINR>	In LTE mode:
	It indicates LTE Signal-to-Interface plus Noise Ratio. The conversion formula for actual SINR is $Y = (1/5) \times X \times 10 - 20$ (**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 dB.
	In 5G NR mode:
	It indicates the signal of 5G NR Signal-to-Interface plus Noise Ratio. Range: -20 to 30 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>	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\>	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\>	Rank of this cell as neighbor for inter-RAT cell reselection.
\<srxlev\>	Suitable reception level for inter frequency cell.
\<threshX_low\>	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\>	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\>	Reselection threshold for high priority layers.
\<thresh_Xlow\>	Reselection threshold for low priority layers.
\<srxlev\>	Select reception 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\>	Threshold to control non-intra frequency searches.
\<thresh_serving_low\>	Specifies the suitable reception level threshold (in dB) used by the UE on the serving cell when reselecting towards a lower priority RAT/frequency.
\<s_intra_search\>	Cell selection parameter for the intra frequency cell.
\<scs\>	Integer type. NR sub-carrier space.
	0 15 kHz
	1 30 kHz
	2 60 kHz
	3 120 kHz
	4 240 kHz

NOTE

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

Example

AT+QENG="servingcell"
+QENG: "servingcell","NOCONN","LTE","FDD",460,01,5F1EA15,12,1650,3,5,5,DE10,-100,-12,-68,11,0,-32768,27
AT+QENG="servingcell"
+QENG: "servingcell","NOCONN"
+QENG: "LTE","FDD",460,01,5F1EA15,12,1650,3,5,5,DE10,-99,-12,-67,11,9,230,-
+QENG:"NR5G-NSA",460,01,747,-71,13,-11,627264,78,12,1
AT+QENG="servingcell"
+QENG: "servingcell","NOCONN","NR5G-SA","TDD", 460,01,9013B004,299,690E0F,633984,78,12,

-107,-13,2,1,-

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

5.21. AT+QNWCFG   Configure and Query Network Parameters

This command configures and queries network parameters.

AT+QNWCFG Configure and Query Network Parameters	
Test Command **AT+QNWCFG=?**	Response **+QNWCFG: "lte_cell_id",<ECGI>,<ECI>,<eNodeB_ID>** **+QNWCFG: "nr5g_cell_id",<NCGI>,<NCI>,<gNodeB_ID>** **+QNWCFG: "WCDMA_cqi",**(list of supported **<CQI_value>**s**)** **+QNWCFG: "up/down",<uplink>,<downlink>,(range of supported <time_interval>s)** **+QNWCFG: "dss_enable",(**list of supported **<enable>**s**)** **OK**
Maximum Response Time	300 ms
Characteristics	/

5.21.1. AT+QNWCFG="lte_cell_id"   Read Cell ID Under LTE

This command reads ECGI, ECI, eNodeB ID under LTE.

AT+QNWCFG="lte_cell_id" Read Cell ID Under LTE	
Write Command **AT+QNWCFG="lte_cell_id"**	Response **+QNWCFG: "lte_cell_id",<ECGI>,<ECI>,<eNodeB_ID>** OK
Maximum Response Time	300 ms

Characteristics	/

Parameter

\<ECGI\>	Integer type. E-UTRAN Cell Global Identifier (MCC + MNC + ECI).
\<ECI\>	Integer type. E-UTRAN Cell Identity (eNodeB ID + cell ID).
\<eNodeB_ID\>	Integer type. LTE base station ID.

Example

AT+QNWCFG="lte_cell_id"	//Read Cell ID under LTE.
+QNWCFG: "lte_cell_id",64F0000D6B5C0,0D6B5C0,0D6B5	
OK	
AT+QNWCFG="lte_cell_id"	//Read Cell ID under non-LTE mode.
OK	

5.21.2. AT+QNWCFG="nr5g_cell_id" Read Cell ID Under 5G NR SA

This command reads the NCGI, NCI, gNodeB ID under 5G NR SA.

AT+QNWCFG="nr5g_cell_id" Read Cell ID Under 5G NR SA	
Write Command **AT+QNWCFG="nr5g_cell_id"**	Response **+QNWCFG: "nr5g_cell_id",\<NCGI\>,\<NCI\>,\<gNodeB_ID\>** OK
Maximum Response Time	300 ms
Characteristics	/

Parameter

\<NCGI\>	Integer type. 5G NR Cell Global Identifier (MCC + MNC + NCI).
\<NCI\>	Integer type. 5G NR Cell Identification (gNodeB ID + cell ID).
\<gNodeB_ID\>	Integer type. 5G NR base station ID.

Example

AT+QNWCFG="nr5g_cell_id"	//Read Cell ID under 5G NR SA.
+QNWCFG: "nr5g_cell_id",64F000170C23000,170C23000,170C23	

OK
AT+QNWCFG="nr5g_cell_id"   **//**Read Cell ID under non-NR 5G SA.
OK

5.21.3. AT+QNWCFG="wcdma_cqi"* Read CQI Under WCDMA

This command reads CQI under WCDMA.

AT+QNWCFG="wcdma_cqi" Read CQI Under WCDMA	
Write Command **AT+QNWCFG="wcdma_cqi"**	Response **+QNWCFG: "wcdma_cqi",<CQI_value>** OK
Maximum Response Time	300 ms
Characteristics	/

Parameter

<CQI_value>	Integer type. CQI value. Values are from 0 to 30 and 255. If 255 is returned, it means that CQI in WCDMA is invalid.

NOTE

The CQI value can be obtained after the HSDPA channel is created, and the HSDPA channel can be established by testing the data traffic.

Example

AT+QNWCFG="wcdma_cqi"
+QNWCFG: "wcdma_cqi",27

OK

5.21.4. AT+QNWCFG="up/down"*   Get Average Uplink Rate and Downlink Rate in Delta Time*

AT+QNWCFG="up/down"* Get Average Uplink Rate and Downlink Rate in Delta Time	
Write Command **AT+QNWCFG="up/down"[, <time_interval>]**	Response If the optional parameter is omitted, query the current configuration: **+QNWCFG: "up/down",<uplink>,<downlink>,<time_interval>** **OK** If the optional parameter is specified, get the average uplink and downlink rate in delta time: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<uplink>	Integer type. Average rate of uplink in delta time. Unit: bytes/second.
<downlink>	Integer type. Average rate of downlink in delta time. Unit: bytes/second.
<time_interval>	Integer type. The time to calculate the average rate automatically. Range:1–60. Default value: 2. Unit: second.

Example

```
AT+QNWCFG=?
…
+QNWCFG: "up/down",<uplink>,<downlink>,(1-60)
…

OK
AT+QNWCFG="up/down"
+QNWCFG: "up/down",2056,384,5

OK
AT+QNWCFG="up/down",5
OK
```

5.21.5. AT+QNWCFG="dss_enable"   Enable/Disable DSS Function

This command enables or disables DSS Function.

AT+QNWCFG="dss_enable" Enable/Disable DSS Function	
Write Command **AT+QNWCFG="dss_enable"[, <dss_enable>]**	Response If the optional parameter is omitted, query the current configuration: **+QNWCFG: "dss_enable",<enable>** **OK** If the optional parameter is specified, enable or disable DSS: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<dss_enable>	Integer type. Enable or disable DSS function. 0 Disable 1 Enable

Example

AT+QNWCFG="dss_enable",1	//Enable DSS function.
OK	
AT+QNWCFG="dss_enable"	//Query whether DSS is enabled.
+QNWCFG: "dss_enable",1	
OK	

5.22. 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_band>**s) +QNWPREFCFG: "nsa_nr5g_band",(list of supported **NSA_NR5G_band>**s) +QNWPREFCFG: "nr5g_band",(list of supported **<NR5G_band>**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) +QNWPREFCFG: "nr5g_disable_mode",(list of supported **<disable_mode>**s) **OK**
Maximum Response Time	300 ms
Characteristics	/

5.22.1. 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, query the 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.

> **NOTE**
>
> Please refer to the module specification for the bands that can be supported by the specific module.

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 B2.
OK

5.22.2. 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, query the 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

Please refer to the module specification for the bands that are supported by the specific module.

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 B1 and LTE B2.
OK

5.22.3. AT+QNWPREFCFG="nsa_nr5g_band"*   5G NR NSA Band Configuration

This command specifies the preferred 5G NR NSA bands to be searched by UE.

AT+QNWPREFCFG="nsa_nr5g_band"	5G NR NSA Band Configuration
Write Command **AT+QNWPREFCFG="nsa_nr5g _band"[,<NSA_NR5G_band>]**	Response If the optional parameter is omitted, query the current configuration: **+QNWPREFCFG: "nsa_nr5g_band",<NSA_NR5G_band>** **OK** If the optional parameter is specified, configure the preferred 5G NR NSA 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

<NSA_NR5G_band>	String type. Use the colon as a separator to list the 5G NR NSA bands to be configured. The parameter format is n1:n2:…:nx.

NOTE

Please refer to the module specification for the bands that are supported by the specific module.

Example

AT+QNWPREFCFG= "nsa_nr5g_band"   //Query the currently configured 5G NR NSA bands of UE.
+QNWPREFCFG: "nsa_nr5g_band",1:3:7:20:28:40:41:71:77:78:79

OK
AT+QNWPREFCFG= "nsa_nr5g_band",1:2 //Set 5G NR NSA n1 and 5G NR NSA n2.
OK

5.22.4. AT+QNWPREFCFG="nr5g_band" 5G NR SA Band Configuration

This command specifies the preferred 5G NR SA bands to be searched by UE.

AT+QNWPREFCFG="nr5g_band" 5G NR SA Band Configuration	
Write Command **AT+QNWPREFCFG="nr5g_band"[,<NR5G_band>]**	Response If the optional parameter is omitted, query the current configuration: **+QNWPREFCFG: "nr5g_band",<NR5G_band>** **OK** If the optional parameter is specified, configure the preferred 5G NR SA 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

<NR5G_band>	String type. Use the colon as a separator to list the 5G NR bands to be configured. The parameter format is n1:n2:…:nx.

Please refer to the module specification for the bands that can be supported by the specific module.

Example

AT+QNWPREFCFG= "nr5g_band"   //Query the currently configured 5G NR SA bands of the UE.
+QNWPREFCFG: "nr5g_band",1:3:7:20:28:40:41:71:77:78:79

OK
AT+QNWPREFCFG= "nr5g_band",1:2   //Set 5G NR SA n1 and 5G NR SA n2.
OK

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

This command specifies the network search mode.

AT+QNWPREFCFG="mode_pref" Network Search Mode Configuration	
Write Command **AT+QNWPREFCFG="mode_pref"[,<mode_pref>]**	Response If the optional parameter is omitted, query 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 & 5G NR
WCDMA	WCDMA only
LTE	LTE only
NR5G	5G NR 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	
AT+QNWPREFCFG="mode_pref",LTE:NR5G	//Set RAT to LTE & 5G NR.
OK	

5.22.6. 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_doma in"[,<srv_domain>]**	Response If the optional parameter is omitted, query the 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
	<u>2</u>	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

5.22.7. 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_do main"[,<voice_domain>]**	Response If the optional parameter is omitted, query the 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
	<u>3</u> 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

5.22.8. 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, query the 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 network
	3 Roam on affiliate network
	255 Roam on any network

Example

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

OK
AT+QNWPREFCFG= "roam_pref",1   //Roam only on home network.
OK

5.22.9. 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, query the 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
	<u>1</u>　Data centric

Example

AT+QNWPREFCFG="ue_usage_setting"
+QNWPREFCFG: "ue_usage_setting",1
 	
OK
AT+QNWPREFCFG="ue_usage_setting",0
OK
	//Query the current configuration.
	
	//Set voice centric.

5.22.10.　AT+QNWPREFCFG="policy_band"　Read Carrier Policy Band

This command reads the band configured in the carrier policy.

AT+QNWPREFCFG="policy_band"　Read Carrier Policy Band	
Write Command **AT+QNWPREFCFG="policy_band"**	Response **+QNWPREFCFG: "gw_band",\<gw_band>**

	+QNWPREFCFG: "lte_band",<LTE_band> +QNWPREFCFG: "nsa_nr5g_band",<NSA_NR5G_ban d> +QNWPREFCFG: "nr5g_band",<NR5G_band> **OK**
Maximum Response Time	300 ms
Characteristics	/

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.
<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.
<NSA_NR5G_band>	String type. Use the colon as a separator to list the 5G NR NSA bands to be configured. The parameter format is n1:n2:…:nx.
<NR5G_band>	String type. Use the colon as a separator to list the 5G NR SA bands to be configured. The parameter format is n1:n2:…:nx.

NOTE

Please refer to the module specification for the bands that are supported by the specific module.

Example

```
AT+QNWPREFCFG="policy_band"
+QNWPREFCFG: "gw_band",1:8
+QNWPREFCFG: "lte_band",1:3:8
+QNWPREFCFG: "nsa_nr5g_band",78
+QNWPREFCFG: "nr5g_band",78

OK
```

5.22.11. AT+QNWPREFCFG="ue_capability_band" Query UE Band Capability

This command queries the band configured in the UE capability information.

AT+QNWPREFCFG="ue_capability_band" Query UE Band Capability	
Write Command **AT+QNWPREFCFG="ue_capability_**	Response +QNWPREFCFG: "gw_band",<gw_band>

band"	+QNWPREFCFG: "lte_band",<LTE_band>
	+QNWPREFCFG: "nsa_nr5g_band",<NSA_NR5G_band>
	+QNWPREFCFG: "nr5g_band",<NR5G_band>
	OK
Maximum Response Time	300 ms
Characteristics	/

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.
<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.
<NSA_NR5G_band>	String type. Use the colon as a separator to list the 5G NR NSA bands to be configured. The parameter format is n1:n2:…:nx.
<NR5G_band>	String type. Use the colon as a separator to list the 5G NR SA bands to be configured. The parameter format is n1:n2:…:nx.

> **NOTE**
>
> Please refer to the module specification for the bands that are supported by the specific module.

Example

```
AT+QNWPREFCFG="ue_capability_band"
+QNWPREFCFG: "gw_band",1:8
+QNWPREFCFG: "lte_band",1:3:8
+QNWPREFCFG: "nsa_nr5g_band",78
+QNWPREFCFG: "nr5g_band",78

OK
```

5.22.12.   AT+QNWPREFCFG="rat_acq_order"   Configure RAT Priority

This command configures the RAT acquisition order.

AT+QNWPREFCFG="rat_acq_order" Configure RAT Priority	
Write Command **AT+QNWPREFCFG="rat_acq_order"[,<rat_order>]**	Response If the optional parameter is omitted, query the current configuration: **+QNWPREFCFG: "rat_acq_order",<rat_order>**

	OK
	If the optional parameter is specified, configure the RAT acquisition order: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration will be saved automatically.

Parameter

<rat_order>	String type. Use the colon as a separator to specify RAT priority. The parameter format is: RAT1:RAT2:…RATN. The RATs supported by the module are as follows: WCDMA WCDMA LTE LTE NR5G 5G NR

Example

AT+QNWPREFCFG= "rat_acq_order"	//Query the current RAT order.
+QNWPREFCFG: "rat_acq_order",NR5G:LTE:WCDMA	
OK	
AT+QNWPREFCFG= "rat_acq_order",LTE:NR5G:WCDMA	//Set RAT order priority.
OK	
AT+CFUN=1,1	//Reset the module.
OK	
AT+QNWPREFCFG= "rat_acq_order"	//Query the current RAT order.
+QNWPREFCFG: "rat_acq_order", LTE:NR5G:WCDMA	
OK	

5.22.13. AT+QNWPREFCFG="nr5g_disable_mode"*   Disable 5G NR

This command disables 5G NR.

AT+QNWPREFCFG="nr5g_disable_mode"* **Disable 5G NR**	
Write Command	Response
AT+QNWPREFCFG="nr5g_disa	If the optional parameter is omitted, query the current configuration:

ble_mode"[,<disable_mode>]	+QNWPREFCFG: "nr5g_disable_mode",<disable_mode> **OK** If the optional parameter is specified, disable 5G NR: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will be saved automatically.

Parameter

<disable_mode>	Integer type. Disable 5G NR SA/NSA. 0 Neither is disabled 1 Disable SA 2 Disable NSA

Example

```
AT+QNWPREFCFG="nr5g_disable_mode"        //Query the current configuration.
+QNWPREFCFG: "nr5g_disable_mode",0

OK
AT+QNWPREFCFG="nr5g_disable_mode",1      //Disable 5G NR SA.
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. Note: **\<text\>** outputs only when **\<value\>** of **ATX** is greater than 0. 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	

NOTE

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	//Incoming call.
AT+CLCC	
+CLCC: 1,0,0,1,0,"",129	//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>** of **ATX** is greater than 0. When MT returns to command mode after 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 Activates closed user group invocation for this call only
	g Deactivates closed user group invocation for this call only
<;>	It is required when setting up voice call, and will return to command state after call.

NOTE

1. When being executed, this command may be aborted generally by the module's receiving of an **ATH** 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** 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 returns **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>]	**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.
	<u>0</u> **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.
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 **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	/

Reference	
V.25ter	

Parameter

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

> **NOTE**
>
> If **<n>** is set too large, 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** **Or** ERROR

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

Parameter

<n>	Integer type. Number of seconds to wait before blind dialing. Range: 0–10. Default: 2.

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

Parameter

<n>	Integer type.	
	<u>0</u>	Disabled
	1–255	Duration of 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**
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**

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

Parameter

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

6.11. AT+CSTA   Select Type of Address

This command selects the type of number for further dialing commands **ATD** according to 3GPP Specifications. The Test Command returns values supported a compound value.

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.	
	<u>129</u>	Unknown type
	145	International type (contains the character "+")

6.12. AT+CLCC   List Current Calls of MT

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

AT+CLCC List Current Calls of MT	
Test Command **AT+CLCC=?**	Response **OK**
Execution Command **AT+CLCC**	Response **[+CLCC: <id1>,<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

<idx>	Integer type. The call identification number as described in *3GPP TS 22.030* can be used in **AT+CHLD** 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\>	Phone number in string type in format specified by **\<type\>**.
\<type\>	Type of address of octet in integer format (See *3GPP TS 24.008 subclause 10.5.4.7* for details). Usually, it has three kinds of values:
	129 Unknown type
	145 International type (contains the character "+")
	161 National type
\<alpha\>	Alphanumeric representation for **\<number\>** corresponding to the entry found in phonebook.
\<err\>	Error codes. For more details, see *Chapter 12.5*.

Example

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

OK
```

6.13. AT+CR   Service Reporting Control

This command controls whether the MT to transmit an intermediate result code **+CR: \<serv\>** 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 MT has determined which speed and quality of service will be used, before any error control or data compression reports and before any final result code (e.g. **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.	
	0	Disable
	1	Enable
<serv>	String type.	
	ASYNC	Asynchronous transparent
	SYNC	Synchronous transparent
	REL ASYNC	Asynchronous non-transparent
	REL SYNC	Synchronous non-transparent

6.14. AT+CRC   Set Extended Format of Incoming Call Indication

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

AT+CRC Set Extended Format of 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	This command takes effect immediately. The configuration will not be saved.
Reference 3GPP TS 27.007	

Parameter

<mode>	Integer 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.
ATH
OK
```

6.15. AT+CRLP   Select Radio Link Protocol Parameter

This command selects radio link protocol (RLP) parameters used when non-transparent data calls are originated.

This Test Command 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).

This Read Command returns current configurations 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).

This Write Command sets radio link protocol (RLP) parameters used when non-transparent data calls are set up.

AT+CRLP   Select Radio Link Protocol Parameter

Test Command **AT+CRLP=?**	Response **+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 **+CRLP: <iws>,<mws>,<T1>,<N2>,<ver>** **...** **OK**
Write Command **AT+CRLP=[<iws>[,<mws>[,<T1>[,<N2>[,<ver>]]]]]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	/
Reference 3GPP TS27.007	

Parameter

<iws>	Integer type. Interworking Window Size (IWF to MS window size).
	<ver>=0/1 Range: 0–61. Default: 61.
	<ver>=2 Range: 0–488. Default: 240.
<mws>	Integer type. Mobile Window Size (MS to IWF window size).
	<ver>=0/1 Range: 0–61. Default: 61.
	<ver>=2 Range: 0–488. Default: 240
<T1>	Integer type. Acknowledgment timer T1 in a unit of 10 ms.
	<ver>=0/1 Range: 38–255. Default: 48.
	<ver>=2 Range: 42–255. Default: 52.
<N2>	Integer type. Retransmission attempts. Range: 1–55. Default: 6.
<ver>	Integer type. RLP version number. Range: 0–2.

6.16. AT+QECCNUM   Configure Emergency Call Numbers

This command queries, adds and deletes ECC phone numbers (emergency call numbers).

AT+QECCNUM Configure Emergency Call Numbers	
Test Command **AT+QECCNUM=?**	Response **+QECCNUM: (**list of supported **<mode>**s**)** **OK**
Write Command **AT+QECCNUM=<mode>[,<type>[,<eccnum1>[,<eccnum2>[,…[,<eccnumN>]]]]]**	Response If **<mode>**=0, **<type>** is specified and **<eccnumN>** is omitted, query the current ECC number type: **+QECCNUM: <type>,<eccnum1>,<eccnum2>[,…]** **OK** If **<mode>**=1, **<type>**=0 or 1, and at least one **<eccnumN>** is specified, add ECC numbers with (U)SIM card or ECC numbers without (U)SIM card: **OK** Or **ERROR** If **<mode>**=2, **<type>**=0 or 1, and at least one **<eccnumN>** is specified, delete ECC numbers with (U)SIM card or ECC numbers without (U)SIM card: **OK** or **ERROR** If **<mode>**=3, **<type>** and **<eccnumN>** are both omitted, reset ECC numbers and the reset will take effect after rebooting: **OK** Or **ERROR**
Write Command **AT+QECCNUM=<mode>[,<type>,<eccnum1>,<category>]**	Response If **<mode>**=4, **<type>**, **<eccnumN>** and **<category>** are specified, add an ECC number with assigned category: **OK** Or **ERROR**

	If **<mode>**=5, **<type>**, **<eccnum*N*>** and **<category>** are omitted, query all the ECC numbers and their categories: **+QECCNUM: 0,<eccnum1>,<category>[,…]** **+QECCNUM: 1,<eccnum1>,<category>[,…]** **+QECCNUM: 2,<eccnum1>,<category>[,…]** **+QECCNUM: 3,<eccnum1>,<category>[,…]** **OK**
Read Command **AT+QECCNUM?**	Response **+QECCNUM: 0,<eccnum1>,<eccnum2>[,…]** **+QECCNUM: 1,<eccnum1>,<eccnum2>[,…]** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<mode>	Integer type. ECC number operations.
	0 Query ECC numbers.
	1 Add ECC numbers with default category.
	2 Delete ECC numbers.
	3 Reset the ECC number list.
	4 Add an ECC number with specified category.
	5 Query all emergency call numbers and their categories.
<type>	Integer type. ECC number type.
	0 ECC numbers stored in the module without (U)SIM card
	1 ECC numbers stored in the module with (U)SIM card
	2 ECC numbers from the network
	3 ECC numbers from the (U)SIM card
<category>	Integer type. ECC number category.
	0 Default
	1 Police
	2 Ambulance
	4 Fire Brigade
	8 Marine Guard
	16 Mountain Rescue
	32 manually initiated eCall
	64 automatically initiated eCall
<eccnum*N*>	String type. ECC numbers (e.g."110", "119").

> **NOTE**
>
> 1. Only the ECC numbers stored in the module with/without (U)SIM card can be modified.
> 2. If a number to be added into the type of ECC numbers with (U)SIM card exists in the module, has gotten from network and (U)SIM card, it cannot be added.
> 3. The priority for reading ECC number list: ECC numbers from the network > ECC numbers from the (U)SIM card> ECC numbers stored in the module with/without (U)SIM card.

Example

```
AT+QECCNUM=?                    //Query the supported ECC number operation mode.
+QECCNUM: (0-5)

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

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

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

OK
AT+QECCNUM=5                    //Query all emergency call numbers and corresponding category.
+QECCNUM: 0,"911",0,"112",0,"00",0,"08",0,"110",0,"999",0,"118",0,"119",0
+QECCNUM: 1,"911",0,"112",0,"234",0
+QECCNUM: 2,"110",1,"120",2,"119",4,"122",8,"999",16
+QECCNUM: 3,"112",0,"000",0,"08",0,"118",0,"122",0,"911",0,"999",0,"119",0,"120",0,"110",0

OK
AT+QECCNUM=4,1,"123",1         //Add ECC number "123" of the Police category into ECC numbers
OK                               with (U)SIM card.
AT+QECCNUM=5                    //Query all emergency call numbers and corresponding category.
```

+QECCNUM: 0,"911",0,"112",0,"00",0,"08",0,"110",0,"999",0,"118",0,"119",0
+QECCNUM: 1,"911",0,"112",0,"234",0,"123",1
+QECCNUM: 2,"110",1,"120",2,"119",4,"122",8,"999",16
+QECCNUM: 3,"112",0,"000",0,"08",0,"118",0,"122",0,"911",0,"999",0,"119",0,"120",0,"110",0

OK
AT+QECCNUM=3   //Reset the ECC number list, and such reset will take effect after the module is rebooted.

OK

6.17. AT^DSCI   Call Status Indication

This command enables or disables the reporting of call status indication.

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. Enable/disable the URC of DSCI.
        0   Disable
        1   Enable

NOTE

When the presentation of the DSCI at the TE is enabled, an unsolicited result code is returned after the action:
^DSCI: <id>,<dir>,<stat>,<type>,<number>,<num_type>

Parameter

\<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
\<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

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

RING

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

NO CARRIER
```

6.18. 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>**

<duration>	can be specified by **AT+VTD**. The maximal length of the string is 31 bytes.
	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, see *Chapter 12.5*.

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
```

6.19. 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, see *Chapter 12.5*.

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: [<alpha>],<number>,<type>]** **[…]** **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

<alpha>	Optional alphanumeric string associated with **<number>**. The used character set should be the one selected with **AT+CSCS**.
<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 has three kinds of values:
	129 Unknown type
	145 International type (contains the character "+")
	161 National type
<err>	Error codes. For more details, see *Chapter 12.5*.

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>]** **…** **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. Maximum length of **<number>**.
<tlength>	Integer type. Maximum length of **<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 phone book memory.
<number>	String type. Phone number of format **<type>**.
<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
<text>	Integer type. The field of maximum length **<tlength>** in current TE character set specified by **AT+CSCS**.

<err>	Error codes. For more details, see *Chapter 12.5*.

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>** is 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 **+CPBR: <index1>,<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. Maximum length of field **<number>**.
<tlength>	Integer type. 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 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

<text>	String type. The field of maximum length **<tlength>** in current TE character set specified by **AT+CSCS**.
<err>	Error codes. For more details, see *Chapter 12.5.*

7.4. AT+CPBS   Select Phonebook Memory Storage

This command selects phonebook memory storage, which is used by other phonebook related commands. The Read Command returns currently selected memory, the number of used locations and the total number of locations in the memory when supported by manufacturer. The Test Command returns supported storages as compound value.

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.
	"<u>SM</u>" (U)SIM phonebook
	"DC" MT dialed calls list (**AT+CPBW** may not be applicable to this storage)
	"FD" (U)SIM fix dialing-phone book (**AT+CPBW** operation needs the authority of PIN2)
	"LD" (U)SIM last-dialing-phone book (**AT+CPBW** may not be applicable to this storage)
	"MC" MT missed (unanswered) calls list (**AT+CPBW** may not be applicable to this storage)
	"ME" Mobile equipment phonebook
	"RC" MT received calls list (**AT+CPBW** may not be applicable to this storage)
	"EN" (U)SIM (or MT) emergency number (**AT+CPBW** may not be applicable to this storage)
	"ON" (U)SIM own numbers (MSISDNs) list
<used>	Integer type. Indicate the total number of used locations in selected memory.
<total>	Integer type. Indicate the total number of locations in selected memory.
<err>	Error codes. For more details, see *Chapter 12.5*.

7.5. AT+CPBW   Write Phonebook Entry

This 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>[,<type>[,<text>]]]**	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

\<index\>	Integer type. In the range of location numbers of phone book memory.
\<nlength\>	Integer type. Maximum length of field **\<number\>**.
\<tlength\>	Integer type. Maximum length of field **\<text\>**.
\<number\>	**String type. Phone number. The format is determined by** \<type\>**.**
\<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
\<text\>	String type field of maximum length **\<tlength\>** in current TE character set specified by **AT+CSCS**.
\<err\>	Error codes. For more details, see *Chapter 12.5*.

Example

```
AT+CSCS="GSM"
OK
AT+CPBW=10,"15021012496",129,"QUECTEL"   //Make a new phonebook entry at location 10.
OK
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
	<u>1</u> Type supported
<mo>	Integer type. Mobile originated messages.
	0 Type not supported
	<u>1</u> Type supported
<bm>	Integer type. Broadcast type messages.
	0 Type not supported
	<u>1</u> Type supported
<err>	Error codes. For more details, see *Chapter 12.6*.

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 **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 **AT+CMGF=?**	Response **+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. Input and output format of the short messages.
	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>** 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 (see **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 (see **<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
	<u>"ME"</u> 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
	<u>"ME"</u> 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
	<u>"ME"</u> Mobile equipment message storage
	"MT" Same as "ME" storage
	"SR" SMS status report storage location
\<used*x*\>	Integer type. Number of current messages in **\<mem*x*\>**.
\<total*x*\>	Integer type. Total number of messages which can be stored in **\<mem*x*\>**.
\<err\>	Error codes. For more details, see *Chapter 12.6*.

Example

```
AT+CPMS?                              //Query the current SMS message storage.
+CPMS: "ME",0,255,"ME",0,255,"ME",0,255

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 **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.
	<u>0</u> Delete the message specified in **<index>**
	1 Delete all read messages from **<mem1>**
	2 Delete all read messages from **<mem1>** and sent mobile originated messages
	3 Delete all read messages from **<mem1>**, sent and unsent mobile originated messages
	4 Delete all messages from **<mem1>** storage
<err>	Error codes. For more details, see *Chapter 12.6*.

Example

AT+CMGD=1   //Delete the message specified in **<index>**=1.

OK
AT+CMGD=1,4   //Delete all messages from **<mem1>**.
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 **AT+CMGL** without status value **<stat>**, it reports 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>][,<tooa/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	The response time of operation of **<stat>** depends on the storage of listed messages. The maximum response time is 300 ms.
Characteristics	/
Reference 3GPP TS 27.005	

Parameter

<stat>	In text mode:	
	"REC UNREAD"	Received unread messages
	"REC READ"	Received read messages
	"STO UNSENT"	Stored unsent messages
	"STO SENT"	Stored sent messages
	"ALL"	All messages
	In PDU mode:	
	0	Received unread messages
	1	Received read messages
	2	Stored unsent messages
	3	Stored sent messages
	4	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 (see **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 (see **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 (see **<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 (see **<toda>** by default).
<length>	Message length, integer type. Indicate the length of the message body <data> in the 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" (see **AT+CSCS** in *3GPP TS 27.007*): ME/TA converts GSM alphabet into current TE character set according to rules in *3GPP TS 27.005 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" (see **AT+CSCS** in *3GPP TS27.007*): ME/TA converts GSM alphabet into current TE character set according to rules of *Annex A* in *3GPP TS 27.005*.
	    - 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)).
<fo>	Depends 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 (default 2) in integer format.
<mr>	*3GPP TS 23.040* TP-Message-Reference in integer format.
<ra>	*3GPP TS 23.040* 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 to command **AT+CSCS** in *3GPP TS 27.007*); type of address given by **<tora>**.

\<tora\>	3GPP TS 24.011 TP-Recipient-Address Type-of-Address octet in integer format (see **\<toda\>** by default).
\<scts\>	3GPP TS 23.040 TP-Service-Centre-Time-Stamp in time-string format (refer to **\<dt\>**).
\<dt\>	3GPP TS 23.040 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* TP-Status in integer format.
\<ct\>	*3GPP TS 23.040* TP-Command-Type in integer format (default 0).
\<sn\>	*3GPP TS 23.041* CBM Serial Number in integer format.
\<mid\>	*3GPP TS 23.041* CBM Message Identifier in integer format.
\<page\>	*3GPP TS 23.041* CBM Page Parameter bits 4–7 in integer format.
\<pages\>	*3GPP TS 23.041* CBM Page Parameter bits 0–3 in integer format.
\<err\>	Error codes. For more details, see *Chapter 12.6*.

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

This 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 changes 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\>,\<d**

cs>,<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>	In the range of location numbers supported by the associated memory.
<stat>	In text mode:

	"REC UNREAD"	Received unread messages
	"REC READ"	Received read messages
	"STO UNSENT"	Stored unsent messages
	"STO SENT"	Stored sent messages
	"ALL"	All messages
	In PDU mode:	
	0	Received unread messages
	1	Received read messages
	2	Stored unsent messages
	3	Stored sent messages
	4	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** (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 (see **AT+CSCS** 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 (see **AT+CSCS** 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 (see **<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>	Integer type. Protocol identifier. 3GPP TS 23.040 TP-Protocol-Identifier. 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 (see **<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 (see **AT+CSCS**). 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 (see **<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 (see **<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 (see **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 (see **<toda>** by default).
<length>	Message length. Indicate 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).
<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* 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* TP-Status in integer format.
<ct>	*3GPP TS 23.040* TP-Command-Type in integer format (default 0).
<sn>	*3GPP TS 23.041* CBM Serial Number in integer format.
<page>	*3GPP TS 23.041* CBM Page Parameter bits 4–7 in integer format.
<pages>	*3GPP TS 23.041* CBM Page Parameter bits 0–3 in integer format.
<cdata>	*3GPP TS 23.040* 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, see *Chapter 12.6*.

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,"+861380021050
```

0",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 invoking the Write Command, wait for the prompt **>** and then start to write the message. After that, enter **<CTRL+Z>** to indicate the ending of PDU and begin to send the message. Sending can be cancelled by giving **<ESC>** character. 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>]** 2) If in PDU mode (**AT+CMGF=0**): **AT+CMGS=<length>**	Response **>** After **>** is responded, input text to be sent. Tap CTRL + Z to send the message or Esc to cancel the sending. If in text mode (**AT+CMGF=1**) and the message is sent successfully: **+CMGS: <mr>** **OK** If in PDU mode (**AT+CMGF=0**) and the message is sent successfully: **+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 (see **AT+CSCS** in *3GPP TS 27.007*); type of address is given by **<toda>**.
<toda>	Integer type. Type of destination address. 3GPP TS 24.011 TP-Destination-Address Type-of-Address octet.
<length>	Message length. Indicate 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).
<mr>	Message reference. 3GPP TS 23.040 TP-Message-Reference in integer format.
<err>	Error codes. For more details, see *Chapter 12.6*.

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+CMGS="15021012496"	
>This is a test from Quectel	//Enter in text and tap **CTRL+Z** to send message
+CMGS: 247	
OK	

8.9. AT+CMMS   Send More Messages

This command controls the continuity of the SMS relay protocol link. If the feature is enabled (and supported by the currently used network) multiple messages can be sent faster as the link is kept opening.

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.
	<u>0</u> Feature disabled
	1 Keep enabled until the time between the response of the latest commands to be sent (**AT+CMGS**, **AT+CMSS**, etc.) and the next command to be sent exceeds 1–5 seconds (the exact value is up to ME implementation); then ME shall close the link and MT switches **<n>** back to 0 automatically.
	2 Feature enabled. If the time between the response of the latest commands to be sent and the next command to be sent exceeds 1–5 seconds (the exact value is up to ME implementation), ME shall close the link but MT not switch **<n>** back to 0 automatically.
<err>	Error codes. For more details, see *Chapter 12.6*.

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 from TE 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 **<stat>** also allows other status values to be given.

The syntax of input text is the same as the one specified in **AT+CMGS** Write Command.

AT+CMGW   Write Messages to Memory

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>]]** 2) If in PDU mode (**AT+CMGF=0**): **AT+CMGW=<length>[,<stat>**	Response **>** After **>** is responded, input text to be sent. Tap CTRL + Z to send the message or Esc to cancel the sending. If message writing is successful: **+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 (see **AT+CSCS** 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 (see **AT+CSCS** 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 (see **<toda>** by default).

<stat>	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>	Message length. Indicate 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 23.04TPDU 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, see **Chapter 12.6**.

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+CMGW="15021012496"

>This is a test from Quectel           //Enter in text and tap CTRL+Z to write message.
+CMGW: 4

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

+CMGW: 5

OK
```

8.11. AT+CMSS   Send Messages from Storage

This command sends a message with location value **<index>** from message storage **<mem2>** to the network. 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. Values can be used to identify message upon unsolicited delivery status report result code.

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 (see **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.
<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 (see **<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, see ***Chapter 12.6.***

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+CMGW="15021012496"
> Hello                            //Enter in text and tap CTRL+Z to send message.
+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>	Message length. Indicate 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, see *Chapter 12.6*.

> **NOTE**
>
> The Execution and Write Commands shall only be used when **<service>** of **AT+CSMS** 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　　　　　　　　　　　//Return error in the second time; it needs ACK only once.

8.13. AT+CNMI　New Message Indications to TE

This command selects the procedure on how the received new messages from the network are 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*.

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 MT. If MT 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 MT-TE link is reserved (e.g. in data mode). Otherwise forward them directly to TE.
	<u>2</u>	Buffer unsolicited result codes in the MT when MT-TE link is reserved (e.g. in data mode) and flush them to the TE after reservation. Otherwise forward them directly to TE.
<mt>	Integer type. The rules for storing received SMS depend on its data coding scheme (refer to *3GPPTS 23.038*) and preferred memory storage (**AT+CPMS**) setting, and the value is:	
	0	No SMS-DELIVER indications are routed to TE.
	<u>1</u>	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, see **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*) and the setting of Select CBM Types (AT+CSCB); and the value is:	
	<u>0</u>	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.	
	<u>0</u>	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.	
	<u>0</u>	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, see *Chapter 12.6*.

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.
	<u>0</u> 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 (see **<mid>**) (default: empty string), e.g. "0,1,5,320–478,922".
<dcss>	String type. All different possible combinations of CBM data coding schemes (see **<dcs>**) (default: empty string), e.g. "0–3,5".
<err>	Error codes. For more details, see *Chapter 12.6*.

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 **+CSCA**, **+CSMP** (**\<sca\>**, **\<tosca\>**, **\<fo\>**, **\<vp\>**, **\<pid\>**, **\<dcs\>**) and **\<length\>**, **\<toda\>** or **\<tooa\>** in **+CMT**, **+CMGL**, **+CMGR** result codes for SMS-DELIVERs and SMS-SUBMITs in text mode
	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.

This Write Command 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).

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 **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 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 TP-Validity-Period either in integer format or in time-string format (see **<dt>**). Default: 167.
<pid>	Integer type. Protocol identifier. 3GPP TS 23.040 TP-Protocol-Identifier. 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.

9 Packet Domain Commands

9.1. AT+CGATT   Attachment or Detachment of PS

This command attaches MT to, or detaches MT from, the Packet Domain service. After the command has been 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 Attachment or Detachment of PS	
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. Indicate 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, see *Chapter 12.5*.

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+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.

This 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. This Read Command returns the current configurations for each defined context. Details can be found in *3GPP TS 23.107* and all parameters are saved in NVM automatically.

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>]** **[…]** **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" IPv4. Internet protocol (IETF STD 5)
	"PPP"
	"IPV6"
	"IPV4V6"
<precedence>	Integer type. Specify the precedence class.
	<u>0</u> 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. A numeric parameter which specifies the delay class. This parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the network. For the details, see **Table 6**.
	<u>0</u> Network subscribed value
	1–4 See **Table 6**.
<reliability>	Integer type. A numeric parameter which specifies the reliability class.
	<u>0</u> 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. A numeric parameter which specifies the peak throughput class, in octets per second.
	<u>0</u> 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, see *Chapter 12.5*.	

Table 6: 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	/

9.3. 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. This Read Command returns the current configurations for each defined context. Details can be found in *3GPP TS 23.107* and all parameters are saved in NVM automatically.

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 configuration 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" IPv4. Internet protocol (IETF STD 5)
	"PPP"
	"IPV6"
	"IPV4V6"
\<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. See *Table 6* for details.
	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.
	<u>0</u> 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, see *Chapter 12.5*.

9.4. AT+CGACT   Activate or Deactivate PDP Contexts

This command activates or deactivates the specified PDP context(s). After the command has been completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If MT is not PS attached when the activation form of the command is executed, MT first performs a PS attach and then attempt to activate the specified contexts. If no **<cid>** specifies the activation/deactivation form of the command, it activates or deactivates 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. Indicate the state of PDP context activation.
	0 Deactivated
	1 Activated
	Other values are reserved and will result in an **ERROR** response to the Write Command.
\<cid\>	Integer type. Specify a particular PDP context definition (see **AT+CGDCONT**)
\<err\>	Error codes. For more details, see *Chapter 12.5*.

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
```

9.5. AT+CGDATA   Enter Data State

This 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
	    Other values are not supported and will result in an **ERROR** response to the Execution
	    Command

<cid>	Integer type. Specify a particular PDP context definition (see **AT+CGDCONT**).
<err>	Error codes. For more details, see *Chapter 12.5*.

9.6. AT+CGPADDR   Show PDP Addresses

This 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 is the one set by the **AT+CGDCONT** when the context was defined. For a dynamic address it is 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
```

9.7. AT+CGEREP   Report Packet Domain Event

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 Report Packet Domain Event	
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.

<u>0</u>		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).

NOTE

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.

Parameter

<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?             //Query the current configuration.
+CGEREP: 0,0

OK
AT+CGEREP=2,1          //Report packet domain event.
OK
AT+CGACT=1,2           //Activated a context.
OK

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

+CGEV: PDN DEACT2
```

9.8. 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>	A numeric parameter which 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, see *Chapter 12.5*.	

9.9. AT+QGDNRCNT   5G NR Packet Data Counter

This command allows the application to check how much bytes are sent to or received by MT in 5G NR.

AT+QGDNRCNT 5G NR Packet Data Counter	
Test Command **AT+QGDNRCNT=?**	Response **+QGDNRCNT: (**list of supported **<op>**s**)** **OK**
Read Command **AT+QGDNRCNT?**	Response **+QGDNRCNT: <bytes_recv>,<bytes_sent>** **OK**
Write Command **AT+QGDNRCNT=<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 about data counter. 0 Reset the data counter 1 Save the results of data counter to NVM.
\<bytes_sent\>	Integer type. The amount of sent bytes.
\<bytes_recv\>	Integer type. The amount of received bytes.
\<err\>	Error codes. For more details, see *Chapter 12.5*.

NOTE

1. When MT is powered on, **\<bytes_sent\>** and **\<bytes_recv\>** are loaded from results of data counter in NVM. The default result in NVM is 0.
2. **AT+QGDNRCNT=1** can write data bytes to NVM and it should not be executed frequently, otherwise the service life of the module flash will be shortened. If you need to write to NVM, it is recommended that the interval be more than 60 seconds.

Example

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

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

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

9.10. AT+QAUGDCNT   Auto Save Packet Data Counter

This command allows **AT+QGDCNT**/**AT+QGDNRCNT** 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**/**AT+QGDNRCNT** to save results to NVM automatically. If it is set to 0, auto-save feature is disabled. Range: 0, 30–65535. Default: 0. Unit: second.
<err>	Error codes. For more details, see **Chapter 12.5**.

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

NOTE

After this command is enabled, the module writes to flash based on the time interval, which may reduce the service life of flash.

9.11. AT+QNETDEVSTATUS   Query RmNet Device Status

AT+QNETDEVSTATUS Query RmNet Device Status	
Test Command **AT+QNETDEVSTATUS=?**	Response **+QNETDEVSTATUS: (**list of supported **<on_off>**s**)** **OK** Or **ERROR**
Read Command **AT+QNETDEVSTATUS?**	Response If an RmNet call exists, **<state>**, **<IP_type>** and **<profile_num>** are included: **+QNETDEVSTATUS: <on_off>[,<state>,<IP_type>,<profile_num>]** **[...]** **OK**
Write Command **AT+QNETDEVSTATUS=<on_off>**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration will not be saved.

Parameter

<on_off>	Integer type. Enable/Disable URC reporting RmNet device status.
	0 Disable URC reporting RmNet device status
	1 Enable URC reporting RmNet device status
<state>	Integer type. RmNet call status.

	0	A RmNet call is disconnected
	1	A RmNet call is connected
<IP_type>	Integer type. IP type.	
	4	IPv4
	6	IPv6
<profile_num>	Integer type. Profile number. Range: 1–42.	

Example

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

OK
AT+QNETDEVSTATUS?
+QNETDEVSTATUS: 1

OK
AT+QNETDEVSTATUS?
+QNETDEVSTATUS: 1,1,4,1
+QNETDEVSTATUS: 1,1,6,1

OK

+QNETDEVSTATUS: 1,0,4,1

+QNETDEVSTATUS: 1,0,6,1
```
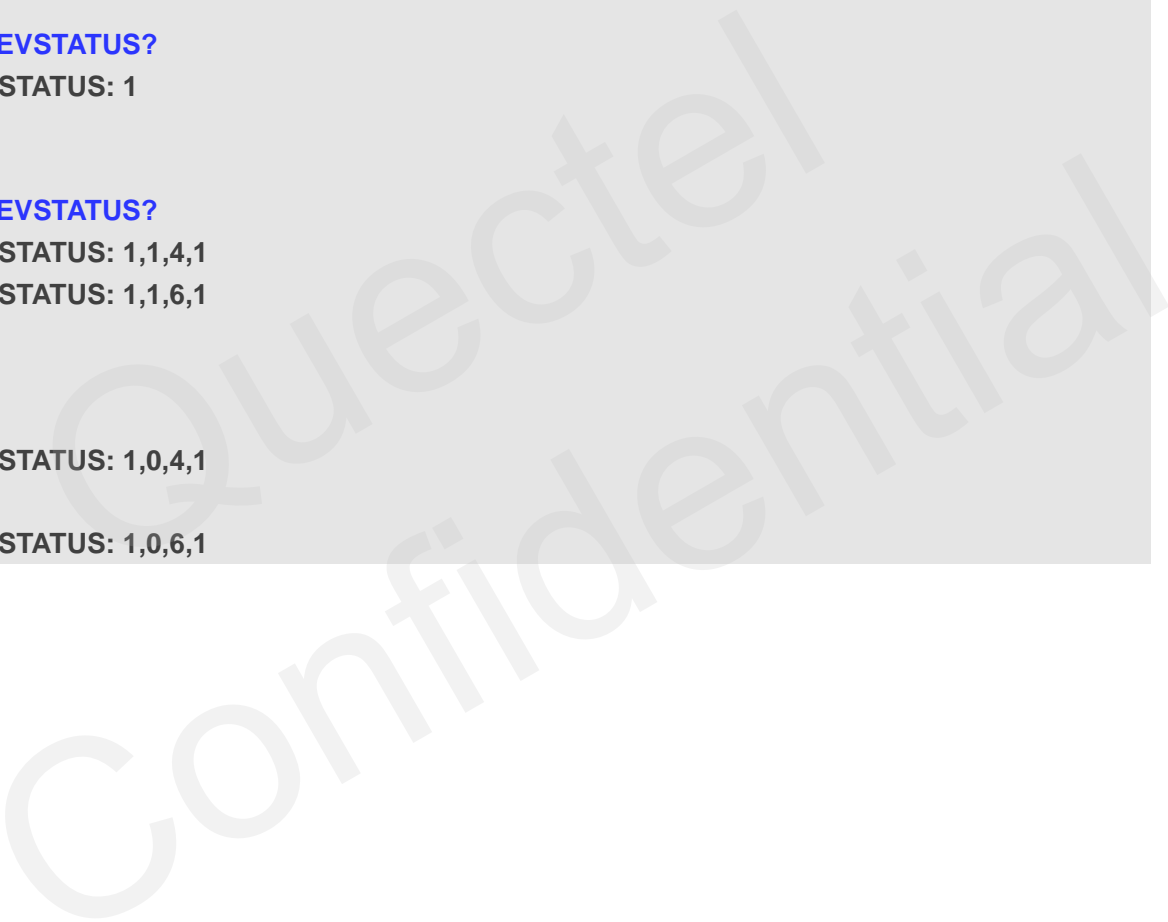
10 Supplementary Service Commands

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*. 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 **<reads>**s**)** **OK**
Write Command **AT+CCFC=<reads>,<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 **<reads>**=(0–3)): For registered call forwarding numbers: **+CCFC: <status>,<class1>[,<number>,<type>[,<subaddr>,<satype>[,<time>]]]<CR><LF>** **[...]** **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

<reads>	Integer type.
	0 Unconditional
	1 Mobile busy
	2 No reply
	3 Not reachable
	4 All call forwarding (see *3GPP TS 22.030*)
	5 All conditional call forwarding (see *3GPP TS 22.030*)
<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; default value is 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.
<classx>	Integer type. Each represents a class of information.
	1 Voice (telephony)
	2 Data (refers to all bearer services; and this may only see some bearer services if TA does not support values 16, 32, 64 and 128 with **<mode>**=2)
	4 Fax (facsimile services)
	<u>7</u> 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.
	1–30 when "no reply", "all call forwarding" or "all conditional call forwarding" is enabled or queried, this gives the time in seconds to wait before call is forwarded, default value is 20
<status>	Integer type.
	0 Not active

	1	Active
<err>		Error codes. For more details, see *Chapter 12.5*.

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*. 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 see 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. Indicate whether the status of the command is enabled or not.
	0 Disable
	1 Enable
\<number>	String type. Phone number of calling address in format specified by **\<type>**.
\<type>	Type of address octet in integer format.
	128 Type specified by the network
	129 Unknown type (ISDN format number)
	145 International number type (ISDN format)
\<alpha>	Optional string type alphanumeric representation of **\<number>** corresponding to the entry found in phonebook.
\<CLI_validity>	Integer type. Provide details why **\<number>** does not contain a calling party BCD number (see *3GPP TS 24.008 subclause 10.5.4.30*).
	0 CLI valid
	1 CLI has been withheld by the originator (see *3GPP TS 24.008 table*

	2	CLI is not available due to interworking problems or limitations of originating network (see *3GPP TS 24.008 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 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 table 10.5.135a/3GPP TS 24.008* code "Unavailable")

When CLI is not available (**<CLI_validity>**=2, **<CLI_validity>**=3 or **<CLI_validity>**=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 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 and 3GPP TS 23.081*), **<number>** and **<type>** is provided. Otherwise, TA shall return the same setting for <number> and <type> as if the CLI is not available.

<subaddr>	String type. Subaddress of format specified by **<satype>**.
<satype>	Integer type. Subaddress octet (see *3GPP TS 24.008 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*.
<err>	Error codes. For more details, see **Chapter 12.5**.

NOTE

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: "0215450293",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.*

This is based on the GSM/UMTS supplementary services HOLD (Call Hold; see *3GPP TS 22.083 clause 2*), MPTY (MultiParty; see *3GPP TS 22.084*) and ECT (Explicit Call Transfer; see *3GPP TS 22.091*). 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.	
	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)
	<u>2</u>	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, see *Chapter 12.5*.

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. It has no effect on the execution of the supplementary service CLIP in the network.

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 **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 subclause 10.5.4.8*)
<type>	Type of address octet in integer format.
	129 Unknown type (ISDN format)
	145 International number type (ISDN format)

	161	National number
<alpha>	String type alphanumeric representation of **<number>** corresponding to the entry found in phone book.	
<CLI_validity>	Integer type. This parameter can provide details why **<number>** does not contain a calling party BCD number.	
	0	CLI valid
	1	CLI has been withheld by the originator
	2	CLI is not available due to interworking problems or limitations of originating network
<err>	Error codes. For more details, see *Chapter 12.5*.	

NOTE

When the presentation of the CLIP at the TE is enabled (and calling subscriber allows), an unsolicited result code is returned after every **RING** (or **+CRING: <type>**) at a mobile terminating call:
+CLIP: <number>,<type>,[subaddr],[satype],[<alpha>],<CLI_validity>

Example

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

RING

+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* and the OIR supplementary service (Originating Identification Restriction) according to *3GPP TS 24.607* 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.	
	<u>0</u>	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, see ***Chapter 12.5***.	

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). MT 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.

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. Set/present 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 (ISDN 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 subclause 10.5.4.8*).
\<alpha\>	Optional string type alphanumeric representation of **\<number\>** corresponding to the entry found in phone book.

> **NOTE**
>
> When enabled (and called subscriber allows), an intermediate result code is returned before any +CR or V.25ter responses:
> **+COLP: \<number\>,\<type\>,[\<subaddr\>],[\<satype\>],[\<alpha\>]**

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

This command enables/disables the presentation of notification result codes from TA 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/indicates the **+CSSI** intermediate result code presentation status to the TE.
	0 Disable

	1	Enable
<m>	Integer type. Sets/indicates the **+CSSU** unsolicited result code presentation status to 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 call is barred
<code2>	Integer type. It is manufacturer specific and supports the following codes:	
	0	The incoming call is a forwarded call
	2	Call has been put on hold (during a voice call)
	3	Call has been retrieved (during a voice call)
	5	Held call was terminated by another party
	10	Additional incoming call forwarded
<err>	Error codes. For more details, see *Chapter 12.5*.	

NOTE

1. When **<n>**=1 and a supplementary service notification is received after a mobile originated call setup, the **+CSSI** intermediate result code is sent to TE before any other MO call setup result codes:
   +CSSI: <code1>
2. When **<m>**=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, the **+CSSU** unsolicited result code is sent to TE:
   +CSSU: <code2>

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*. Both network and mobile initiated operations are supported.

<mode> disables/enables the presentation of an unsolicited result code. The value **<mode>**=2 cancels an ongoing USSD session. For a USSD response from the network, or a network initiated operation, the format is: **+CUSD: <status>[,<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 **<mode>**s**)** **OK**
Read Command **AT+CUSD?**	Response **+CUSD: <mode>** **OK**
Write Command **AT+CUSD=[<mode>[,<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	/
Reference 3GPP TS 27.007	

Parameter

<mode>	Integer type. Sets/indicates the result code presentation status to the TE.	
	<u>0</u>	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. 3GPP TS 23.038 Cell Broadcast Data Coding Scheme (default 15)	
<status>	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, see *Chapter 12.5*.	

11 Hardware Related Commands

11.1. AT+QPOWD   Power off

This command powers off the MT. UE returns **OK** immediately when the command is executed. Then UE deactivates the network. After the deactivation is completed, UE outputs **POWERED DOWN** and enters 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 **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 Immediate power-down
	1 Normal power-down

11.2. AT+CCLK   Clock

This command sets or queries the real time clock (RTC) of the MT.

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	The command takes effect immediately. The configuration will not be saved.
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 to +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, see **Chapter 12.5**.

Example

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

11.3. 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: (**list 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
<status>	Integer type. Indicate whether the ADC value read is successful.
	0 Failed
	1 Successful
<value>	Integer type. The voltage of specified ADC channel. Unit: uV.

11.4. AT+QSCLK   Configure Sleep Mode

This command controls whether MT enters sleep mode. When entering into sleep mode is enabled, MT can directly enter sleep mode.

AT+QSCLK Configure Sleep Mode	
Test Command **AT+QSCLK=?**	Response **+QSCLK: (**list of supported **<n>**s**),(**list of supported **<saved>**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. Enable or disable sleep mode.
	0 Disable
	1 Enable. It is controlled by DTR. DTR is pulled up by default.
\<saved>	Integer type. Whether to save the configuration into NVM.
	0 Not save
	1 Save

11.5. AT+QAGPIO   Set Output Level of AP or PMU GPIO

This command sets the AP or PMU GPIO output level.

AT+QAGPIO Set Output Level of AP Or PMU GPIO	
Test Command **AT+QAGPIO=?**	Response **+QAGPIO: \<type>,\<gpio_num>,(**list of supported **\<value>**s**)** **OK**
Write Command **AT+QAGPIO=\<type>,\<gpio_num>,\<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_num>	Integer type. GPIO number.
<value>	Integer type. GPIO output level.
	0 Low level
	1 High level

> **NOTE**
>
> The range of PMU GPIO is 1–16.

Example

```
AT+QAGPIO=?
+QAGPIO: <type>,<gpio_num>,(0,1)

OK
AT+QAGPIO=0,105,1              //Set the AP gpio_105 output high level.
OK
AT+QAGPIO=1,8,0               //Set the PMU gpio_8 output low level.
OK
```

11.6. AT+QMAP   Configure QMAP Related Parameters

AT+QCFG Configure QMAP Related Parameters	
Test Command **AT+QMAP?**	Response +QMAP: "LANIP",<LAN_IP_start_address>,<LAN_IP_end_ address>,<GW_IP_address>,<effect> +QMAP: "vlan",(range of supported **<VLAN_ID>**s),(list of supported **<enable>**s),(list of supported **<VLAN_type>**s) +QMAP: "mPDN_rule",(range of supported **<rule_num>**s),(range of supported **<profileID>**s),(range of supported **<VLAN_ID>**s),(list of supported **<IPPT_mode>**s),(list of supported **<auto_connect>**s),<IPPT_info> +QMAP: "auto_connect",(range of supported **<rule_num>**s),(list of supported **<auto_connect>**s),(range of supported **<profileID>**s) +QMAP: "mPDN_status" +QMAP: "sfe",(list of supported **<status>**s) +QMAP: "domain",<domain_name> +QMAP: "dhcpv6dns",(list of supported **<status>**s)

	OK
Maximum Response Time	300 ms
Characteristics	/

11.6.1. AT+QMAP="LANIP" Query/Modify DHCP Address Pool of the Default LAN Interface

This command queries or modifies DHCP address pool of the default LAN interface (VLAN0).

AT+QMAP="LANIP" get/set lan ip pool	
Write Command AT+QMAP="LANIP"[,<LAN_IP_start_address>,<LAN_IP_end_address>,<GW_IP_address>[,<effect>]]	Response If the optional parameters are omitted, query the current setting: +QMAP: "LANIP",<LAN_IP_start_address>,<LAN_IP_end_address>,<GW_IP_address> OK If the optional parameters are specified, configure DHCP address pool of the default LAN interface: OK Or ERROR
Maximum Response Time	300 ms
Characteristics	Whether the command takes effect immediately depends on <effect>. The configuration is saved automatically.

Parameter

<LAN_IP_start_address>	String type. Start address of DHCP address pool of the default LAN interface. Format: Dotted decimal IPv4 address without double quotes.
<LAN_IP_end_address>	String type. End address of DHCP address pool of the default LAN interface. Format: Dotted decimal IPv4 address without double quotes.
<GW_IP_address>	String type. Gateway address of DHCP address pool of the default LAN interface. Format: Dotted decimal IPv4 address without double quotes.
<effect>	Integer type. Whether the command takes effect immediately or not. 0 Take effect after the module is rebooted 1 Take effect immediately

Example

AT+QMAP="LANIP" //Query the current setting of DHCP address pool. **+QMAP: "LANIP",192.168.225.40,192.168.225.60,192.168.225.1** **OK**	
AT+QMAP="LANIP",192.168.111.20,192.168.111.60,192.168.111.1,1	//Configure the DHCP address pool and the configuration takes effect immediately.
OK	
AT+QMAP="LANIP",192.168.111.20,192.168.111.60,192.168.111.1	//Configure the DHCP address pool and the configuration takes effect after the module is rebooted.
OK	

11.6.2. AT+QMAP="vlan"　Query/Configure VLAN

This command queries or configures VLAN of the module.

AT+QMAP="vlan"　Query/Configure VLAN	
Write Command **AT+QMAP="vlan"[,<VLAN_ID>,<enable>[,<VLAN_type>]]**	Response **If the optional parameters are omitted, query the enabled VLAN:** **+QMAP: "vlan",0** **+QMAP: "vlan",<VLAN_ID>,<VLAN_type>** **…** **OK** **If the optional parameters are specified, enable or disable the specified VLAN:** OK **Or** **ERROR**
Maximum Response Time	5 s
Characteristics	The command takes effect immediately, but when the first VLAN is enabled or the last one is disabled, the module reboots automatically and the command takes effect after the reboot. The configuration is saved automatically.

Parameter

\<VLAN_ID\>	Integer type. VLAN ID. Range: 0, 2–255.
	0 is displayed only in the response, and it is expressed as a physical network card rather than a VLAN ID.
\<enable\>	String type. Enable or disable VLAN specified by **\<VLAN_ID\>**.
	"enable" Enable
	"disable" Disable
\<VLAN_type\>	Integer type. VLAN type. It is valid only when **\<enable\>** is "enable".
	1 ETH
	2 ECM
	3 RNDIS
	11 ETH without enabling VLAN data acceleration
	12 ECM without enabling VLAN data acceleration
	13 RNDIS without enabling VLAN data acceleration

Example

```
AT+QMAP="vlan"                    //Query the list of the enabled VLAN IDs.
+QMAP: "vlan",0
+QMAP: "vlan",2,1                 //VLAN 2 (eth0.2) of ETH is enabled.
+QMAP: "vlan",3,1                 ///VLAN 3 (eth0.3) of ETH is enabled.


OK
AT+QMAP="vlan",4,"enable",1    //Enable VLAN 4 (eth0.4) of ETH.
OK
AT+QMAP="vlan",4,"disable"     //Disable VLAN 4 (eth0.4) of ETH.
OK
```

11.6.3. AT+QMAP="mPDN_rule" Query/Modify mPDN VLAN Mapping Rule

This command queries or modifies mPDN VLAN mapping rule.

AT+QMAP="mPDN_rule" Query/Modify mPDN VLAN Mapping Rule	
Write Command **AT+QMAP="mPDN_rule"[,\<rule_num\>[,\<profileID\>,\<VLAN_ID\>,\<IPPT_mode\>,\<auto\>[,\<IPPT_info\>]]]**	Response If the optional parameters are omitted, query the current setting: **+QMAP: "mPDN_rule",\<rule_num\>,\<profileID\>,\<VLAN_ID\>, \<IPPT_mode\>,\<auto\>** **…** **OK** If only **\<rule_num\>** is specified, delete a specified mPDN rule: **OK**

	If the optional parameters are specified, configure the specified mPDN VLAN mapping rule: **OK** Or **ERROR**
Maximum Response Time	5 s
Characteristics	See the note below for whether the command takes effect immediately or not. The configuration is saved automatically.

Parameter

<rule_num>	Integer type. mPDN rule number. Range: 0–3.
<profileID>	Integer type. APN profile ID. Range: 1–16.
<VLAN_ID>	Integer type. VLAN ID. Range: 2–255.
<IPPT_mode>	Integer type. Enable or disable IPPT mode (IP Passthrough mode).
	0　　Disable IPPT mode
	1　　Enable IPPT mode (ETH)
	2　　Enable IPPT mode (Wi-Fi)
	3　　Enable IPPT mode (USB-ECM/RNDIS)
<auto_connect>	Integer type. Enable or disable automatic data backhaul connectivity.
	1　　Enable
	0　　Disable
<IPPT_info>	String type. If **<IPPT_mode>** is 1 or 2, **<IPPT_info>** is the peer NIC MAC address bound in IPPT mode. If **<IPPT_mode>** is 3, **<IPPT_info>** is the peer host name bound in IPPT mode. If **<IPPT_mode>** is 0, **<IPPT_info>** does not need to be filled in. When **<IPPT_mode>** is not 0, if **<IPPT_info>** is specified, the bound peer NIC or peer host gets a public IP, and other devices get a private IP; if **<IPPT_info>** is not specified, only the first connected device gets a public IP, other devices will not be able to get IP.

> **NOTE**
>
> 1. The mPDN rule is implemented by binding the WAN interfaces obtained from data calls of different APNs to the LAN/VLAN interface, and implementing the NAT configuration between the corresponding WAN and LAN/VLAN. In this way, the devices under different LAN/VLAN interfaces can access different networks through the corresponding WAN interface.
> 2. When configuring mPDN rule, if you need to use a VLAN interface (**<VLAN_ID>** is not 0), you need to create a corresponding VLAN interface through **AT+QMAP="vlan"** first.

3. IPPT mode (IP Passthrough mode), is a function of transparently transmitting the IP address (Public IP) assigned by the operator to the LAN device.

4. In general, when using the USB (ECM/RNDIS) interface for data backhaul connectivity, if the IPPT mode is enabled, you need to set **<IPPT_mode>** to 3, and set the hostname of the LAN device in **<IPPT_info>**.

5. In most cases, the MAC address of the USB virtual Ethernet interface (ECM/RNDIS) is not fixed. But the module supports IPPT mode by setting **<IPPT_mode>** to 1 and setting the MAC address of the LAN USB device in **<IPPT_info>** in actual use.

6. WLAN interface does not support VLAN function, so WLAN belongs to VLAN0. In actual use, to assign the public IP to the device under the WLAN, you need to set **<IPPT_mode>** to 2, and **<VLAN_ID>** can only be 0.

7. When **<rule_num>**=0, the module uses the default WAN interface for data backhaul connectivity. When **<rule_num>**=1, the module uses the second WAN interface, and so on.

8. The default WAN interface in mPDN data backhaul connectivity and the default LAN interface on the physical interface are bound by default. If the LAN/VLAN interface bound to the default WAN interface of mPDN data backhaul connectivity is changed, the module restarts automatically. For example, execute **AT+QMAP="mPDN_rule",0,1,2,0,1** (bind the default WAN interface of mPDN to **<VLAN_ID>** = 2), the module accesses the network through the default WAN interface, that is, if **<rule_num>** is 0 and no data backhaul connectivity is performed, there is no network in the module.

Example

```
AT+QMAP="mPDN_rule"                        //Query the current mPDN VLAN mapping rule.
+QMAP: "mPDN_rule",0,0,0,0,0
+QMAP: "mPDN_rule",1,0,0,0,0
+QMAP: "mPDN_rule",2,0,0,0,0
+QMAP: "mPDN_rule",3,0,0,0,0

OK
AT+QMAP="mPDN_rule",0,1,0,0,1              //Configure to enable mPDN rule number 0.
OK
AT+QMAP="mPDN_rule",1,5,2,0,1              //Configure to enable mPDN rule number 1.
OK
AT+QMAP="mPDN_rule"                        //Query the current mPDN VLAN mapping rule.
+QMAP: "mPDN_rule",0,1,0,0,1
+QMAP: "mPDN_rule",1,5,2,0,1
+QMAP: "mPDN_rule",2,0,0,0,0
+QMAP: "mPDN_rule",3,0,0,0,0

OK
AT+QMAP="mPDN_rule",1                      //Configure to disable mPDN rule number 1.
OK
AT+QMAP="mPDN_rule"                        //Query the current mPDN VLAN mapping rule.
+QMAP: "mPDN_rule",0,1,0,0,1
```

11.6.4. AT+QMAP="auto_connect"　Query/Modify Automatic Data Backhaul

Connectivity

This command queries or modifies automatic data backhaul connectivity.

AT+QMAP="auto_connect"　Query/Modify Automatic Data Backhaul Connectivity	
Write Command **AT+QMAP="auto_connect"[,<rule_num>[,<auto>[,<profileID>]]]**	Response If the optional parameters are omitted, query the current settings of all mPDN rules: **+QMAP: "auto_connect",<rule_num>,<auto_connect>** … **OK** If only **<rule_num>** is specified, query the current setting of the specified mPDN rule: **+QMAP: "auto_connect",<rule_num>,<auto_connect>** **OK** If only **<rule_num>** and **<auto>** are specified, enable or disable automatic data backhaul connectivity for the specified mPDN rule: **OK** If all optional parameters are specified, enable automatic data backhaul connectivity and modify the APN Profile ID, or disable automatic data backhaul connectivity for the specified mPDN rule: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

\<rule_num\>	Integer type. mPDN rule number. Range: 0–3.
\<auto_connect\>	Integer type. Enable or disable automatic data backhaul connectivity.
	1 Enable
	<u>0</u> Disable
\<profileID\>	Integer type. APN Profile ID. Range: 1–16.

NOTE

Before modifying **\<auto_connect\>**, you need to ensure that the specified mPDN rule is configured over **AT+QMAP="mPDN_rule"** in advance and is enabled.

Example

```
AT+QMAP="auto_connect"            //Query the current setting.
+QMAP: "auto_connect",0,1
+QMAP: "auto_connect",1,0
+QMAP: "auto_connect",2,0
+QMAP: "auto_connect",3,0

OK
AT+QMAP="auto_connect",0          //Query auto connect configuration of rule number 0.
+QMAP: "auto_connect",0,1

OK
AT+QMAP="auto_connect",1,1        //Configure auto connect of rule number 2.
OK
AT+QMAP="auto_connect",2,1,6      //Configure auto connect of rule number 2 and modify
                                  //<profileID> to 6.
OK
```

11.6.5. AT+QMAP="mPDN_status"   Query mPDN Status

This command queries mPDN status.

AT+QMAP="mPDN_status" Query mPDN Status	
Write Command **AT+QMAP="mPDN_status"**	Response **+QMAP: "mPDN_status",\<rule_num\>,\<profileID\>,\<IPPT_status\>,\<connect_status\>** … **OK**

Maximum Response Time	300 ms
Characteristics	/

Parameter

<rule_num>	Integer type. mPDN rule number. Range: 0–3.
<profileID>	Integer type. APN profile ID. Range: 1–16.
<IPPT_status>	Integer type. Whether IPPT mode is enabled.
	0 Enabled
	1 Disabled
<connect_status>	Integer type. Status of data backhaul connectivity.
	0 Disconnected
	1 Connected

Example

```
AT+QMAP="mPDN_status"                // Query current mPDN status.
+QMAP: "mPDN_status",0,1,0,1,1
+QMAP: "mPDN_status",1,2,2,0,1
+QMAP: "mPDN_status",2,3,3,0,0
+QMAP: "mPDN_status",3,0,0,0,0

OK
```

11.6.6. AT+QMAP="sfe"   Query/Configure SFE Software Acceleration

This command queries or configures software acceleration of the module.

AT+QMAP="sfe" Query/Configure SFE Software Acceleration	
Write Command **AT+QMAP="sfe"[,<status>]**	Response If the optional parameter is omitted, query the current setting: **+QMAP: "sfe",<status>** **OK** If the optional parameter is specified, enable or disable SFE software acceleration: **OK** Or **ERROR**
Maximum Response Time	500 ms
Characteristics	The command takes effect immediately.

	The configuration is saved automatically.

Parameter

\<status>	String type. Enable or disable SFE software acceleration.	
	"enable"	Enable
	<u>"disable"</u>	Disable

NOTE

Only when the module does not support hardware acceleration (IPA), can the SFE function provide limited performance optimization. If the module supports hardware acceleration (IPA), this function is invalid.

Example

```
AT+QMAP="sfe"              //Query the current setting.
+QMAP: "sfe","disable"

OK
AT+QMAP="sfe","enable"     //Enable SFE software acceleration.
OK
```

11.6.7. AT+QMAP="domain"   Query/Configure Gateway Domain Name

This command queries or configures gateway domain name of LAN/VLAN interface.

AT+QMAP="domain" Query/Configure Gateway Domain Name	
Write Command **AT+QMAP="domain"[,\<domain_na me>]**	Response If the optional parameter is omitted, query the current setting: **+QMAP: "domain",\<domain_name>** **OK** If the optional parameter is specified, configure gateway domain name of LAN/VLAN interface: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately.

	The configuration is saved automatically.

Parameter

<domain_name>	String type. LAN/VLAN Gateway domain name. For example, ""quectel.com".

Example

```
AT+QMAP="domain"        //Query gateway domain name of LAN/VLAN interface.
+QMAP: "domain","qualcomm.mobileap.com"

OK
AT+QMAP="domain","qualcomm.mobileap.com"   //Set gateway domain name of LAN/VLAN
                                             interface.
OK
```

11.6.8. AT+QMAP="dhcpv6dns"   Query/Configure IPv6 DNS

This command queries or configures IPv6 DNS.

AT+QMAP="dhcpv6dns" Query/Configure IPv6 DNS	
Write Command **AT+QMAP="dhcpv6dns"[,<status>]**	Response If the optional parameter is omitted, query the current setting: **+QMAP: "dhcpv6dns",<status>** **OK** If the optional parameter is specified, enable or disable IPv6 DNS: **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<status>	String type. Enable or disable IPv6 DNS.	
	"enable"	Enable
	"disable"	Disable

Example

AT+QMAP="dhcpv6dns"	//Query the current setting
+QMAP: "dhcpv6dns","enable"	
OK	
AT+QMAP="dhcpv6dns","enable"	//Enable IPv6 DNS
OK	

11.7. AT+QGETCAPABILITY   Get Band and LTE UE-Category Supported by UE

This command gets band and LTE UE-Category supported by UE, and queries whether CA is supported.

AT+QGETCAPABILITY Get Band and LTE UE-Category Supported by UE	
Read Command **AT+ QGETCAPABILITY?**	Response **+QGETCAPABILITY: NR:\<band1\>,\<band2\>,……,\<bandn\>** **+QGETCAPABILITY: LTE-FDD:\<band1\>,\<band2\>,……,\<bandn\>** **+QGETCAPABILITY: LTE-TDD:\<band1\>,\<band2\>,……,\<bandn\>** **+QGETCAPABILITY: WCDMA:\<band1\>,\<band2\>,……,\<bandn\>** **+QGETCAPABILITY: LTE-CATEGORY:\<CAT_type\>** **+QGETCAPABILITY: LTE-CA:\<support_CA\>** **OK**
Maximum Response Time	300 ms
Characteristics	/

Parameter

\<bandX\>	String type. Supported band. In 5G NR: n1 n2 … nn In LTE/WCDMA: B1 Band 1 B2 Band 2 …

	Bn	Band N
<CAT_type>	String type. LTE UE category.	
	CAT1	Category 1
	CAT2	Category 2
	…	
	CATn	Category N
<support_CA>	Integer type. Whether CA is supported.	
	0	Do not support
	1	Support

Example

```
AT+QGETCAPABILITY?
+QGETCAPABILITY: NR:n41,n79                              //Supported 5G NR band.
+QGETCAPABILITY: LTE-FDD:B1,B2,B3,B4,B5,B7,B8,B28  //Supported LTE-FDD bands.
+QGETCAPABILITY: LTE-TDD:B40                             //Supported LTE-TDD bands.
+QGETCAPABILITY: WCDMA:B1,B2,B5,B8                       //Supported WCDMA bands.
+QGETCAPABILITY: LTE-CATEGORY:CAT4                       //LTE Cat4 is supported.
+QGETCAPABILITY: LTE-CA:0                                //CA is not supported.

OK
```
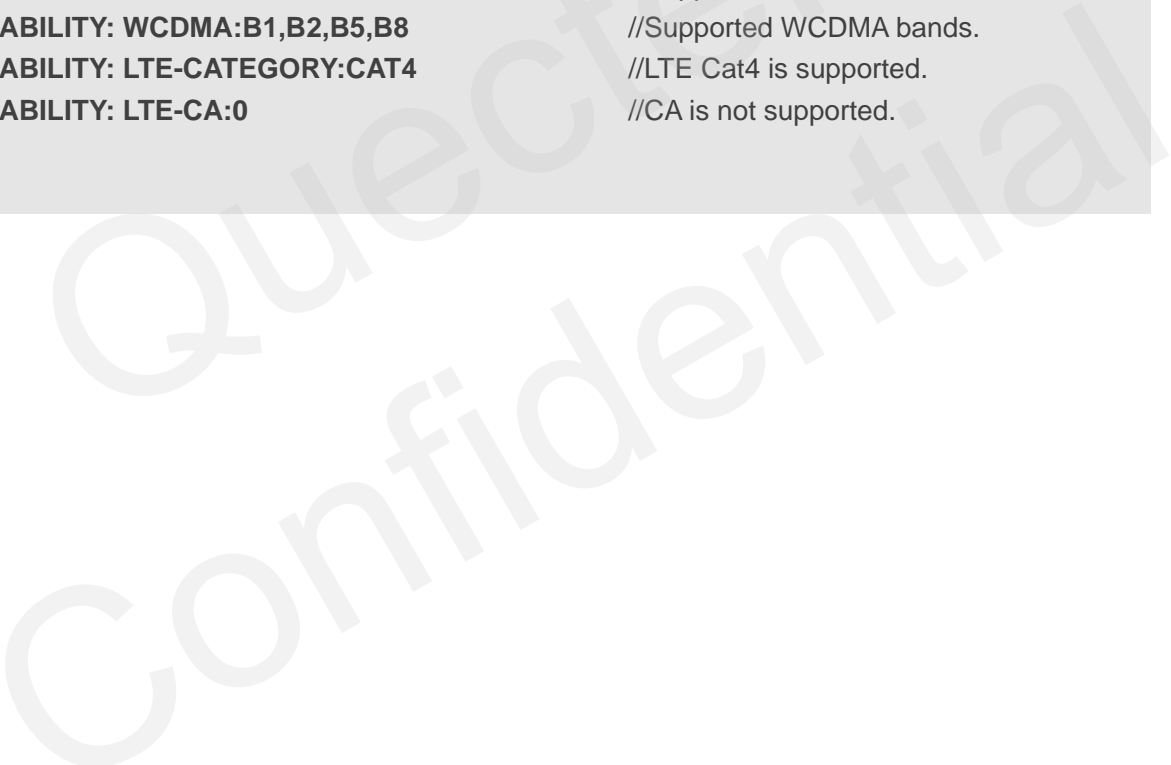
12 Appendix References

12.1. Terms and Abbreviations

Table 7: Terms and Abbreviations

Abbreviation	Description
3GPP	3rd Generation Partnership Project
5GCN	5G Core Network
5GS	5G System
ADC	Analog To Digital Converter
AP	Application Processor
APDU	Application Protocol Data Unit
APN	Access Point Name
ARFCN	Absolute Radio-Frequency Channel Number
ARM	Advanced RISC (Reduced Instruction Set Computing) Machine
ASCII	American Standard Code for Information Interchange
BB	Baseband
BCD	Binary Coded Decimal
BER	Bit Error Rate
BT	Bluetooth
CA	Carrier Aggregation
CBM	Cell Broadcast Message

CDRX	Connected Discontinuous Reception
CFU	Call Forwarding Unconditional
CLI	Calling Line Identification
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
COL	Connected Line
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Restriction
CQI	Channel Quality Indicator
CS	Circuit Switch
CSD	Circuit Switch Data
CSI	Channel State Information
DCE	Data Communication Equipment
DCS	Data Coding Scheme
DF	Dedicated File
DFOTA	Delta Firmware Upgrade Over-The-Air
DL	Downlink
DPCH	Dedicated Physical Channel
DPR	Dynamic Power Reduction
DSS	Decision Support System
DTE	Data Terminal Equipment
DTMF	Dual-Tone Multifrequency
DTR	Data Terminal Ready
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
ECC	Emergency Communications Center

ECGI	E-UTRAN Cell Global Identifier
ECI	E-UTRAN Cell Identifier
ECT	Explicit Call Transfer supplementary service
EFS	Encrypting File System
eMLPP	Enhanced Multi-Level Precedence and Pre-emption Service
EN-DC	E-UTRA NR Dual Connectivity
EPS	Evolved Packet System
eUTRAN	Evolved Universal Terrestrial Radio Access Network
FDD	Frequency Division Duplex
FDPCH	Fraction-Dedicated Physical Channel
FOTA	Firmware Upgrade Over-The-Air
GERAN	GSM/EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMT	Greenwich Mean Time
GPIO	General-Purpose Input/Output
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HCO	Hearing Carry-Over
HLR	Home Location Register
HSDPA	High Speed Downlink Packet Access
HSUPA	High Speed Uplink Packet Access
I2S	Inter-IC Sound
IIC	Inter-Integrated Circuit
IMEI	International Mobile Equipment Identity

IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identity
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IRA	International Reference Alphabet
ISDN	Integrated Services Digital Network
ISIM	IP Multimedia Service Identity Module
IWF	Interworking Function
LLC	Logical Link Control
LTE	Long-Term Evolution
LTE CA	LTE Carrier Aggregation
LTE CAT	LTE Category
MBN	Modem Software Configuration Binary
MCS	Modulation and Coding Scheme
ME	Mobile Equipment
MO	Mobile Original
MPTY	MultiParty
MS	Mobile Station
MSC	Mobile Switching Center
MSISDN	Mobile Subscriber International Integrated Service Digital Network number
MT	Mobile Terminal
MTU	Maximum Transmission Unit
NAS	Non-Access Stratum
NG-RAN	Next-Generation Radio Access Network
NITZ	Network Identity and Time Zone / Network Informed Time Zone

NR	New Radio
NSA	Non-Standalone
NSAPI	Network Service Access Point Identifier
NSSAI	Network Slice Selection Assistance Information
NTC	Negative Temperature Coefficient
NVM	Non-Volatile Memory
OIR	Originating Identification Restriction
PCIe	Peripheral Component Interconnect Express
PCIe EP	PCI Express Endpoint Device
PCIe RC	PCI Express Root Complex
PCM	Pulse Code Modulation
PCO	Protocol Configuration Options
PDN	Public Data Network
PDP	Packet Data Protocol
PDSCH	Physical Downlink Shared Channel
PDU	Protocol Data Unit
PIN	Personal Identification Number
PLMN	Public Land Mobile Network
PMI	Precoding Matrix Indicator
PMU	Power Management Unit
PPP	Point-to-Point Protocol
PS	Packet Switch
PSC	Primary Synchronization Code
PUK	PIN Unlock Key
QoS	Quality of Service

RAN	Radio Access Network
RAT	Radio Access Technology
RF	Radio Frequency
RGMII	Reduced Gigabit Media Independent Interface
RI	Ring Indicator
RLP	Radio Link Protocol
RP	Relay Protocol
RRC	Radio Resource Control
RSRP	Reference Signal Received Power
RSRQ	Reference Signal Received Quality
RSSI	Received Signal Strength Indicator
RSSNR	
RTC	Real-Time Clock
SA	Standalone
SAR	Specific Absorption Rate
SCC	Secondary Component Carrier
SINR	Signal to Interference plus Noise Ratio
SLIC	Subscriber Line Interface Circuit
SMS	Short Messaging Service
SMSC	Short Message Service Center
SNDCP	Sub Network Dependence Convergence Protocol
S-NSSAI	Single Network Slice Selection Assistance Information
SSC	Session and Service Continuity
SST	Slice/Serive Type
TA	Terminal Adapter

TCP	Transmission Control Protocol
TDD	Time Division Duplex
TE	Terminal Equipment
TFT	Traffic Flow Template
TTY	Teletype Terminals
UAC	USB Audio Class
UART	Universal Asynchronous Receiver/Transmitter
UCS2	Universal Character Set (UCS-2) Format
UDP	User Datagram Protocol
UDUB	User Determined User Busy
UE	User Equipment
UFS	Universal Flash Storage
UICC	Universal Integrated Circuit Card
UIM	User Identity Model
UL	Uplink
UMTS	Universal Mobile Telecommunications System
URC	Unsolicited Result Code
USB	Universal Serial Bus
USSD	Unstructured Supplementary Service Data
(U)SIM	(Universal) Subscriber Identity Module
UTRA	UMTS Terrestrial Radio Access
UTRAN	Universal Terrestrial Radio Access Network
VCO	Voice Carry-Over
VLR	Visitor Location Register
WCDMA	Wideband Code Division Multiple Access

WIM	Wireless Identity Module
XO	Crystal Oscillator

12.2. 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+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

12.3. 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

12.4. 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

12.5. Summary of CME ERROR Codes

Final result code **+CME ERROR: <err>** indicates an error related to mobile equipment or network. 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. 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
901	Audio unknown error
902	Audio invalid parameters
903	Audio operation is not supported
904	Audio device is busy

12.6. Summary of CMS ERROR Codes

Final result code **+CMS ERROR: <err>** indicates an error related to mobile equipment or network. 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
340	Not expected
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

12.7. Summary of URC

Table 13: Summary of URC

Index	URC Display	Meaning	Condition
1	+QUSIM: 1	Indicate (U)SIM card initialization status	NA
2	+QSIMSTAT: <enable>,<inserted_status>	Indicate (U)SIM card insertion status	AT+QSIMSTAT=1
3	+CREG: <stat>	Indicate registration status of the MT	AT+CREG=1
4	+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
5	+CGREG: <stat>	Indicate network registration status of the MT	AT+CGREG=1
6	+CGREG: <stat>[,[<lac>],[<ci>],[<AcT>],[<rac>]]	Indicate network registration and location information of the MT	AT+CGREG=2
7	+CTZV: <tz>	Time zone reporting	AT+CTZR=1
8	+CTZE: <tz>,<dst>,<time>	Extended time zone reporting	AT+CTZR=2
9	+CEREG: <stat>	Indicate the change in EPS network registration status in E-UTRAN	AT+CEREG=1
10	+CEREG: <stat>[,<lac>,<ci>[,<AcT>]]	Indicate the change of the network cell in E-UTRAN	AT+CEREG=2
11	+C5GREG: <stat>	Indicate the change of the network registration status in 5GS	AT+C5GREG=1
12	+C5GREG: <stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>]]	Indicate the change of the network cell in 5GS or the network provided an Allowed NSSAI	AT+C5GREG=2
13	+CMTI: <mem>,<index>	New message is received, and saved to memory	See AT+CNMI
14	+CMT: [<alpha>],<length><CR><LF><pdu>	New short message is received and output directly to TE (PDU mode)	See AT+CNMI
15	+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

16	+CBM: <length><CR><LF><pdu>	New CBM is received and output directly (PDU mode)	See AT+CNMI
17	+CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>	New CBM is received and output directly to TE (Text mode)	See AT+CNMI
18	+CDS: <length><CR><LF><pdu>	New CDS is received and output directly (PDU mode)	See AT+CNMI
19	+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>	New CDS is received and output directly to TE (Text mode)	See AT+CNMI
20	+CDSI: <mem>,<index>	New message status report is received, and saved to memory	See AT+CNMI
21	+COLP: <number>,<type>,[<subaddr>],[<satype>],[<alpha>]	The presentation of the COL (connected line) at the TE for a mobile originated call	AT+COLP=1
22	+CLIP: <number>,<type>,[subaddr],[satype],[<alpha>],<CLI validity>	Mobile terminating call indication	AT+CLIP=1
23	+CRING: <type>	An incoming call is indicated to the TE with unsolicited result code instead of the normal RING	AT+CRC=1
24	+CCWA: <number>,<type>,<class>[,<alpha>][,<CLI_validity>[,<subaddr>,<satype>[,<priority>]]]	Call waiting indication	AT+CCWA=1,1
25	+CSSI: <code1>	Shows the +CSSI intermediate result code presentation status to the TE	AT+CSSN=1
26	+CSSU: <code2>	Shows the +CSSU unsolicited result code presentation status to the TE	AT+CSSN=<n>,1
27	RDY	MT initialization is successful	N/A
28	+CFUN: 1	All function of the MT is available	N/A
29	+CPIN: <state>	(U)SIM card pin state	N/A
30	+QIND: SMS DONE	SMS initialization finished	N/A
31	+QIND: PB DONE	Phonebook initialization finished	N/A
32	+CPIN: NOT READY	(U)SIM card is not ready	N/A
33	POWERED DOWN	Module power down	AT+QPOWD
34	+CGEV: REJECT <PDP_type>,<PDP_addr>	A network request for PDP activation, and was automatically rejected.	AT+CGEREP=2,1

35	+CGEV: NW REACT <PDP_type>,<PDP_addr>,[<cid>]	The network request PDP reactivation	AT+CGEREP=2,1
36	+CGEV: NW DEACT <PDP_type>,<PDP_addr>,[<cid>]	The network has forced a context deactivation	AT+CGEREP=2,1
37	+CGEV: ME DEACT <PDP_type>,<PDP_addr>,[<cid>]	The ME has forced a context deactivation.	AT+CGEREP=2,1
38	+CGEV: NW DETACH	The network has forced a Packet Domain detach.	AT+CGEREP=2,1
39	+CGEV: ME DETACH	The mobile equipment has forced a Packet Domain detach.	AT+CGEREP=2,1
40	+CGEV: NW CLASS <class>	The network has forced a change of MS class.	AT+CGEREP=2,1
41	+CGEV: ME CLASS <class>	The mobile equipment has forced a change of MS class.	AT+CGEREP=2,1
42	+QIND: "csq",<rssi>,<ber>	The signal strength and channel bit error rate is changed.	AT+QINDCFG="csq",1
43	+QIND: "smsfull",<storage>	SMS storage is full.	AT+QINDCFG="smsfull",1
44	RING	There is an incoming call.	AT+QINDCFG="ring",1
45	+QIND: "act",<actvalue>	Network access technology is changed.	AT+QINDCFG="act",1
46	^DSCI: <id>,<dir>,<stat>,<type>,<number>,<num_type>	Call status indication.	AT^DSCI=1
47	+CLIP: <number>,<type>,[subaddr],[satype],[<alpha>],<CLI_validity>	Indicate the calling line identity (CLI) of the calling party when receiving a mobile terminated call	AT+CLIP=1
48	+CUSD: <status>[,<rspstr>,[<dcs>]]	USSD response from the network, or a network initiated operation.	AT+CUSD=1
49	+QIND: "SLIC Hook off"	Hook off the phone	AT+QAUDCFG="slic_IndRep",1
50	+QIND: "SLIC DTMF",<key>	Press key	AT+QAUDCFG="slic_IndRep",1
51	+QIND: "SLIC Flash Key"	Press the flash key	AT+QAUDCFG="slic_IndRep",1

12.8. 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

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

No.						
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

No.	0	1	2	3	4	5	6	7
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. See *Table 15* for more details.

12.9. Release Cause Text List of AT+CEER

Table 22: Release Cause Text 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

NOTE

...ch failure

...ngestion

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