RG520N&RG525F&RG5x0F &RM5x0N&RM521F Series AT Commands Manual

5G Module Series

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About the Document

Revision History

Version	Date	Author	Description
-	2022-08-12	James YU/ Evan JIN/ Ozzy ANG/ Amos ZHANG/ Shaun DUAN/ Joseph WANG/ Pacifier WANG/ Wolf GUAN/ Westring LIU	Creation of the document
1.0	2024-02-07	James YU/ Evan JIN/ Ozzy ANG/ Amos ZHANG/ Shaun DUAN/ Joseph WANG/ Pacifier WANG/ Wolf GUAN/ Westring LIU	First official release

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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 Family	Module
-	RG520N Series
-	RG525F-NA
RG5x0F	RG520F Series
	RG530F Series
RM5x0N	RM520N Series
	RM530N-GL
-	RM521F-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 its previous value or the default settings, unless otherwise specified.
- **Underline** 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>**. In tables presenting commands and responses throughout this document, only the commands and responses are presented, and **<CR>** and **<LF>** 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:

- **Basic**

Basic command format is **AT<x><n>**, or **AT&<x><n>**, where **<x>** is the command, and **<n>** is/are the argument(s) of the command. For example, **ATE<n>** 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**

S Parameter command format is **ATS<n>=<m>**, where **<n>** is the index of the **S** register to be set, and **<m>** is the value to be assigned to it.

- **Extended Command**

There are several types of extended commands as shown in the following table.

Table 2: Type of AT Commands

Command Type	Syntax	Description
Test Command	**AT+<cmd>=?**	Test the existence of the corresponding command and return information about the type, value, or range of its parameter.
Read Command	**AT+<cmd>?**	Check the current parameter value of the corresponding 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. In such cases, only the first command should have **AT** prefix. Commands can be in upper or lower case.

Spaces should be ignored when you enter AT commands, except in the following cases:

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

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 entered parameter.

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

1.6. Supported Character Sets

The AT command interfaces 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 queried via **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 a report message that is not issued in response to an executed AT command. URC is automatically issued by the modules in response to a certain event. Typical URC triggering events include incoming calls (**RING**), short message reception, high/low voltage alarm, high/low temperature alarm, etc.

1.9. Turn-off Procedure

The safest and best way to turn off the module is to execute **AT+QPOWD**. This procedure is performed 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**, do not enter any other AT commands. When the command is executed successfully, the module will output **POWERED DOWN** and then enter the power down mode. 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** is not received within 65 s, the power supply will be disconnected automatically.

2 General Commands

2.1. ATI Request MT Identification

This command returns the MT identification.

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

Parameter

<objectID>	String type. Device type identifier.
<revision>	String type. Identification of MT firmware version.

Example

```
ATI
Quectel
RG520NNA
Revision: RG520NNAAAR01A01M4G

OK
```

2.2. AT+GMI Request Manufacturer Identification

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

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

2.3. AT+CGMI Request Manufacturer Identification

This command returns the manufacturer identification. It is identical with **AT+GMI** in ***Chapter 2.2***.

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

2.4. AT+GMM Request MT Model Identification

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

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

Parameter

<objectID>	String type. Device type identifier.

2.5. AT+CGMM Request MT Model Identification

This command returns the MT model information. It is identical with the **AT+GMM** in ***Chapter 2.4***.

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. Device type identifier.

2.6. AT+GMR Request MT Firmware Version Identification

This command returns the MT firmware version identification. It is identical with **AT+CGMR** in ***Chapter 0***.

AT+GMR Request MT Firmware Version 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 of MT firmware version, including line terminators, which should not exceed 2048 characters.

Example

```
AT+GMR
RG520NNAAAR01A01M4G

OK
```

2.7. AT+CGMR Request MT Firmware Version Identification

This command returns the MT firmware version. It is identical with **AT+GMR** in ***Chapter 2.6***.

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

Parameter

<revision>	String type. Identification of MT firmware version, including line terminators, which should not exceed 2048 characters.

2.8. AT+GSN Request IMEI Number

This command returns the IMEI (International Mobile Equipment Identity) number of the ME that permits the user to identify the individual ME device. It is identical with **AT+CGSN** in ***Chapter 0***.

AT+GSN Request IMEI Number	
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 ME.

NOTE

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

2.9. AT+CGSN Request IMEI Number

This command requests the IMEI (International Mobile Equipment Identity) number of the ME that permits the user to identify the individual ME device. It is identical with **AT+GSN** in ***Chapter 2.8***.

AT+CGSN Request IMEI Number	
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 ME.

NOTE

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 factory settings specified by the manufacturer. See ***Chapter 13.2*** for the factory settings restorable with **AT&F**.

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 settings.

NOTE

Executing **AT&F** writes data to NVM (Non-Volatile Memory). Please proceed with caution.

2.11. AT&V Display Current AT Command Settings

This command displays the current settings of some AT command parameters, including the single-letter AT command parameters that are not otherwise readable. See ***Table 4*** for the default command response before any change.

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

Table 3: AT&V Response

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

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

This command stores the current AT command settings to a user-defined profile in non-volatile memory (See ***Chapter 13.3***). After this command is executed, the AT command settings are automatically restored from the user-defined profile during power-up or if **ATZ** is executed.

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

Parameter

<n>	Integer type.

0	Profile number to store current AT command settings.

NOTE

Executing **AT&W[<n>]** writes data to NVM. Please proceed with caution.

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** (See ***Chapter 13.4***).

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. 0 Reset to profile number 0.

2.14. ATQ Set Result Code Presentation Mode

This command controls whether the result code is transmitted to 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 result code is transmitted to TE.	
	0	Result code is transmitted
	1	Result code is suppressed and not transmitted

2.15. ATV MT Response Format

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

The numeric equivalents and brief descriptions of results codes 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 4: Numeric Equivalents and Brief Descriptions of ATV0&ATV1 Result Codes

ATV1	ATV0	Description
OK	0	Acknowledge of a command execution.
CONNECT	1	A connection has been established. DCE is switching from command mode to data mode.
RING	2	DCE has detected an incoming call signal from network.
NO CARRIER	3	A connection has been terminated or an attempt to establish a connection fails.
ERROR	4	Command not recognized due to exceeding command line maximum length, invalid parameter value, or other processing issues.
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 connection timer expired (S7).

2.16. ATE Set Command Echo Mode

This command controls whether TA echoes characters received from TE in 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 characters received from TE.	
	0	Echo mode OFF
	1	Echo mode ON

2.17. A/ Repeat Previous Command Line

This command repeats the 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                                    //Deliver the MT identification information text.
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 that terminates an incoming command line, which is recognized by TA. It is also generated by the module 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 editing character used by TA to delete the immediately preceding character from the command line, i.e., the 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 a dial tone when initiating a call and an engaged tone (i.e., 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, with both dial tone and busy detection disabled. 1 Only **CONNECT<text>** is returned, with both dial tone and busy detection disabled. 2 **CONNECT<text>** is returned, with dial tone detection enabled, and busy detection disabled. 3 **CONNECT<text>** is returned, with dial tone detection disabled, and busy detection enabled. 4 **CONNECT<text>** is returned, with both dial tone and busy detection enabled.

2.22. AT+CFUN Set UE Functionality

This command controls UE functionality level. It can also be used for resetting 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	Response

AT+CFUN=<fun>[,<rst>]	**OK** If there is any error: **+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
	1	Full functionality
	4	Disable both transmitting and receiving RF signal
<rst>	Integer type. Whether to reset UE.	
	0	Do not reset 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 code. For more details, see ***Chapter 13.5***.	

NOTE

When the module searches or registers the network, it may write data to NVM if executing **AT+CFUN=1**. Please proceed with caution.

Example

```
AT+CFUN=0                    //Switch UE to minimum functionality.
OK
AT+COPS?                     //Read command.
+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                                  //Enter PIN.
OK

+CPIN: READY

+QUSIM: 1

+QIND: PB DONE

+QIND: SMS DONE
AT+CPIN?                                      //Read command.
+CPIN: READY

OK
AT+COPS?                                      //Read command.
+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 for errors. When enabled, errors will trigger **+CME ERROR: <err>** final result code instead of **ERROR**.

AT+CMEE Error Message Format	
Test Command **AT+CMEE=?**	Response **+CMEE: (**range of supported **<n>**s**)** **OK**
Read Command **AT+CMEE?**	Response **+CMEE: <n>** **OK**
Write Command **AT+CMEE=[<n>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<n>	Integer type. Whether to enable result code. 0 Disable result code and use **ERROR** instead. 1 Enable result code and use numeric values. 2 Enable result code and use verbose values.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

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

2.24. AT+CSCS Select TE Character Set

This command informs the module of the character set used by TE. This enables 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** Or **ERROR**

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?                          //Query the current character set.
+CSCS: "UCS2"                     //The character set is UCS2 after the configuration.

OK
```

2.25. AT+QURCCFG Configure URC Indication Option

This command configures URC output port.

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 setting: **+QURCCFG: "urcport",<URC_port_value>** **OK**

	If the optional parameter is specified, set URC output port: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is 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

NOTE

Executing **AT+QURCCFG="urcport",<URC_port_value>** writes data to NVM. Please proceed with caution.

Example

```
AT+QURCCFG=?                          //Test command.
+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"                  //Query the current configuration of URC output port.
+QURCCFG: "urcport","usbmodem"

OK
```

3 Status Control Commands

3.1. AT+CPAS ME Activity Status

This command queries the activity status of ME.

AT+CPAS ME 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 ME: **+CPAS: <pas>** **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<pas>	Integer type. ME activity status. 0 Ready 3 Ringing 4 Call in progress or call on hold
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

```
AT+CPAS                                  //Execution command.
+CPAS: 0                                 //ME is ready.

OK
RING
AT+CLCC                                  //Execution command.
+CLCC: 1,1,4,0,0,"15695519173",161

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

OK
AT+CLCC                                  //Execution command.
+CLCC: 1,0,0,0,0,"10010",129

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

OK
```

3.2. AT+CEER Extended Error Report

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

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

The release cause **<text>** is a text that describes the cause information provided by the network.

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

	If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<text>	Release cause text. Reason for the last call-related failure, see ***Chapter 13.9*** for details. Both CS and PS domain call types are reported. Cause data is captured from call manager events and cached locally for later use by this command.
<err>	Error code. For more details, see ***Chapter 13.5***.

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",(**range 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: "usbnet",(**range of supported **<net>**s**)** **+QCFG: "usbspeed",(**list of supported **<speed>**s**)** **+QCFG: "urc/ri/ring",(**list of supported **<typeri>**s**),(**range of supported **<pulse_duration>**s**),(**range of supported **<active_duration>**s**), (**range of supported **<inactive_duration>**s**),(**list of supported **<ring_no_disturbing>**s**),(**range of supported **<pulse_count>**s**)** **+QCFG: "urc/ri/smsincoming",(**list of supported **<typeri>**s**),(**range of supported **<pulse_duration>**s**),(**range of supported **<pulse_count>**s**)** **+QCFG: "urc/ri/other",(**list of supported **<typeri>**s**),(**range of supported **<pulse_duration>**s**),(**range of supported

	<pulse_count>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 setting: **+QCFG: "hsdpacat",<cat>** **OK** If the optional parameter is specified, set the HSDPA category: **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<cat>	Integer type. HSDPA category.	
	6	Category 6
	8	Category 8
	10	Category 10
	12	Category 12
	14	Category 14
	18	Category 18
	20	Category 20
	24	Category 24
<err>	Error code. For more details, see ***Chapter 13.5***.	

NOTE

Executing **AT+QCFG="hsdpacat",<cat>** writes data to NVM. Please proceed with caution.

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** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<cat>	Integer type. HSUPA category. 5 Category 5 6 Category 6 7 Category 7 8 Category 8
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

Executing **AT+QCFG="hsupacat",<cat>** writes data to NVM. Please proceed with caution.

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 setting: **+QCFG: "rrc",<rrcr>** **OK** If the optional parameter is specified, set the RRC release version: **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<rrcr>	Integer type. RRC release version. 0 R99 1 R5 2 R6 3 R7 4 R8 5 R9
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

Executing **AT+QCFG="rrc",<rrcr>** writes data to NVM. Please proceed with caution.

3.3.4. AT+QCFG="pdp/duplicatechk" Establish Multi PDNs With a Single APN

This command allows or refuses establishing multi PDNs with a single APN profile.

AT+QCFG="pdp/duplicatechk" Establish Multi PDNs With a Single APN	
Write Command **AT+QCFG="pdp/duplicatechk"[,<enable>]**	Response If the optional parameter is omitted, query the current setting: **+QCFG: "pdp/duplicatechk",<enable>** **OK** If the optional parameter is specified, allow or refuse establishing multiple PDNs with a single APN profile: **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<enable>	Integer type. 0 Refuse to establish multi PDNs with a single APN profile 1 Allow to establish multi PDNs with a single APN profile
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

Executing **AT+QCFG="pdp/duplicatechk",<enable>** writes data to NVM. Please proceed with caution.

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"[,<risignatype>]**	Response If the optional parameter is omitted, query the current setting: **+QCFG: "risignaltype",<risignatype>** **OK** If the optional parameter is specified, set the RI signal output carrier: **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<risignaltype>	String type. RI signal output carrier.	
	"respective"	The ring indicator behaves according to the port where URC is presented. If URC is presented on UART port, it acts as a physical ring indicator. If on USB port, it acts as a virtual ring indicator. If on USB AT port which does not support a ring indicator, then there is no ring indicator. Use **AT+QURCCFG="urcport"** to determine the port on which URC is presented, see ***Chapter 2.25***.
	"physical"	Regardless of the port where URC is presented, it only affects the behavior of physical ring indicator.
<err>	Error code. For more details, see ***Chapter 13.5***.	

NOTE

Executing **AT+QCFG="risignaltype",<risignatype>** writes data to NVM. Please proceed with caution.

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 setting: **+QCFG: "data_interface",<network>,<diag>** **OK** If the optional parameters are specified, set the network port/diagnostic port communication via USB/PCIe interface: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configurations are saved automatically.

Parameter

<network>	Integer type. 0 Set the network port communication via USB interface. 1 Set the network port communication via PCIe interface. See note 3.
<diag>	Integer type. 0 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.
2. If the network port is set to communicate via the USB interface, the PCIe interface is disabled, i.e., no AT port or diagnostic port communicates via the PCIe interface.
3. PCIe switching with **AT+QCFG="data_interface"** is only possible when the host has an ARM system and the USB interface of the module is connected to the host.
4. PCIe switching through eFuse supports firmware upgrading when the host is connected via the PCIe interface. However, PCIe switching via **AT+QCFG="data_interface"** does not support PCIe-

based upgrading, ensure to use the USB interface for firmware upgrading.
5. When rebooting the module (For example: 5 seconds after upgrading firmware via FOTA or host connection), ensure to synchronously reboot both the host and module while maintaining the same power-on time sequence as during the first initialization.
6. It is not recommended to execute **AT+CFUN=1,1** to restart the module with the PCIe interface, as it may cause the PCIe initialization time sequence errors, resulting in PCIe interface initialization failure. It is recommended to restart the module by hardware method instead.
7. If the module or the host restarts, ensure that the PCIe interface initializes correctly in the proper time sequence.

Example

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

OK
AT+QCFG="data_interface",1,0    //Set the network port communication via PCIe interface, and
                                diagnostic port communication via USB interface, enabling AT
                                commands to communicate via both interfaces.
OK
```

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 setting: **+QCFG: "pcie/mode",<mode>** **OK** If the optional parameter is specified, set PCIe RC/EP mode: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<mode>	Integer type. PCIe RC or EP mode. 0 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        //Set PCIe RC/EP mode to PCIe RC mode.
OK
```

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

This command sets USB speed mode when the device is inserted in a USB 3.0 (USB 3.1 Gen 1/USB 3.1 Gen 2) port.

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

Parameter

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

Example

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

OK
AT+QCFG="usbspeed","20"             //Set USB speed mode to USB 2.0 high speed, 480 Mbps.
OK
```

3.3.9. AT+QCFG="usbnet" Configure NIC Data Call Method

This command configures NIC data call method in USB NIC mode.

AT+QCFG="usbnet" Configure NIC Data Call Method	
Test Command **AT+QCFG=?**	Response **…** **+QCFG: "usbnet",(**range of supported **<net>**s**)** **…** **OK**
Write Command **AT+QCFG="usbnet"[,<net>]**	Response If the optional parameter is omitted, query the current configuration: **+QCFG: "usbnet",<net>** **OK** If the optional parameter is specified, set the NIC data call method in USB NIC mode: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	This command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<net>	Integer type. NIC data call method in USB NIC mode. 0 RMNET 1 ECM

	2	MBIM
	3	RNDIS

Example

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

OK
AT+QCFG="usbnet",1        //Set the NIC data call method to ECM
OK
```

3.3.10. AT+QCFG="urc/ri/ring" Set RI Behavior for URC RING

AT+QCFG="urc/ri/ring", **AT+QCFG="urc/ri/smsincoming"** (***Chapter 3.3.11***) and **AT+QCFG="urc/ri/other"** (***Chapter 3.3.12***) control the RI (ring indicator) behavior when a URC is reported. These configurations will be stored into NV automatically.

The ring indicator is active low. **AT+QCFG="urc/ri/ring"** specifies the RI behavior when URC **RING** is reported to indicate an incoming call.

The sum of **<active_duration>** and **<inactive_duration>** determines the interval of URC **RING** for an incoming call.

AT+QCFG="urc/ri/ring" Set RI Behavior for URC RING	
Write Command **AT+QCFG="urc/ri/ring"[,<typeri>[,<pulse_duration>[,<active_duration>[,<inactive_duration>[,<ring_no_disturbing>[,<pulse_count>]]]]]]**	Response If the optional parameters are omitted, query the current setting: **+QCFG: "urc/ri/ring",<typeri>,<pulse_duration>,<active_duration>,<inactive_duration>,<ring_no_disturbing>,<pulse_count>** **OK** If any of the optional parameters is specified, set the RI behavior when **RING** URC is reported: **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms

Characteristics	The command takes effect immediately. The configurations are saved automatically.

Parameter

<typeri>	String type. RI behavior when URC **RING** is reported. "off" No change. Ring indicator keeps inactive. "pulse" Pulse. Pulse width is determined by **<pulse_duration>**. "always" Change to active. "auto" When URC **RING** is presented to indicate an incoming call, the ring indicator changes to active and remains active. Answering or hanging up the incoming call changes the ring indicator state to inactive. "wave" When URC **RING** is reported to indicate an incoming call, the ring indicator outputs a square wave. Both **<active_duration>** and **<inactive_duration>** are used for setting the square wave parameters. Answering or hanging up the incoming call changes the ring indicator to inactive.
<pulse_duration>	Integer type. Pulse width. Range: 1–2000. Default value: 120. Unit: ms. This parameter is only valid when **<typeri>** is "pulse". If this parameter is not needed, it can be set as null.
<active_duration>	Integer type. Active duration of square wave. Range: 1–10000. Default value: 1000. Unit: ms. This parameter is only valid when **<typeri>** is "wave".
<inactive_duration>	Integer type. Inactive duration of square wave. Range: 1–10000. Default value:5000. Unit: ms. This parameter is only valid when **<typeri>** is "wave".
<ring_no_disturbing>	String type. Whether the ring indicator behavior can be affected. This parameter is only valid when **<typeri>** is configured as "auto" or "wave". For example, when **<typeri>** is "wave", if the square wave should not be affected by other URCs (including SMS-related URCs), then **<ring_no_disturbing>** should be set to "on". "off" RI behavior can be affected by other URCs when it is triggered by an incoming call ringing. "on" RI behavior cannot be affected by other URCs when it is triggered by an incoming call ringing.
<pulse_count>	Integer type. Pulse count. Range: 1–5. Default value: 1. This parameter is only valid when **<typeri>** is "pulse". Interval between two pulses equals **<pulse_duration>**.
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

Executing **AT+QCFG="urc/ri/ring",<typeri>[,<pulse_duration>[,<active_duration>[,<inactive_duration>[,<ring_no_disturbing>[,<pulse_count>]]]]]** writes data to NVM. Please proceed with caution.

3.3.11. AT+QCFG="urc/ri/smsincoming" Set RI Behavior for Incoming SMS URCs

This command specifies the RI (ring indicator) behavior when related incoming message URC is presented. Related incoming message URCs list: **+CMTI**, **+CMT**, **+CDS** and **+CBM**. See ***Chapter 13.7***.

AT+QCFG="urc/ri/smsincoming" Set RI Behavior for Incoming SMS URCs	
Write Command **AT+QCFG="urc/ri/smsincoming"[,<typeri>[,<pulse_duration>[,<pulse_count>]]]**	Response If the optional parameters are omitted, query the current setting: **+QCFG: "urc/ri/smsincoming",<typeri>,<pulse_duration>,<pulse_count>** **OK** If any of the optional parameters is specified, set the RI behavior for incoming SMS URCs: **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.

Parameter

<typeri>	String type. RI behavior for incoming SMS URCs. "off" No change. Ring indicator remains inactive. "pulse" Pulse. Pulse width is determined by **<pulse_duration>**. "always" Change to active.
<pulse_duration>	Integer type. Pulse width. Range: 1–2000. Default value: 120. Unit: ms. This parameter is only valid when **<typeri>** is "pulse".
<pulse_count>	Integer type. Pulse count. Range: 1–5. Default value: 1. This parameter is only valid when **<typeri>** is "pulse". Interval between two pulses equals **<pulse_duration>**.
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

Executing **AT+QCFG="urc/ri/smsincoming",<typeri>[,<pulse_duration>[,<pulse_count>]]** writes data to NVM. Please proceed with caution.

3.3.12. AT+QCFG="urc/ri/other" Set RI Behavior for Other URCs

This command specifies the RI (ring indicator) behavior when other URCs are reported.

AT+QCFG="urc/ri/other" Set RI Behavior for Other URCs	
Write Command **AT+QCFG="urc/ri/other"[,<typeri>[,<pulse_duration>[,<pulse_count>]]]**	Response If the optional parameters are omitted, query the current setting: **+QCFG: "urc/ri/other",<typeri>,<pulse_duration>,<pulse_count>** **OK** If any of the optional parameters is specified, set the RI behavior for other URCs: **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.

Parameter

<typeri>	String type. RI behavior for other URCs. "off" No change. Ring indicator remains inactive. "pulse" Pulse. Pulse width is determined by **<pulse_duration>**.
<pulse_duration>	Integer type. Pulse width. Range: 1–2000. Default value: 120. Unit: ms. This parameter is valid only when **<typeri>** is "pulse".
<pulse_count>	Integer type. Pulse count. Range: 1–5. Default value: 1. This parameter is only valid when **<typeri>** is "pulse". Interval between two pulses equals **<pulse_duration>**.
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

Executing **AT+QCFG="urc/ri/other",<typeri>[,<pulse_duration>[,<pulse_count>]]** writes data to NVM. Please proceed with caution.

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 any of the optional parameters is specified, set the URC indication configurations: **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
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"	URC master switch. Default: ON.

	"csq"	Indication of signal strength and channel bit error rate change (similar to **AT+CSQ**, see ***Chapter 5.9***). Default: OFF. If set to ON, **+QIND: "csq",<rssi>,<ber>** is present.
	"smsfull"	SMS storage full indication. Default: OFF. If set to ON, **+QIND: "smsfull",<storage>** is present.
	"ring"	**RING** indication. Default: ON.
	"smsincoming"	Incoming message indication. Default: ON. Related URC list: **+CMTI**, **+CMT**, **+CDS**
	"act"	Indication of network access technology change. Default: OFF. If set to ON, **+QIND: "act",<actvalue>** is present immediately. Only when the network access technology changes, a new URC is reported. **<actvalue>** is a string type value. Its values are listed below: "WCDMA" "HSDPA" "HSUPA" "HSDPA&HSUPA" "LTE" "UNKNOWN" (MT not registered on network) URC examples: **+QIND: "act","HSDPA&HSUPA"** **+QIND: "act","UNKNOWN"**
<enable>	Integer type. URC indication is ON or OFF. 0 OFF 1 ON	
<savetonvram>	Integer type. Whether to save configuration into NVM. 0 Do not save 1 Save	
<err>	Error code. For more details, see ***Chapter 13.5***.	

NOTE

Executing **AT+QINDCFG=<URC_type>,<enable>,1** writes data to NVM. Please proceed with caution.

4 (U)SIM-Related Commands

4.1. AT+CIMI Request IMSI

This command requests the IMSI (International Mobile Subscriber Identity), which is intended to permit TE to identify the individual (U)SIM card or active application in 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 TA returns **<IMSI>** for identifying the individual (U)SIM attached to the module. **<IMSI>** **OK** If there is any error : **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<IMSI>	String type without double quotes. International mobile subscriber identity.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

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

OK
```

4.2. AT+ICCID Get ICCID

This command returns ICCID (Integrated Circuit Card ID) if a (U)SIM card is inserted.

AT+ICCID Query ICCID	
Test Command **AT+ICCID=?**	Response **OK**
Execution Command **AT+ICCID**	Response **+ICCID: <ICCID>** **OK** If there is any error: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<ICCID>	String type without double quotes. ICCID of (U)SIM card.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

```
AT+ICCID                          //Query ICCID of (U)SIM card.
+ICCID: 89148000000000000002

OK
```

4.3. AT+CLCK Facility Lock

This command locks/unlocks or interrogates a MT or a network facility **<fac>**. Normally such actions require a password. When querying the status of a network service (**<mode>**=2), the response line for "not active" case (**<status>**=0) should be returned only if the 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 executed successfully: **OK** If **<mode>**=2 and the command is executed successfully: **+CLCK: <status>[,<class>]** **[+CLCK: <status>[,<class>]]** **[…]** **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. The configurations are 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 requests the password at MT power-up and when this lock command is issued).
	"AO"	BAOC (Barr All Outgoing Calls, see *3GPP TS 22.088*).
	"OI"	BOIC (Barr Outgoing International Calls, see *3GPP TS 22.088*).
	"OX"	BOIC-exHC (Barr Outgoing International Calls except to Home Country, see *3GPP TS 22.088*).
	"AI"	BAIC (Barr All Incoming Calls, see *3GPP TS 22.088*).
	"IR"	BIC-Roam (Barr 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 UICC (GSM or (U)SIM) fixed dialing

		memory feature (if SIM PIN2 authentication has not been performed during the current session, SIM PIN2 is required as **<password>**. See ***Chapter 4.4*** for details about SIM PIN2).
	"PF"	Lock Phone to the very first inserted (U)SIM/UICC card (also referred in the present document as PH-FSIM). MT requests a 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. Operation mode.	
	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

NOTE

When **<mode>** is not 2, executing **AT+CLCK=<fac>,<mode>[,<password>[,<class>]]** writes data to NVM. Please proceed with caution.

Example

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

OK
AT+CLCK="SC",1,"1234"           //Lock (U)SIM card. Password: 1234.
OK
AT+CLCK="SC",2                  //Query (U)SIM card status.
+CLCK: 1                        //(U)SIM card is locked (ON).
```

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

4.4. AT+CPIN Enter PIN

This command sends to the MT a password that is necessary before it can be operated, or queries whether MT requires a password before it can be operated. The password may be (U)SIM PIN, (U)SIM PUK (PIN Unlocking Key), PH-SIM PIN, etc.

AT+CPIN Enter PIN	
Test Command **AT+CPIN=?**	Response **OK**
Read Command **AT+CPIN?**	Response MT returns an alphanumeric string indicating if a password is required. **+CPIN: <code>** **OK** If there is any error related to MT functionality: **+CME ERROR: <err>**
Write Command **AT+CPIN=<pin>[,<new_pin>]**	Response MT stores a password, such as (U)SIM PIN, (U)SIM PUK, required to operate it. If the PIN is to be entered twice, MT automatically repeats 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 pin is required. The second PIN **<new_pin>** replaces the old pin in the (U)SIM. **OK** If there is any error: **+CME ERROR: <err>**
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. The configurations are saved automatically.
Reference *3GPP TS 27.007*	

Parameter

<code>	String type without double quotes.	
	READY	MT is not pending for any password
	SIM PIN	MT is waiting for (U)SIM PIN
	SIM PUK	MT is waiting for (U)SIM PUK
	SIM PIN2	MT is waiting for (U)SIM PIN2
	SIM PUK2	MT is waiting for (U)SIM PUK2
	PH-NET PIN	MT is waiting for network personalization password
	PH-NET PUK	MT is waiting for network personalization unlocking password
	PH-NETSUB PIN	MT is waiting for network subset personalization password
	PH-NETSUB PUK	MT is waiting for network subset personalization unlocking password
	PH-SP PIN	MT is waiting for service provider personalization password
	PH-SP PUK	MT is waiting for service provider personalization unlocking password
	PH-CORP PIN	MT is waiting for corporate personalization password
	PH-CORP PUK	MT is waiting for corporate personalization unlocking password
<pin>	String type. Password. If the requested password is a PUK, such as (U)SIM PUK, (U)SIM PUK2, etc., then **<pin>** must be followed by **<new_pin>**.	
<new_pin>	String type. A second PIN to replace the old PIN in (U)SIM.	
<err>	Error code. For more details, see ***Chapter 13.5***.	

Example

```
//Enter PIN
AT+CPIN?                        //Whether or not a password is required.
+CPIN: SIM PIN                  //Waiting for (U)SIM PIN to be entered.

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?                        //Whether or not a password is required.
+CPIN: SIM PUK                  //Waiting for (U)SIM PUK to be entered.

OK
```

AT+CPIN="26601934","1234"	//Enter PUK and the new password.
OK	
+CPIN: READY	
AT+CPIN?	//Whether or not a password is required.
+CPIN: READY	//PUK has already been entered.
OK	

4.5. 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 that present the available facilities and the maximum length of their passwords. **+CPWD:** list of supported **(<fac>,<pwdlength>)**s **OK**
Write Command **AT+CPWD=<fac>,<oldpwd>,<newpwd>**	Response **OK** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	5 s
Characteristics	The command takes effect immediately. The configurations are saved automatically.
Reference *3GPP TS 27.007*	

Parameter

<fac>	String type. Facility lock type. "SC" (U)SIM (lock (U)SIM/UICC card inserted in the currently selected card slot) (U)SIM/UICC requests the password at MT power-up and when this lock command is issued). "AO" BAOC (Barr All Outgoing Calls, see *3GPP TS 22.088*).

	"OI"	BOIC (Barr Outgoing International Calls, see *3GPP TS 22.088*).
	"OX"	BOIC-exHC (Barr Outgoing International Calls except to Home Country, see *3GPP TS 22.088*).
	"AI"	BAIC (Barr All Incoming Calls, see *3GPP TS 22.088*).
	"IR"	BIC-Roam (Barr 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 UICC (GSM or (U)SIM) fixed dialing memory feature (if SIM PIN2 authentication has not been performed during the current session, SIM PIN2 is required as **<password>**. See ***Chapter 4.4*** for details about SIM PIN2).
	"PF"	Lock Phone to the very first inserted (U)SIM/UICC card (also referred in the present document as PH-FSIM). MT requests a 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*).
<pwdlength>	Integer type. Maximum password length.	
<oldpwd>	String type. Password specified for the facility from the user interface or with command.	
<newpwd>	String type. New password.	
<err>	Error code. For more details, see ***Chapter 13.5***.	

Example

```
AT+CPIN?                                  //Whether or not a password is required.
+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 entered.
+CPIN: SIM PIN

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

+CPIN: READY
```

4.6. AT+CSIM Generic (U)SIM Access

This command allows a direct control of the (U)SIM inserted in the selected card slot by a remote 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** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.
Reference *3GPP TS 27.007*	

Parameter

<length>	Integer type. Length of **<command>** or **<response>**. Unit: byte.
<command>	String type in hexadecimal format. Command transferred by the MT to the (U)SIM in the format described in *3GPP TS 51.011*.
<response>	String type in hexadecimal format. Response to the command transferred by the (U)SIM to the MT in the format described in *3GPP TS 51.011*.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

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

OK
```

4.7. AT+CRSM Restricted (U)SIM Access

This command offers easy and limited access to the (U)SIM database. It transmits the (U)SIM command number **<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** If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not 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 passed on by the MT to the (U)SIM. These parameters are mandatory for every command, except GET RESPONSE and STATUS. Their values are described in *3GPP TS 51.011*.
<data>	String type in hexadecimal format. Information to be written to the (U)SIM. See **AT+CSCS** in ***Chapter 2.24***.
<pathId>	String type in hexadecimal format. Directory path of an elementary file on a

	(U)SIM/UICC.
<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>	String type in hexadecimal format. Response of a successful completion of the previously issued command. See **AT+CSCS** in ***Chapter 2.24***. STATUS and GET RESPONSE return data, which gives information about the current elementary data field. The information includes the type and size of the file (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 code. For more details, see ***Chapter 13.5***.

Example

```
AT+CRSM=?
OK
AT+CRSM=242
+CRSM:  144,0,"623A8202782183027FF08410A0000000871002FF86FFFF89FFFFFFFF8A01058B032
F0601C6129001788301018301818301 0A83010B83010C81026DA7"

OK
AT+CRSM=242,80,01,01,12
+CRSM: 144,0,"8410A0000000871002FF86FF"

OK
```

4.8. AT+CCHO Open Logical Channel

This command opens a logical channel. **<sessionid>** is to be used when you send commands with generic UICC logical channel access **AT+CGLA** (see ***Chapter 4.10***).

AT+CCHO Open Logical Channel	
Test Command **AT+CCHO=?**	Response **OK**
Write Command **AT+CCHO=<dfname>**	Response **+CCHO: <sessionid>** **OK** If there is any error:

	+CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.
Reference *3GPP TS 31.101*	

Parameter

<sessionid>	Integer type. A session ID to be used to target a specific application on the smart card, e.g. (U)SIM, WIM, iSIM, using the logical channel mechanism.
<dfname>	String Type. All selectable applications in the UICC referenced by a DF name coded on 1 to 16 bytes.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

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

OK
```

4.9. AT+CCHC Close Logical Channel

This command asks ME to close a communication session with the active UICC, then ME will close the previously opened logical channel, and TE will no longer be able to send commands on this logical channel. UICC closes the logical channel after 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 is not saved.

Reference *3GPP TS 31.101*	

Parameter

<sessionid>	Integer type. A session ID to be used to target a specific application on the smart, card, e.g. (U)SIM, WIM, iSIM, using logical channel mechanism.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

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

4.10. AT+CGLA Generic UICC Logical Channel Access

This command allows a direct control of the currently selected UICC by a remote application on TE. TE will process 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** If there is any error: **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are not saved.
Reference *3GPP TS 31.101*	

Parameter

<sessionid>	Integer type. Identifier of the session used to send the APDU commands to the UICC. It is mandatory 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>	String type in hexadecimal character format. Command passed on by the MT to the UICC as described in *3GPP TS 31.101*. See **AT+CSCS** in ***Chapter 2.24***.
<response>	String type in hexadecimal character format. Response to the command passed on by the UICC to the MT in the format as described in *3GPP TS 31.101*. See **AT+CSCS** in ***Chapter 2.24***.
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

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

Example

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

OK
```

4.11. 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 If there is any error: **+CME ERROR: <err>** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<facility>	String type. "SC" (U)SIM PIN "P2" (U)SIM PIN2
<pincounter>	Integer type. Number of attempts left to enter PIN.
<pukcounter>	Integer type. Number of attempts left to enter PUK.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

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

OK
```

4.12. 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 states (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
```

4.13. AT+QSIMDET (U)SIM Card Detection

This command enables or disables (U)SIM card detection. (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 configurations are saved automatically.

Parameter

<enable>	Integer type. Enable or disable (U)SIM card detection. 0 Disable 1 Enable
<insert_level>	Integer type. Level of (U)SIM card detection pin when a (U)SIM card is inserted. 0 Low level 1 High level

NOTE

1. (U)SIM card detection is invalid if the configured value of **<insert_level>** is inconsistent with hardware design.
2. The configuration of **<insert_level>** is valid only when (U)SIM card detection is enabled.
3. Executing **AT+QSIMDET=<enable>,<insert_level>** writes data to NVM. Please proceed with caution.

Example

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

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

<Insert (U)SIM card>
+CPIN: READY
```

4.14. 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 configuration is saved automatically.

Parameter

<enable>	Integer type. Enable or disable (U)SIM insertion 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. (U)SIM card insertion status. 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?                //Query (U)SIM card insertion status.
+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?                //Query (U)SIM card insertion status.
```

+QSIMSTAT: 1,0

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

+CPIN: READY

NOTE

Executing **AT+QSIMSTAT=<enable>** writes data to NVM. Please proceed with caution.

4.15. AT+QUIMSLOT Switch (U)SIM Slot

This command queries the slot currently used by the (U)SIM and configures the (U)SIM slot to be used.

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 configuration is saved automatically.

Parameter

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

NOTE

Executing **AT+QUIMSLOT=<slot>** writes data to NVM. Please proceed with caution.

Example

```
AT+QUIMSLOT?            //Query currently used (U)SIM slot.
+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 information about the current operators and their status, and allows automatic or manual network selection.

The Test Command returns a set or sets of five parameters, each set representing an operator present 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 network registration/deregistration 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 Command (**AT+COPS?**).

AT+COPS Operator Selection	
Test Command **AT+COPS=?**	Response **+COPS: [**list of supported **(<stat>,**long alphanumeric **<oper>,**short alphanumeric **<oper>,**numeric **<oper> [,<AcT>])**s**][,,(**range of supported **<mode>**s**),(**range of supported **<format>**s**)]** **OK** If there is any error: **+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** Or **+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>** is optional) 2 Deregistration 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 the Read Command. 4 Manual/automatic selection (**<oper>** field shall be present). If manual selection fails, automatic mode (**<mode>**=0) is entered.
<format>	Integer type. Format of **<oper>.** 0 Long format alphanumeric **<oper>** up to 16 characters. 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 the Read Command while MS is in data service state, and they are not intended for the Write Command of **AT+COPS**. 2 UTRAN 4 UTRAN W/HSDPA 5 UTRAN W/HSUPA 6 UTRAN W/HSDPA and HSUPA 7 E-UTRAN 10 E-UTRAN connected to 5GCN 11 NR connected to 5GCN 12 NG-RAN 13 E-UTRAN-NR dual connectivity
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

1. When selecting 5G SA network, **<AcT>** should be set to 12, and when registering 5G SA network, **<AcT>** returned by **AT+COPS?** is 11.
2. Executing **AT+COPS=<mode>[,<format>[,<oper>[,<AcT>]]]** writes data to NVM. Please proceed with caution.

Example

```
AT+COPS=?                                   //List all network operators present in the network.
+COPS: (1,"CHN-UNICOM","UNICOM","46001",2),(1,"CHN-UNICOM","UNICOM","46001",12),(3,"CHINA 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 presentation of URC (Unsolicited Result Code) 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 return an URC or not and controls the presentation of URC **+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: **+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 URC
	1	Enable network registration URC: **+CREG: <stat>**
	2	Enable network registration and location information URC: **+CREG: <stat>[,<lac>,<ci>[,<AcT>]]**
<stat>	Integer type. Circuit mode registration status.	
	0	Not registered. MT is not currently searching a new operator to register to.
	1	Registered. Home network.
	2	Not registered. MT is currently searching a new operator to register to.
	3	Registration denied.
	4	Unknown
	5	Registered. Roaming.
<lac>	String type in hexadecimal format. Two-byte location area code.	
<ci>	String type in hexadecimal format. 28-bit (UMTS/LTE) cell ID.	
<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 5GCN (not supported currently)
	11	NR connected to 5GCN (not supported currently)
	12	NG-RAN (not supported currently)
	13	E-UTRAN-NR dual connectivity
<err>	Error code. For more details, see ***Chapter 13.5***.	

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 PS Network Registration Status

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

AT+CGREG PS Network Registration Status	
Test Command **AT+CGREG=?**	Response **+CGREG: (**list of supported **<n>**s**)** **OK**
Read Command **AT+CGREG?**	Response **+CGREG: <n>,<stat>[,[<lac>],[<ci>],[<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 URC. 1 Enable network registration URC: **+CGREG:<stat>** 2 Enable network registration and location information URC **+CGREG: <stat>[,[<lac>],[<ci>],[<AcT>],[<rac>]]**
<stat>	Integer type. 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. 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>	String type. 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 URC **+CEREG: <stat>** when **<n>**=1 and there is a change in the MT's EPS network registration status in E-UTRAN, or URC **+CEREG: <stat>[,[<tac>],[<ci>],[<AcT>]]** when **<n>**=2 and there is a change of the network cell in E-UTRAN.

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 URC 1 Enable network registration URC **+CEREG:<stat>** 2 Enable network registration and location information URC **+CEREG: <stat>[,[<tac>],[<ci>],[<AcT>]]**
<stat>	Integer type. 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.

It also controls the presentation of 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 when the network provides an allowed NSSAI. The parameters **<AcT>**, **<tac>**, **<ci>**, **<Allowed_NSSAI_length>** and **<Allowed_NSSAI>** are included 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 URC
- 1 Enable network registration URC **+C5GREG:<stat>**
- 2 Enable network registration and location information URC **+C5GREG: <stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>]]**

<stat> Integer type. NR registration status.
- 0 Not registered. MT is currently not searching an operator to registerto.
- 1 Registered. Home network.
- 2 Not registered. 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 5GCN
- 11 NR connected to 5GCN

<Allowed_NSSAI_length> Integer type. Number of octets of the **<Allowed_NSSAI>** information element.

<Allowed_NSSAI> String type in hexadecimal format. Depending on 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. **<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 is not subject to conventional character conversion as per **AT+CSCS**.

<S-NSSAI> String type in hexadecimal character format. Depending on 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 is not subject to conventional character conversion as per **AT+CSCS**.
The parameter takes one of the following 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.

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 Context

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 **<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 Context	
Test Command **AT+CGDCONT=?**	Response **+CGDCONT: (**range of supported **<cid>**s**),<PDP_type>,<APN>,<PDP_addr>,(**list of supported **<d_comp>**s**),(**list of supported **<h_comp>**s**)[,(**list of supported **<IPv4AddrAlloc>**s**)[,(**list of supported **<request_type>**s**)[,(**list of supported **<SSC_mode>**s**)[,(**list of supported **<S-NSSAI>**s**)[,(**list of supported **<Pref_access_type>**s**)[,(**list of supported **<Always-on_req>**s**)]]]]]]** **OK**

Read Command **AT+CGDCONT?**	Response **+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<request_type>,,,,,,,,[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>,,[,<Always-on_req>]]]]]]** **[…]** **OK**
Write Command **AT+CGDCONT=[<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4AddrAlloc>[,<request_type>,,,,,,,,[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>,,[,<Always-on_req>]]]]]]]]]]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.
Reference *3GPP TS 27.007*	

Parameter

<cid>	Integer type. PDP context identifier, which specifies a particular PDP context definition. Range: 1–42. The parameter is local to the TE-MT interface and is used in other PDP context-related commands.
<PDP_type>	String type. Packet data protocol type. "IP" IPv4. Internet protocol (see IETF STD 5) "PPP" Point to Point protocol (see IETF STD 51) "IPV6" Internet protocol, version 6 (see RFC 2460) "IPV4V6" Virtual **<PDP_type>** 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 GGSN or the external packet data network. If the value is null or omitted, the subscription value will be requested.
<PDP_addr>	String type. It identifies the MT in the address space applicable to the PDP. If the value is null or omitted, 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 **AT+CGPADDR** (see ***Chapter 9.4***).
<d_comp>	Integer type. It controls PDP data compression (applicable for SNDCP only) (see *3GPP TS 44.065*). 0 Off 2 V.42bis

<h_comp>	Integer type. It controls PDP header compression (see *3GPP TS 44.065 and 3GPP TS 25.323*). 0 Off 4 RFC3095
<IPv4AddrAlloc>	Integer type. It controls how the MT/TA requests to get the IPv4 address information. 0 IPv4 address allocation through NAS signaling 1 IPv4 address allocated through DHCP
<request_type>	Integer type. Type of PDP context activation request. 0 PDP context is for a new PDP context establishment or for a handover from a non-3GPP access network (how the MT decides whether the PDP context is for a new PDP context establishment or for a handover is implementation specific). 1 PDP context is for emergency bearer services.
<SSC_mode>	Integer type. It indicates the session and service continuity (SSC) mode for the PDU session in 5GS, see *3GPP TS 23.501*. 0 PDU session is associated with SSC mode 1 1 PDU session is associated with SSC mode 2 2 PDU session is associated with SSC mode 3
<S-NSSAI>	String type in hexadecimal character format. Depending on 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 is not subject to conventional character conversion as per **AT+CSCS**. The parameter takes one of the following 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. Preferred access type for the PDU session in 5GS. See *3GPP TS 23.501*and *3GPP TS 24.501*. 0 Preferred access type is 3GPP access 1 Preferred access type is non-3GPP access
<Always-on_req>	Integer type. It indicates whether the UE requested to establish the PDU session as an always-on PDU session, see *3GPP TS 24.501*. 0 Always-on PDU session was not requested 1 Always-on PDU session was requested

NOTE

Executing **AT+CGDCONT=[<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4AddrAlloc>[,<request_type>,,,,,,,,[,<SSC_mode>[,<S-NSSAI>[,<Pref_access_type>,,,[,<Always-**

on_req>]]]]]]]]]]]] writes data to NVM. Please proceed with caution.

5.7. AT+C5GNSSAI 5GS NSSAI Setting

This command enables updating the default NSSAI configuration 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**)** **OK**
Read Command **AT+C5GNSSAI?**	Response **+C5GNSSAI: [<default_configured_nssai_length>,<default_configured_nssai>]** **OK**
Write Command **AT+C5GNSSAI=<default_configured_nssai_length>,<default_configured_nssai>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<default_configured_nssai_length>	Integer type. Default configured NSSAI length in octets to be stored in MT.
<default_configured_nssai>	String type in hexadecimal format. Depending on 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 in MT. **<default_configured_nssai>** is coded as a list of **<S-NSSAI>**s

	separated by colon(s). See **<S-NSSAI>** in *subclause 10.1.1*. This parameter is not subject to conventional character conversion as per **AT+CSCS**.
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

1. If the value is an empty string (""), no default configured NSSAI is stored in MT.
2. Executing **AT+C5GNSSAI=<default_configured_nssai_length>,<default_configured_nssai>** writes data to NVM. Please proceed with caution.

5.8. AT+C5GNSSAIRDP Read 5GS NSSAI Dynamic Parameters

This command returns the default configured NSSAI, rejected NSSAI for 3GPP access or non-3GPP access stored in MT. The execution command returns the default configured NSSAI, rejected NSSAI for 3GPP access and rejected NSSAI for non-3GPP access stored at the MT, if any, as well as the configured NSSAI, allowed NSSAI for 3GPP access and allowed NSSAI for non-3GPP access stored at the MT, if any for the PLMN identified by **<plmn_id>**.

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. Type of NSSAI to be returned. Return stored default configured NSSAI only Return stored default configured NSSAI and rejected NSSAI(s) Return stored default configured NSSAI, rejected NSSAI(s), and configured NSSAI(s) Return stored default configured NSSAI, rejected NSSAI(s), configured NSSAI(s), and allowed NSSAI(s)
<plmn_id>	String type. 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 is not subject to conventional character conversion as per **AT+CSCS**.
<default_configured_nssai_length>	Integer type. Length in octets of the default configured NSSAI stored in MT.
<default_configured_nssai>	String type in hexadecimal format. Depending on 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 in MT for the PLMN. The **<default_configured_nssai>** is coded as a list of **<S-NSSAI>**s separated by colon(s). See **<S-NSSAI>** in *3GPP 27.007 subclause 10.1.1*. This parameter is not subject to conventional character conversion as per **AT+CSCS.**
<rejected_nssai_3gpp_length>	Integer type. Length in octets of the rejected NSSAI associated with 3GPP access stored in MT for the serving PLMN.
<rejected_nssai_3gpp>	String type in hexadecimal format. Depending on 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 in MT for the serving PLMN. The **<rejected_nssai_3gpp>** is coded as a list of rejected **<S-NSSAI>**s separated by colon(s). For the format and the encoding of **<S-NSSAI>**, see also *3GPP TS 23.003*. This parameter is not subject to conventional character conversion as per **AT+CSCS**. Rejected S-NSSAI takes 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 the cause is a cause value according to *3GPP TS 24.501 Table 9.11.3.46.1*.

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

<rejected_nssai_non3gpp> String type in hexadecimal format. Depending on 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 in MT for the serving PLMN. The **<rejected_nssai_non3gpp>** is coded as a list of rejected **<S-NSSAI>**s separated by colon(s). For the format and the encoding of **<S-NSSAI>**, see also *3GPP TS 23.003*. This parameter is not subject to conventional character conversion as per **AT+CSCS**. The rejected S-NSSAI takes one of the following 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. Length in octets of the configured NSSAI stored in MT for the PLMN identified by **<plmn_id>**.

<configured_nssai> String type in hexadecimal format. Depending on 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 in MT for the PLMN identified by **<plmn_id>**. The **<configured_nssai>** is coded as a list of **<S-NSSAI>**s separated by colon(s). See **<S-NSSAI>** in *3GPP 27.007 subclause 10.1.1*. This parameter is not subject to conventional character conversion as per **AT+CSCS**.

<allowed_nssai_3gpp_length> Integer type. Length in octets of the allowed NSSAI associated with 3GPP access stored in MT for the PLMN identified by **<plmn_id>**.

<allowed_nssai_3gpp> String type in hexadecimal format. Depending on 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 in MT for the PLMN identified by **<plmn_id>**. The **<allowed_nssai_3gpp>** is coded as a list of **<S-NSSAI>**s separated by colon(s). See **<S-NSSAI>** in *3GPP 27.007 subclause 10.1.1*. This parameter is not subject to conventional character conversion as per **AT+CSCS**.

<allowed_nssai_non3gpp_length> Integer type. Length in octets of the allowed NSSAI associated with non-3GPP access stored in MT for the PLMN identified by **<plmn_id>**.

<allowed_nssai_non3gpp>	String type in hexadecimal format. Depending on 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 in MT for the PLMN identified by **<plmn_id>**. The **<allowed_nssai_non3gpp>** is coded as a list of **<S-NSSAI>**s separated by colon(s). See **<S-NSSAI>** in *3GPP 27.007 subclause 10.1.1*. This parameter is not subject to conventional character conversion as per **AT+CSCS**.
<S-NSSAI>	String type in hexadecimal character format. Depending on 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 is not subject to conventional character conversion as per **AT+CSCS**. The parameter takes one of the following 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.

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 the received signal strength indication **<RSSI>** and the 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 any error: **+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 Unknown 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 Unknown or not detectable
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

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

OK
AT+CSQ
+CSQ: 28,99
//The current signal strength indication is 28 and the channel bit error rate is unknown 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** to ensure that any network access required for the preceding command has been completed.
2. This command only takes effect under WCDMA and LTE, and does not apply 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. It indicates the service mode in which the MT will report the RSRP. LTE LTE mode NR5G 5G mode

NOTE

1. This command is only supported in LTE and 5G.
2. If the queried **<PRX>**, **<DRX>**, **<RX2>** or **<RX3>** is -32768, it indicates that the RSRP value is invalid.
3. This command is strongly related to the RF link and is generally only used for customer reference and cannot be used as a sensitivity test. In addition, it is best to use it when measuring the speed, the results are more accurate.

Example

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

OK
```

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** If there is any error: **ERROR**
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. It indicates the service mode in which the MT will report the RSRQ. LTE LTE mode NR5G 5G mode

NOTE

1. This command is only supported in LTE and 5G.
2. If the queried **<PRX>**, **<DRX>**, **<RX2>** or **<RX3>** is -32768, it indicates that the RSRQ value is invalid.
3. This command is strongly related to the RF link and is generally only used for customer reference and cannot be used as a sensitivity test. In addition, it is best to use it when measuring the speed, the results are more accurate.

Example

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

OK
```

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** If there is any error: **ERROR**
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.
<DRX>	Integer type. DRX path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G.
<RX2>	Integer type. RX2 path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G.
<RX3>	Integer type. RX3 path SINR value. Range: -20 to 30 dB in LTE, -23 to 40 dB in 5G.
<sysmode>	String type. It indicates the service mode in which the MT will report the SINR. LTE LTE mode NR5G 5G mode

NOTE

1. This command is only supported in LTE and 5G.
2. If the queried **<PRX>**, **<DRX>**, **<RX2>** or **<RX3>** is -32768, it indicates that the SINR value is invalid.
3. This command is strongly related to the RF link and is generally only used for customer reference and cannot be used as a sensitivity test. In addition, it is best to use it when measuring the speed, the results are more accurate.

Example

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

OK
```

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_compact>,<UTRAN>,<E-UTRAN>,<NG-RAN>]** **[…]** **OK**
Write Command Edit the list of preferred operators: **AT+CPOL=<index>[,<format>[,<oper>[<GSM>,<GSM_compact>,<UTRAN>,<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. Order number of the operator in the (U)SIM preferred operator list.
<format>	Integer type. Format of operator name.

	0 Long format alphanumeric **<oper>** 1 Short format alphanumeric **<oper>** 2 Numeric **<oper>**
<oper>	String type. Operation name. **<format>** indicates if the format is alphanumeric or numeric (see **AT+COPS**).
<GSM>	Integer type. GSM access technology selection. 0 Not selected 1 Selected
<GSM_compact>	Integer type. GSM compact access technology selection. 0 Not selected 1 Selected
<UTRAN>	Integer type. UTRAN access technology selection. 0 Not selected 1 Selected
<E-UTRAN>	Integer type. E-UTRAN access technology selection. 0 Not selected 1 Selected
<NG-RAN>	Integer type. NG-RAN access technology selection. 0 Not selected 1 Selected
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

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

5.14. AT+COPN Read Operator Names

This command returns the list of 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	Determined by the number of operator names.
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<numeric>	String type. Operator name in numeric format (see **AT+COPS**).
<alpha>	String type. Operator name in long alphanumeric format (see **AT+COPS**).
<err>	Error code. For more details, see ***Chapter 13.5***.

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 configuration is saved automatically.
Reference *3GPP TS 27.007*	

Parameter

<onoff>	Integer type. Enable or disable automatic time zone update. 0 Disable 1 Enable

NOTE

Executing **AT+CTZU=<onoff>** writes data to NVM. Please proceed with caution.

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 time zone change event reporting. If reporting is enabled, MT returns URC **+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**
Read Command **AT+CTZR?**	Response **+CTZR: <reporting>** **OK**

Write Command **AT+CTZR=<reporting>**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.
Reference *3GPP TS 27.007*	

Parameter

<reporting>	Integer type. Disable or enable time zone reporting. 0 Disable 1 Enable time zone change event reporting by URC **+CTZV: <tz>** 2 Enable extended time zone change event reporting by URC **+CTZE: <tz>,<dst>,<time>**
<tz>	String type. Sum of local time zone and daylight saving time (difference between local time and GMT is expressed in quarter(s) of an hour). Format: "±zz", where "zz" is a fixed width, two-digit integer with the range -48 to +56. To maintain a fixed width, numbers in range -9 to +9 are expressed with a leading zero, e.g. "-09", "+00" and "+09".
<dst>	Integer type. It indicates whether **<tz>** includes daylight saving time adjustment. 0 **<tz>** does not include adjustment for daylight saving time 1 **<tz>** includes +1 hour adjustment (equivalent to 4 quarters in **<tz>**) for daylight saving time 2 **<tz>** includes +2 hours adjustment (equivalent to 8 quarters in **<tz>**) for daylight saving time
<time>	String type. Local time. Format: "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 URC of extended time zone change event reporting if provided by the network.

NOTE

Executing **AT+CTZR=<reporting>** writes data to NVM. Please proceed with caution.

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 Latest Time Synchronized Through Network

The Execution Command returns the latest time synchronized through the network.

AT+QLTS Obtain Latest Time Synchronized Through Network	
Test Command **AT+QLTS=?**	Response **+QLTS: (**range of supported **<mode>**s**)** **OK**
Write Command **AT+QLTS=<mode>**	Response **+QLTS: <time>,<ds>** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Execution Command **AT+QLTS**	Response **+QLTS: <time>,<ds>** **OK** If there is any error: **ERROR**
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>	String type. Format is "yyyy/MM/dd,hh:mm:ss±zz", where characters represent year month, day, hour, minute, second and time zone (indicating the difference, expressed in quarter(s) of an hour, between local time and GMT; range: -48 to +48). E.g., 6th of May 2004, 22:10:00 GMT+2 equals "2004/05/06,22:10:00+08".
<ds>	Integer type. Daylight saving time. 0 No adjustment 1 Plus one hour 2 Plus two hours
<err>	Error code. For more details, see ***Chapter 13.5***.

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 the 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 the selected access technology, the operator and the selected band.

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. Selected access technology. "NONE" "WCDMA" "TDD LTE" "FDD LTE" "TDD NR5G" "FDD NR5G"
<oper>	String type. Operator name in numeric format without double quotes.
<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 device has not been registered on network, the command returns **+QNWINFO: No Service**. For 5G NSA, it returns both LTE and 5G 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** If there is any error: **ERROR** Or **+CME ERROR: <err>**
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.
3. If network is not registered, **AT+QSPN** returns **OK**.

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 cell.

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>,<scs>,<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>]** **[…]** **OK** In WCDMA mode: **[+QENG:"neighbourcell","WCDMA",<uarfcn>,<srxqual>,<PSC>,<RSCP>,<ecno>,<set>,<rank>,<srxlev>]** **[…]** **[+QENG: "neighbourcell","LTE",<earfcn>,<PCID>,<RSRP>,<RSRQ>,<srxlev>]** **[…]** **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<cell_type>	String type. Information of different cells. "servingcell" Information of 3G/4G/5G serving cells "neighbourcell" Information of 3G/4G neighbor cells
<state>	String type. UE state.

	"SEARCH" UE is searching but cannot (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. 5G SA 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).
<cellID>	Integer type. Cell ID. 28-bit (UMTS, LTE) or 36-bit (5G) cell ID. Range: 0–0xFFFFFFFFF.
<PCID>	Integer type. Physical cell ID.
<TAC>	String type. Two-byte tracking area code for LTE or three-byte tracking area code for 5G SA in hexadecimal format without double quotes (see *3GPP 23.003 Section 19.4.2.3*).
<ARFCN>	Integer type. SA-ARFCN of the scanned cell.
<band>	32-bit unsigned integer. Frequency band in 5G SA network mode.
<NR_DL_bandwidth>	Integer type. DL bandwidth. It 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 15 35 MHz 16 45 MHz
<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. A value closer to -44 indicates a stronger signal, whereas the value closer to -140 indicates a weaker signal. - In 5G mode: It indicates the signal of 5G Reference Signal Received Power. Range:

	-140 to -44 dBm. A value closer to -44 indicates a stronger signal, whereas the value closer to -140 indicates a weaker signal.
<RSRQ>	16-bit signed integer. - In LTE mode: It indicates the signal of current LTE Reference Signal Received Quality (see *3GPP 36.214*). Range: -20 to -3 dB. A value closer to -3 indicates a stronger signal, whereas the value closer to -20 indicates a weaker signal. - In 5G mode: It indicates the signal of current 5G Reference Signal Received Quality. Range: -20 to -3 dB. A value closer to -3 indicates a stronger signal, whereas the value closer to -20 indicates a weaker signal.
<SINR>	16-bit signed integer. - In LTE mode: It indicates LTE Signal-to-Interface plus Noise Ratio. The conversion formula for actual SINR is **Y** = (**1/5**) × **X** × **10** - **20** (**X** is the **<SINR>** value queried by **AT+QENG** and **Y** is the actual value of LTE SINR after calculating with the formula). Range: -20 to 30 dB. - In 5G mode: It indicates the signal of 5G Signal-to-Interface plus Noise Ratio. Range: -23 to 40 dB.
<scs>	Integer type. NR subcarrier space. 0 15 kHz 1 30 kHz 2 60 kHz 3 120 kHz 4 240 kHz
<srxlev>	Integer type. Suitable reception level for inter frequency cell.
<is_tdd>	String type. LTE network mode. "TDD" "FDD"
<earfcn>	Integer type. E-UTRA-ARFCN of the scanned cell.
<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
<RSSI>	Integer type. LTE Received Signal Strength Indication.
<CQI>	Integer type. Channel Quality Indication. Range: 1–30.
<tx_power>	Integer type. TX power value in 1/10 dBm. It is the maximum of all UL channel TX power. **<tx_power>** is only meaningful when the device is in traffic.
<LAC>	Integer type. Location area code. Range: 0–65535. It determines the two-byte location area code in hexadecimal format (e.g. 00C1 equals 193 in decimal) of the scanned cell.
<uarfcn>	Integer type. UTRA-ARFCN of scanned cell.
<PSC>	Integer type. Primary scrambling code of scanned cell.
<RAC>	Integer type. Routing Area Code. Range: 0–255.
<RSCP>	Integer type. Received Signal Code Power level of scanned cell.
<ecio>	Integer type. Carrier to noise ratio in dB = measured Ec/Io value in dB.
<phych>	Integer type. Physical channel. 0 DPCH 1 FDPCH
<SF>	Integer type. Spreading factor. 0 SF_4 1 SF_8 2 SF_16 3 SF_32 4 SF_64 5 SF_128 6 SF_256 7 SF_512 8 UNKNOWN
<slot>	Integer type. 0–16 Slot format for DPCH 0–9 Slot format for FDPCH
<speech_code>	Integer type. Destination number on which call is to be deflected.
<comMod>	Integer type. Number format. Compress mode. 0 Not support compress mode 1 Support compress mode
<cell_resel_priority>	Integer type. Cell reselection priority. Range: 0–7.
<s_non_intra_search>	Integer type. Threshold to control non-intra frequency search.
<thresh_serving_low>	Integer type. It 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>	Integer type. Cell selection parameter for the intra frequency cell.
<threshX_low>	Integer type. To be considered for re-selection. Suitable receive level value of an evaluated lower priority cell must be greater than this value.
<threshX_high>	Integer type. To be considered for re-selection. Suitable receive level value of an evaluated higher priority cell must be greater than this value.

<thresh_Xhigh>	Integer type. Reselection threshold for high priority layers.
<thresh_Xlow>	Integer type. Reselection threshold for low priority layers.
<srxqual>	Integer type. Receiver automatic gain control on the camped frequency.
<ecno>	Integer type. Ratio of the received energy per PN chip to the total received power spectral density (see *3GPP TS 25.133*).
<set>	Integer type. 3G neighbor cell set. 1 Active set 2 Synchronous neighbor set 3 Asynchronous neighbor set
<rank>	Integer type. Rank of this cell as neighbor for inter-RAT cell reselection.
<srxlev>	Integer type. Selection of reception level value for base station in dB (see *3GPP 25.304*).

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,
-,-,27

OK
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

OK
AT+QENG="servingcell"
+QENG: "servingcell","NOCONN","NR5G-SA","TDD",460,01,9013B004,299,690E0F,633984,78,12,-1
07,-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+QCAINFO Query Carrier Aggregation Parameters

This command queries carrier aggregation parameters.

AT+QCAINFO Query Carrier Aggregation Parameters	
Test Command **AT+QCAINFO=?**	Response **+QCAINFO: (**list of supported **<5G_signal_ext>)** **OK**
Read Command **AT+QCAINFO?**	Response **+QCAINFO: <5G_signal_ext>** **OK**
Write Command **AT+QCAINFO=<5G_signal_ext>**	Response **OK** Or **ERROR**
Execution Command **AT+QCAINFO**	In LTE mode: **+QCAINFO: "PCC",<freq>,<bandwidth>,<band>,<pcell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<RSSNR>** **[+QCAINFO: "SCC",<freq>,<bandwidth>,<band>,<scell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<RSSNR><UL_configured>,<UL_bandwidth>,<UL_EARFCN>]** **[…]** **OK** In EN-DC mode: **+QCAINFO: "PCC",<freq>,<bandwidth>,<band>,<pcell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<RSSNR>** **[+QCAINFO: "SCC",<freq>,<bandwidth>,<band>,<scell_state>,<PCID>,<RSRP>,<RSRQ>,<RSSI>,<RSSNR><UL_configured>,<UL_bandwidth>,<UL_EARFCN>]** **[…]** **[+QCAINFO: "SCC",<freq>,<NR_DL_bandwidth>,<NR_band>,<PCID>]** **[+QCAINFO: "SCC",<freq>,<NR_DL_bandwidth>,<NR_band>,<scell_state>,<PCID>,<UL_configured>,<NR_UL_bandwidth>,<UL_ARFCN>[,<NR_RSRP>,<NR_RSRQ>,<NR_SNR>]** **[…]** **OK**

	In SA mode: **+QCAINFO: "PCC",<freq>,<NR_DL_bandwidth>,<NR_band>,<PCID>** **[+QCAINFO: "SCC",<freq>,<NR_DL_bandwidth>,<NR_band>,<state>,<PCID>,<UL_configured>,<NR_UL_bandwidth>,<UL_ARFCN>[,<NR_RSRP>,<NR_RSRQ>,<NR_SNR>]** **[…]** **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<freq>	Integer type. EARFCN.
<bandwidth>	Integer type. Bandwidth. 6 1.4 MHz 15 3 MHz 25 5 MHz 50 10 MHz 75 15 MHz 100 20 MHz
<band>	String type. LTE DL band information. "LTE BAND 1" "LTE BAND 2" "LTE BAND 3" … "LTE BAND 66"
<pcell_state>	Integer type. Primary cell state. 0 Not registered, not searching 1 Registered on home network 2 Not registered, searching 3 Registration denied 4 Unknow registration state 5 Registered on roaming network
<scell_state>	Integer type. Secondary cell state. 0 Deconfigured 1 Configuration deactivated

	2 Configuration activated
<PCID>	Integer type. Physical Cell ID.
<RSRP>	Integer type. Reference Signal Received Power (see *3GPP 36.214*)
<RSRQ>	Integer type. Reference Signal Received Quality (see *3GPP 36.214*)
<RSSI>	Integer type. Received Signal Strength Indication.
<RSSNR>	Integer type. Logarithmic value of RSSNR. Range: -10 to +30 dB.
<UL_configured>	Integer type. Whether the UL of secondary cell is configured by network. 0 Not configured 1 Configured
<UL_bandwidth>	Integer type. UL bandwidth. "-" will be displayed if **<UL_configured>**=0. 6 1.4 MHz 15 3 MHz 25 5 MHz 50 10 MHz 75 15 MHz 100 20 MHz
<UL_EARFCN>	Integer type. UL EARFCN. "-" will be displayed if **<UL_configured>**=0.
<NR_DL_bandwidth>	Integer type. NR downlink bandwidth. 0 5 MHz 1 110 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 15 35 MHz 16 45 MHz
<NR_band>	String Type. NR DL band information. "NR5G BAND 1" "NR5G BAND 2" "NR5G BAND 3" … "NR5G BAND 261"
<NR_UL_bandwidth>	Integer type. "-" will be displayed if **<UL_configured>**=0. The value of **<NR_UL_bandwidth>** is the same as that of **<NR_DL_bandwidth>**.
<UL_ARFCN>	Integer type. UL_ARFCN. "-" will be displayed if **<UL_configured>** is 0.

<NR_RSRP>	Integer type. NR Reference Signal Received Power. Range: -140 to -44; Unit: dBm. The closer to -44, the better the signal is. The closer to -140, the worse the signal is.
<NR_RSRQ>	Integer type. Current NR Reference Signal Received Quality. Range: -20 to -3; Unit: dB. The closer to -3, the better the signal is. The closer to -20, the worse the signal is.
<NR_SNR>	Integer type. Current NR SNR. Range: -2300 to 4000. The actual value of NR SNR is calculated via the formula: NR SNR = **<NR_SNR>** / 100 Range of NR SNR: -23 to 40; Unit: dB.
<5G_signal_ext>	Integer type. Hide or show extension parameters: **<NR_RSRP>**, **<NR_RSRQ>** and **<NR_SNR>** 0 Hide 1 Show

NOTE

This command is valid only after the module registers on network.

Example

```
AT+QCAINFO
+QCAINFO: "PCC",300,100,"LTE BAND 1",1,23,-66,-12,-34,30
+QCAINFO: "SCC",1575,100,"LTE BAND 3",2,43,-64,-7,-24,30,0,-,-

OK
```

5.22. AT+QNETRC Get the Cause of Network Rejection

This command gets the cause of network rejection. This Write Command sets whether to present URC and controls the presentation of the URC **+QNETRC: "emm_cause",<emm_reject_cause>** when **<mode>** & 0x01 = 1 and the module receives a rejection code issued by the network during LTE network registration, the URC **+QNETRC: "esm_cause",<esm_reject_cause>** when **<mode>** & 0x02 = 2 and the module receives a rejection code issued by the network during LTE session management process, or the URC **+QNETRC: "5gmm_cause",<5gmm_reject_cause>** when **<mode>** & 0x4 = 4 and the module receives a rejection code issued by the network during 5G network registration.

AT+QNETRC Get the Cause of Network Rejection	
Read Command **AT+QNETRC?**	Response **+QNETRC: "emm_cause",<emm_reject_cause>** **+QNETRC: "esm_cause",<esm_reject_cause>**

	+QNETRC: "5gmm_cause",<5gmm_reject_cause> **OK**
Write Command **AT+QNETRC=<mode>**	Response **OK** Or **ERROR**
Execution Command **AT+QNETRC**	Response **+QNETRC: <mode>** **OK**
Characteristics	-

Parameter

<mode>	Integer type. Determines the output type of URC sentences by bitwise OR.	
	0	No URC report
	1	EMM URC
	2	ESM URC
	4	5GMM URC
<emm_reject_cause>	Integer type. EMM reject cause.	
	0	No cause
	2	IMSI unknown in HSS
	3	Illegal UE
	5	IMEI not accepted
	6	Illegal ME
	7	EPS services not allowed
	8	EPS services and non-EPS services not allowed
	9	UE identity cannot be derived by the network
	10	Implicitly detached
	11	PLMN not allowed
	12	Tracking Area not allowed
	13	Roaming not allowed in this tracking area
	14	EPS services not allowed in this PLMN
	15	No Suitable Cells in tracking area
	16	MSC temporarily not reachable
	17	Network failure
	18	CS domain not available
	19	ESM failure
	20	MAC failure
	21	Synch failure
	22	Congestion
	23	UE security capabilities mismatch

	24	Security mode rejected, unspecified
	25	Not authorized for this CSG
	26	Non-EPS authentication unacceptable
	31	Redirection to 5GCN required
	35	Requested service option not authorized in this PLMN
	39	CS service temporarily not available
	40	No EPS bearer context activated
	42	Severe network failure
	95	Semantically incorrect message
	96	Invalid mandatory information
	97	Message type non-existent or not implemented
	98	Message type not compatible with the protocol state
	99	Information element non-existent or not implemented
	100	Conditional IE error
	101	Message not compatible with the protocol state
	111	Protocol error, unspecified
<esm_reject_cause>	Integer type. ESM reject cause.	
	0	No cause
	8	Operator Determined Barring
	26	Insufficient resources
	27	Missing or unknown APN
	28	Unknown PDN type
	29	User authentication failed
	30	Request rejected by Serving GW or PDN GW
	31	Request rejected, unspecified
	32	Service option not supported
	33	Requested service option not subscribed
	34	Service option temporarily out of order
	35	PTI already in use
	36	Regular deactivation
	37	EPS QoS not accepted
	38	Network failure
	39	Reactivation requested
	41	Semantic error in the TFT operation
	42	Syntactical error in the TFT operation
	43	Invalid EPS bearer identity
	44	Semantic errors in packet filter(s)
	45	Syntactical errors in packet filter(s)
	46	Unused (see NOTE 2)
	47	PTI mismatch
	49	Last PDN disconnection not allowed
	50	PDN type IPv4 only allowed
	51	PDN type IPv6 only allowed
	52	Single address bearers only allowed

	53	ESM information not received
	54	PDN connection does not exist
	55	Multiple PDN connections for a given APN not allowed
	56	Collision with network initiated request
	57	PDN type IPv4v6 only allowed
	58	PDN type non IP only allowed
	59	Unsupported QCI value
	60	Bearer handling not supported
	61	PDN type Ethernet only allowed
	65	Maximum number of EPS bearers reached
	66	Requested APN not supported in current RAT and PLMN combination
	81	Invalid PTI value
	95	Semantically incorrect message
	96	Invalid mandatory information
	97	Message type non-existent or not implemented
	98	Message type not compatible with the protocol state
	99	Information element non-existent or not implemented
	100	Conditional IE error
	101	Message not compatible with the protocol state
	111	Protocol error, unspecified
	112	APN restriction value incompatible with active EPS bearer context
	113	Multiple accesses to a PDN connection not allowed
<5gmm_reject_cause>	Integer type. 5GMM reject cause.	
	0	No cause
	3	Illegal UE
	5	PEI not accepted
	6	Illegal ME
	7	5GS services not allowed
	9	UE identity cannot be derived by the network
	10	Implicitly de-registered
	11	PLMN not allowed
	12	Tracking area not allowed
	13	Roaming not allowed in this tracking area
	15	No suitable cells in tracking area
	20	MAC failure
	21	Synch failure
	22	Congestion
	23	UE security capabilities mismatch
	24	Security mode rejected, unspecified
	26	Non-5G authentication unacceptable
	27	N1 mode not allowed
	28	Restricted service area
	31	Redirection to EPC required

	43	LADN not available
	62	No network slices available
	65	Maximum number of PDU sessions reached
	67	Insufficient resources for specific slice and DNN
	69	Insufficient resources for specific slice
	71	ngKSI already in use
	72	Non-3GPP access to 5GCN not allowed
	73	Serving network not authorized
	74	Temporarily not authorized for this SNPN
	75	Permanently not authorized for this SNPN
	76	Not authorized for this CAG or authorized for CAG cells only
	77	Wireline access area not allowed
	78	PLMN not allowed to operate at the present UE location
	79	UAS services not allowed
	90	Payload was not forwarded
	91	DNN not supported or not subscribed in the slice
	92	Insufficient user-plane resources for the PDU session
	95	Semantically incorrect message
	96	Invalid mandatory information
	97	Message type non-existent or not implemented
	98	Message type not compatible with the protocol state
	99	Information element non-existent or not implemented
	100	Conditional IE error
	101	Message not compatible with the protocol state
	111	Protocol error, unspecified

Example

```
AT+QNETRC=7
OK
AT+QNETRC
+QNETRC: 7

OK
AT+QNETRC?
+QNETRC: "emm_cause",7
+QNETRC: "esm_cause",0
+QNETRC: "5gmm_cause",0

OK
```

5.23. 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",** **+QNWCFG: "nr5g_cell_id"** **+QNWCFG: "wcdma_cqi"** **+QNWCFG: "up/down",(**range of supported **<time_interval>**s**)** **+QNWCFG: "dss_enable",(**list of supported **<enable>**s**)** **OK**
Maximum Response Time	300 ms
Characteristics	-

5.23.1. 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 in hexadecimal format (MCC + MNC + ECI).
<ECI>	Integer type. E-UTRAN Cell Identity in hexadecimal format (eNodeB ID + cell ID).
<eNodeB_ID>	Integer type. LTE base station ID in hexadecimal format.

Example

```
AT+QNWCFG="lte_cell_id"                    //Read cell IDs under LTE.
```

```
+QNWCFG: "lte_cell_id",64F0000D6B5C0,0D6B5C0,0D6B5

OK
AT+QNWCFG="lte_cell_id"                    //Read cell ID under non-LTE mode.
OK
```

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

This command reads the NCGI, NCI, NR5G base station ID under 5G SA.

AT+QNWCFG="nr5g_cell_id" Read Cell ID Under 5G 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. NR Cell Global Identification in hexadecimal format (MCC + MNC + NCI).
<NCI>	Integer type. NR Cell Identification in hexadecimal format (gNodeB ID + cell ID).
<gNodeB_ID>	Integer type. 5G base station ID in hexadecimal format.

Example

```
AT+QNWCFG="nr5g_cell_id"                   //Read cell IDs under 5G SA.
+QNWCFG: "nr5g_cell_id",64F000170C23000,170C23000,170C23

OK
AT+QNWCFG="nr5g_cell_id"                   //Read cell ID under non-5G SA.
OK
```

5.23.3. AT+QNWCFG="wcdma_cqi" Read CQI Under WCDMA

This command reads CQI (Channel Quality Indicator) under WCDMA.

AT+QNWCFG="wcdma_cqi" Read CQI Under WCDMA	
Write Command	Response

AT+QNWCFG="wcdma_cqi"	**+QNWCFG: "wcdma_cqi",<CQI_value>** **OK**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<CQI_value>	Integer type. CQI value. Range: 0–30 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
```

5.23.4. AT+QNWCFG="up/down" Get Average Uplink and Downlink Rates in Delta Time

This command gets 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 setting: **+QNWCFG: "up/down",<uplink>,<downlink>,<time_interval>** **OK** If the optional parameter is specified, set interval time for automatically calculating the average rate: **OK** If there is any error:

	ERROR
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.

Parameter

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

NOTE

Executing **AT+QNWCFG="up/down"** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWCFG="up/down"          //Query the current setting.
+QNWCFG: "up/down",2056,384,2

OK
AT+QNWCFG="up/down",5        //Set the interval time for automatically calculating the average rate.
OK
```

5.23.5. AT+QNWCFG="dss_enable" Enable or Disable DSS Function

This command enables or disables DSS Function.

AT+QNWCFG="dss_enable" Enable/Disable DSS Function	
Write Command **AT+QNWCFG="dss_enable"[,<enable>]**	Response If the optional parameter is omitted, query the current setting: **+QNWCFG: "dss_enable",<enable>** **OK** If the optional parameter is specified, enable or disable DSS: **OK** If there is any error: **ERROR**

Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<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
```

5.24. 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 **<SA_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	-

5.24.1. AT+QNWPREFCFG="gw_band" Set WCDMA Band

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

AT+QNWPREFCFG="gw_band" Set WCDMA Band	
Write Command **AT+QNWPREFCFG="gw_band"[,<gw_band>]**	Response If the optional parameter is omitted, query the current setting: **+QNWPREFCFG: "gw_band",<gw_band>** **OK** If the optional parameter is specified, set the preferred WCDMA bands to be searched: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<gw_band>	String type. WCDMA bands to be configured. Format: **<WCDMA_band1>**:**<WCDMA_band2>**:**…**:**<WCDMA_band*n*>**
<WCDMA_band>	Integer type. WCDMA band. 1 WCDMA 2100 band 2 WCDMA 1900 band 3 WCDMA 1800 band 4 WCDMA 1700 band

5	WCDMA 850 band
6	WCDMA 800 band
8	WCDMA 900 band
19	WCDMA Japan 850 band

NOTE

1. See the specific module specification for the bands that can be supported.
2. When the module locks to WCDMA, an error is reported if **<gw_band>** is set to null.
3. Executing **AT+QNWPREFCFG="gw_band",<gw_band>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="gw_band"          //Query the 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
```

5.24.2. AT+QNWPREFCFG="lte_band" Set LTE Band

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

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

Parameter

<LTE_band>	String type. LTE bands to be configured. Format: **<band1>**:**<band2>**:…:**<band*n*>**.
<band>	Integer type. LTE bands supported by the module. 1–5 B1–B5 7 B7 8 B8 12–14 B12–B14 17–20 B17–B20 25 B25 26 B26 28–30 B28–B30 32 B32 34 B34 38–43 B38–B43 48 B48 66 B66 71 B71

NOTE

1. See the specific module specification for the bands that are supported.
2. When the module locks to LTE, an error is reported if **<LTE_band>** is set to null.
3. Executing **AT+QNWPREFCFG="lte_band",<LTE_band>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="lte_band"          //Query the 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
```

5.24.3. AT+QNWPREFCFG="nsa_nr5g_band" Set 5G NSA Band

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

AT+QNWPREFCFG="nsa_nr5g_band" Set 5G NSA Band	
Write Command **AT+QNWPREFCFG="nsa_nr5g**	Response If the optional parameter is omitted, query the current setting:

_band"[,<NSA_NR5G_band>]	**+QNWPREFCFG: "nsa_nr5g_band",<NSA_NR5G_band>** **OK** If the optional parameter is specified, set the preferred 5G NSA bands to be searched: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<NSA_NR5G_band>	String type. 5G NSA bands to be configured. Format: **<NSA_band1>**:**<NSA_band2>**:…:**<NSA_band*n*>**
<SA_band>	Integer type. 5G NSA band. The configurable 5G NSA bands supported by the module. 1–3 n1–n3 5 n5 7 n7 8 n8 12 n12 20 n20 25 n25 28 n28 38 n38 40 n40 41 n41 48 n48 66 n66 71 n71 77–79 n77–n79 257 n257 258 n258 260 n260 261 n261

NOTE

1. See the specific module specification for the bands that are supported.
2. When the module locks to 5G NSA, an error is reported if **<NSA_NR5G_band>** is set to null.
3. Executing **AT+QNWPREFCFG="nsa_nr5g_band",<NSA_NR5G_band>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG= "nsa_nr5g_band"      //Query the currently configured 5G 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 NSA n1 and 5G NSA n2.
OK
```

5.24.4. AT+QNWPREFCFG="nr5g_band" Set 5G SA Band

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

AT+QNWPREFCFG="nr5g_band" Set 5G SA Band	
Write Command **AT+QNWPREFCFG="nr5g_band"[,<SA_NR5G_band>]**	Response If the optional parameter is omitted, query the current setting: **+QNWPREFCFG: "nr5g_band",<SA_NR5G_band>** **OK** If the optional parameter is specified, set the preferred NR5G SA bands to be searched: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<SA_NR5G_band>	String type. 5G NSA bands to be configured. Format: **<SA_band1>**:**<SA_band2>**:…:**<SA_band*n*>**.
<SA_band>	Integer type. SA 5G band. The configurable SA 5G bands supported by the

applicable modules.	
1–3	n1–n3
7	n7
8	n8
12	n12
20	n20
25	n25
28	n28
38	n38
40	n40
41	n41
48	n48
66	n66
71	n71
77–79	n77–n79

NOTE

1. See the specific module specification for the bands that are supported by the module.
2. When the module locks to 5G SA, an error is reported if **<SA_NR5G_band>** is set to null.
3. Executing **AT+QNWPREFCFG="nr5g_band",<SA_NR5G_band>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG= "nr5g_band"          //Query the currently configured 5G 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 SA n1 and 5G SA n2.
OK
```

5.24.5. AT+QNWPREFCFG="mode_pref" Set Network Search Mode

This command specifies the network search mode.

AT+QNWPREFCFG="mode_pref" Set Network Search Mode	
Write Command **AT+QNWPREFCFG="mode_pref"[,<mode_pref>]**	Response If the optional parameter is omitted, query the current setting: **+QNWPREFCFG: "mode_pref",<mode_pref>** **OK**

	If the optional parameter is specified, set the network search mode: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<mode_pref>	String type without double quotes. RATs to be configured. Format: **<mode_pref1>:<mode_pref2>:…:<mode_pref2*n*>**. RATs supported:	
	AUTO	WCDMA & LTE & 5G
	WCDMA	WCDMA only
	LTE	LTE only
	NR5G	5G only

NOTE

Executing **AT+QNWPREFCFG="mode_pref",<mode_pref>** writes data to NVM. Please proceed with caution.

Example

```
AT+QNWPREFCFG="mode_pref"                  //Query the current setting.
+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.
OK
```

5.24.6. AT+QNWPREFCFG="srv_domain" Set Service Domain

This command specifies the registered service domain.

AT+QNWPREFCFG="srv_domain" Set Service Domain	
Write Command **AT+QNWPREFCFG="srv_domain"[,<srv_domain>]**	Response If the optional parameter is omitted, query the current setting: **+QNWPREFCFG: "srv_domain",<srv_domain>**

	OK If the optional parameter is specified, set the service domain of UE: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

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

NOTE

Executing **AT+QNWPREFCFG="srv_domain",<srv_domain>** writes data to NVM. Please proceed with caution.

Example

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

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

5.24.7. AT+QNWPREFCFG="voice_domain" Set Voice Domain

This command specifies the UE voice domain.

AT+QNWPREFCFG="voice_domain Set Voice Domain	
Write Command **AT+QNWPREFCFG="voice_domain"[,<voice_domain>]**	Response If the optional parameter is omitted, query the current setting: **+QNWPREFCFG: "voice_domain",<voice_domain>**

	OK If the optional parameter is specified, set UE voice domain: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<voice_domain>	Integer type. UE voice domain. 0 CS voice only 1 IMS PS voice only 2 CS voice preferred with IMS PS voice as secondary 3 IMS PS voice preferred with CS voice as secondary

NOTE

Executing **AT+QNWPREFCFG="voice_domain",<voice_domain>** writes data to NVM. Please proceed with caution.

Example

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

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

5.24.8. AT+QNWPREFCFG="roam_pref" Set Roaming Preference

This command specifies the roaming preference of UE.

AT+QNWPREFCFG="roam_pref" Set Roaming Preference	
Write Command **AT+QNWPREFCFG="roam_pref"[,<roam_pref>]**	Response If the optional parameter is omitted, query the current setting: **+QNWPREFCFG: "roam_pref",<roam_pref>**

	OK If the optional parameter is specified, set UE roaming preference: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

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

NOTE

Executing **AT+QNWPREFCFG="roam_pref",<roam_pref>** writes data to NVM. Please proceed with caution.

Example

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

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

5.24.9. AT+QNWPREFCFG="ue_usage_setting" Set UE Usage Setting

This command specifies the usage setting of UE.

AT+QNWPREFCFG="ue_usage_setting" Set UE Usage Setting	
Write Command **AT+QNWPREFCFG="ue_usage_setting"[,<setting>]**	Response If the optional parameter is omitted, query the current setting: **+QNWPREFCFG: "ue_usage_setting",<setting>** **OK**

	If the optional parameter is specified, set UE usage setting: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

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

NOTE

Executing **AT+QNWPREFCFG="ue_usage_setting",<setting>** writes data to NVM. Please proceed with caution.

Example

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

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

5.24.10. 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_band>** **+QNWPREFCFG: "nr5g_band",<NR5G_band>**

	OK
Maximum Response Time	300 ms
Characteristics	-

Parameter

<gw_band>	String type. WCDMA bands to be configured. Format: **<WCDMA_band1>**:**<WCDMA_band2>**:…:**<WCDMA_band*n*>**
<WCDMA_band>	Integer type. WCDMA band. See **<WCDMA_band>** in ***Chapter 5.24.1***.
<LTE_band>	String type. LTE bands to be configured. Format: **<band1>**:**<band2>**:…:**<band*n*>**.
<band>	Integer type. LTE band. See **<band>** in ***Chapter 5.24.2***.
<NSA_NR5G_band>	String type. 5G NSA bands to be configured. Format: **<NSA_band1>**:**<NSA_band1>**:…:**<NSA_band*n*>**
<NSA_band>	Integer type. 5G NSA band. See **<NSA_band>** in ***Chapter 5.24.3***.
<SA_NR5G_band>	String type. 5G SA bands to be configured. Format: **<SA_band1>**:**<SA_bandx>**:…:**<SA_band*n*>**
<SA_band>	Integer type. 5G SA band. See **<SA_band>** in ***Chapter 5.24.4***.

NOTE

See the specific module specification for the bands supported.

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
```

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

This command queries the band configured in the UE capability.

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. Parameter format:: **<WCDMA_band1>**:**<WCDMA_band2>**:…:**<WCDMA_band*n*>**
<WCDMA_band>	Integer type. WCDMA band. See **<WCDMA_band>** in ***Chapter 5.24.1***.
<LTE_band>	String type. Use the colon as a separator to list the LTE bands to be configured. Parameter format: **<band1>**:**<band2>**:…:**<band*n*>**.
<band>	Integer type. LTE band. See **<band>** in ***Chapter 5.24.2***.
<NSA_NR5G_band>	String type. Use the colon as a separator to list the NR5G NSA bands to be configured. Parameter format: **<NSA_band1>**:**<NSA_band1>**:…:**<NSA_band*n*>**
<NSA_band>	Integer type. 5G NSA band. See **<NSA_band>** in ***Chapter 5.24.3***.
<SA_NR5G_band>	String type. Use the colon as a separator to list the NR5G SA bands to be configured. Parameter format: **<SA_band1>**:**<SA_band2>**:…:**<SA_band*n*>**
<SA_band>	Integer type. 5G SA band. See **<SA_band>** in ***Chapter 5.24.4***.

NOTE

Please see the module specification for the bands 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
```

5.24.12. AT+QNWPREFCFG="rat_acq_order" Set RAT Priority

This command sets the RAT acquisition order.

AT+QNWPREFCFG="rat_acq_order" Set RAT Priority	
Write Command **AT+QNWPREFCFG="rat_acq_order"[,<rat_order>]**	Response If the optional parameter is omitted, query the current setting: **+QNWPREFCFG: "rat_acq_order",<rat_order>** **OK** If the optional parameter is specified, set the RAT acquisition order: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<rat_order>	String type without double quotes. RAT priority. Format: **<rat_order1>:<rat_order2>:…:< rat_order*n*>**. RATs supported: WCDMA LTE NR5G

NOTE

Executing **AT+QNWPREFCFG="rat_acq_order",<rat_order>** writes data to NVM. Please proceed with caution.

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
```

5.24.13. AT+QNWPREFCFG="nr5g_disable_mode" Disable 5G

This command disables 5G.

AT+QNWPREFCFG="nr5g_disable_mode" Disable 5G	
Write Command **AT+QNWPREFCFG="nr5g_disable_mode"[,<disable_mode>]**	Response If the optional parameter is omitted, query the current setting: **+QNWPREFCFG: "nr5g_disable_mode",<disable_mode>** **OK** If the optional parameter is specified, disable NR5G: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

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

NOTE

Executing **AT+QNWPREFCFG="nr5g_disable_mode",<disable_mode>** writes data to NVM. Please proceed with caution.

Example

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

```
OK
AT+QNWPREFCFG="nr5g_disable_mode",1          //Disable 5G 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 a data call, if successfully connected: **CONNECT<text>** MT switches to data mode. **<text>** is output only when **<value>** of **ATX** is greater than 0. When MT returns to command mode after call release: **OK** In case of a voice call, if successfully connected: **OK** If no call 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 when the module receives a character during command execution. However, the command will not be aborted during some connection establishment processes 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                                         //Answer a voice call with ATA.
OK
```

6.2. ATD Originate a Call

This command sets up an outgoing voice or a data call. 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: **BUSY** If a call connection cannot be established: **NO CARRIER** If a call connection is established successful and a non-voice call is to be set: **CONNECT<text>** MT switches to data mode. **<text>** is output only when **<value>** of **ATX** is greater than 0. When MT returns to command mode after call release: **OK** If a call connection is established successful and a voice call is set up: **OK**
Maximum Response Time	5 s, determined by the network.
Characteristics	-

Reference
V.25ter

Parameter

<n>	String of dialing digits and optional V.25ter modifiers. Dialing digits: 0-9, *, #, +, A, B, C Following V.25ter, optional modifiers ,(comma), T, P, !, W, @ are ignored
<mgsm>	String of GSM modifiers: I Activates CLIR (presentation of own number to called party disabled) i Deactivates CLIR (presentation of own number to called party enabled) G Activates CUG invocation for this call only g Deactivates CUG invocation for this call only
<;>	It is required when setting up a voice call, and MT will return to command state after call release.

NOTE

1. This command may be aborted during execution if the module receives an **ATH** command or a character. However, the command will not be aborted during certain connection establishments such as handshaking.
2. "I" and "i" of **<mgsm>** are only valid when **<n>** contains "*****" or "#".
3. See **ATX** for setting result codes and call monitoring parameters.
4. For voice calls, if dialing with **ATD**, there are two possible response modes:
   MT returns **OK** immediately, either after dialing is completed or after the call is established. The mode is controlled by **AT+COLP**. By default, **AT+COLP=0** is set, causing the MT to return **OK** immediately after the dialing is 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 an active voice call is in progress, 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;                    //Dial a number.
OK
```

6.3. ATH Disconnect Existing Call

This command disconnects data or voice call. **AT+CHUP** is also used for disconnecting voice call.

ATH Disconnect Existing Call	
Execution Command **ATH[<n>]**	Response **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

6.4. AT+CVHU Control Voice Call Hang Up

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

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

Parameter

<mode>	Integer type. 0 **ATH** can be used to disconnect existing voice call 1 **ATH** is ignored with only the response **OK** returned

6.5. AT+CHUP Hang Up Voice Call

This command cancels any voice call in Active, Waiting, and Held state. For data call hang up, use **ATH**.

AT+CHUP Hang Up Voice 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 Ring Count Before Automatic Answering

This command controls automatic answering mode for incoming call.

ATS0 Set Ring Count Before Automatic Answering	
Read Command **ATS0?**	Response **<n>** **OK**
Write Command	Response

ATS0=<n>	**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 specified ring count

NOTE

If **<n>** is set to a high value (based on operator need, usually 90 s), 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                            //Call incoming.
##0

RING
##0

RING                            //Call is automatically answered after three rings.
##0
```

6.7. ATS6 Set Pause Before Blind Dialing

This command is implemented for compatibility reason 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 Waiting Time 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.

ATS7 Set Waiting Time 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.	
	0	Disabled
	1–255	Waiting time in second(s) for connection completion

6.9. ATS8 Set Waiting Time for Comma Dial Modifier

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

ATS8 Set Waiting Time 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	Waiting time in second(s) for comma dial modifier

6.10. ATS10 Set Disconnection Delay After Indicating Data Carrier Absence

This command determines the duration (unit: tenth(s) of a second) during which UE remains connected when no data carrier is present. If the data carrier is detected again before disconnection, MT remains connected.

ATS10 Set Disconnection Delay After Indicating Data Carrier Absence	
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. Time to wait before disconnecting after UE has indicated the absence of received line signal. Range: 1–254. Default: 15. Unit: tenth(s) of a second.

6.11. AT+CSTA Select Address Type

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

AT+CSTA Select Address Type	
Test Command **AT+CSTA=?**	Response **+CSTA: (**list of supported **<type>**s**)** **OK**
Read Command **AT+CSTA?**	Response **+CSTA: <type>** **OK**
Write Command **AT+CSTA=[<type>]**	Response **OK**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

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

6.12. AT+CLCC List Current Call of MT

This command returns the list of all current call(s). If the command is executed successfully, but there is no active call, no information will be provided in the response, and only **OK** will be sent to TE.

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

<id>	Integer type. Call identification number as described in *3GPP TS 22.030*, which can be used in **AT+CHLD** operation.	
<dir>	Integer type.	
	0	Mobile originated (MO) call
	1	Mobile terminated (MT) call
<stat>	Integer type. Call state.	
	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 a part of a multiparty (conference) call

	1 Call is a part of a multiparty (conference) call
<number>	String type. Phone number. Format specified by **<type>**.
<type>	Integer type. Octet address type (See *3GPP TS 24.008 subclause 10.5.4.7* for details). Values: 129 Unknown type 145 International type (contains the character "+") 161 National type
<alpha>	String type. Alphanumeric representation for **<number>** corresponding to the entry found in phonebook.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

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

OK
```

6.13. AT+CR Service Reporting Control

This command controls whether MT transmits an intermediate result code **+CR: <serv>** to TE or not during call setup.

If it is enabled, the intermediate result code is transmitted during the connect negotiation phase, indicating the selected speed and quality of service, before any error control or data compression is reported 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 MT controls whether the intermediate result code **+CR: <serv>** is returned by TA to TE or not during call setup.

	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 URC **+CRING: <type>** instead of the usual **RING** notification.

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 is not 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 a voice type incoming call 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 call is originated.

This Test Command returns supported values. RLP versions 0 and 1 share the same parameter set. MT returns only one line for this set, omitting **<ver>**.

This Read Command returns current setting for RLP version. RLP versions 0 and 1 share the same parameter set. TA returns only one line for this set, excluding **<ver>**.

AT+CRLP Select Radio Link Protocol Parameter	
Test Command	Response
AT+CRLP=?	**+CRLP: (**range of supported **<iws>**s**),(**range of supported **<m**

	ws>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** Or **ERROR**
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 attempt(s). Range: 1–55. Default: 6.
<ver>	Integer type. RLP version number. Range: 0–2.

6.16. AT+QECCNUM Configure Emergency Call Number

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

AT+QECCNUM Configure Emergency Call Number	
Test Command **AT+QECCNUM=?**	Response **+QECCNUM: (**list of supported **<mode>**s**)** **OK**
Write Command **AT+QECCNUM=<mode>[,<type>[,<eccnum1>[,<eccnum2>[,…[,<eccnum*n*>]]]]]**	Response If **<mode>**=0, **<type>** is specified and **<eccnum>** is omitted, query the current ECC number type: **+QECCNUM: <type>,<eccnum1>,<eccnum2>[,…]** **OK** If **<mode>**=1, **<type>**=0 or 1, and at least one **<eccnum>** is specified, add ECC number with (U)SIM card or without (U)SIM card: **OK** If **<mode>**=2, **<type>**=0 or 1, and at least one **<eccnum>** is specified, delete ECC number with (U)SIM card or without (U)SIM card: **OK** If **<mode>**=3, and both **<type>** and **<eccnum>** are omitted, reset ECC number, and the reset will take effect after rebooting: **OK** If there is any error: **ERROR**
Write Command **AT+QECCNUM=<mode>[,<type>,<eccnum>,<category>]**	Response If **<mode>**=4, **<type>**, **<eccnum>** and **<category>** are specified, add an ECC number with assigned category: **OK** If **<mode>**=5, **<type>**, **<eccnum>** 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** If there is any error: **ERROR**
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 operation. 0 Query ECC number. 1 Add ECC number with default category. 2 Delete ECC number. 3 Reset ECC number list 4 Add ECC number with specified category. 5 Query all emergency call numbers and their categories.
<type>	Integer type. ECC number type. 0 ECC number stored in module without (U)SIM card 1 ECC number stored in module with (U)SIM card 2 ECC number from network 3 ECC number from (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>	String type. ECC number (e.g."110", "119").

NOTE

1. Only the ECC number stored in the module with/without the (U)SIM card can be modified.
2. If a number to be added into the type of ECC numbers with the (U)SIM card already exists in the module, and has been obtained from the network and the (U)SIM card, it cannot be added.
3. The priority for reading ECC number list: ECC number from the network > ECC number from the (U)SIM card > ECC number stored in the module with/without the (U)SIM card.
4. Executing **AT+QECCNUM=<mode>[,<type>[,<eccnum1>[,<eccnum2>[,…[,<eccnum*n*>]]]]]** writes data to NVM. Please proceed with caution.
5. Executing **AT+QECCNUM=<mode>[,<type>,<eccnum>,<category>]** writes data to NVM. Please proceed with caution.

Example

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

OK
AT+QECCNUM?                     //Query 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 ECC numbers stored in module with (U)SIM card.
+QECCNUM: 1,"911","112"

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

OK
AT+QECCNUM=2,1,"110"
//Delete "110" from ECC numbers stored in module with (U)SIM card.
OK
AT+QECCNUM=0,1                  //Query ECC numbers stored in module with (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 stored in module with (U)SIM card.
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,"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 Indicate Call Status

This command indicates the call status.

AT^DSCI Indicate Call Status	
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 URC of DSCI. 0 Disable

1	Enable

NOTE

When the presentation of the DSCI at the TE is enabled, an URC 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. Octet address type (See *3GPP TS 24.008 subclause 10.5.4.7* for details). Usually, it has three value types: 129 Unknown type 145 International type (contains the character "+") 161 National type

Example

```
//Dial a call.
AT^DSCI=1                          //Enable DSCI.
OK
ATD10086;                          //Dial a number.
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 Generate DTMF Tone

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 Generate DTMF Tone	
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** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	Determined by 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. Maximal length: 31 bytes. When sending multiple tones at a time, the time interval of two tones can be specified by **AT+VTD**.
<duration>	Integer type. Tone duration in 1/10 seconds 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 code. For more details, see ***Chapter 13.5***.

Example

```
ATD12345678900;          //Dial a number.
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 DTMF 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 DTMF 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**

	If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The parameters are not saved.
Reference *3GPP TS 27.007*	

Parameter

<duration>	Integer type. Tone duration 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. Time interval of two tones in 1/10 seconds when sending multiple tones at a time by **AT+VTS**. Range: 0–255. Default: 0.
<err>	Error code. For more details, see ***Chapter 13.5***.

7 Phonebook Commands

7.1. AT+CNUM Get Subscriber Number

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

AT+CNUM Get Subscriber Number	
Test Command **AT+CNUM=?**	Response **OK**
Execution Command **AT+CNUM**	Response **[+CNUM: [<alpha>],<number>,<type>]** **[…]** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP 27.007*	

Parameter

<alpha>	String type. 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>	Integer type. Octet address type (See *3GPP TS 24.008 subclause 10.5.4.7*). 129 Unknown type 145 International type (contains the character "+") 161 National type
<err>	Error code. For more details, see *Chapter **13.5***.

7.2. AT+CPBF Find Phonebook Entry

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

AT+CPBF Find Phonebook Entry	
Test Command **AT+CPBF=?**	Response **+CPBF: <nlength>,<tlength>** **OK**
Write Command **AT+CPBF=<findtext>**	Response **[+CPBF: <index>,<number>,<type>,<text>]** **[…]** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	Determined by phonebook entry storage
Characteristics	-
Reference *3GPP 27.007*	

Parameter

<nlength>	Integer type. Maximum length of **<number>**.
<tlength>	Integer type. Maximum length of **<text>**.
<findtext>	String type. Field of maximum length **<tlength>** in current TE character set specified by **AT+CSCS**.
<index>	Integer type. Location number of phonebook memory storage.
<number>	String type. Phone number of format **<type>**.
<type>	Integer type. Octet address type (See *3GPP TS 24.008 subclause 10.5.4.7* for details). 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 code. For more details, see ***Chapter 13.5***.

7.3. AT+CPBR Read Phonebook Entry

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

AT+CPBR Read Phonebook Entry	
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** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	Determined by the phonebook entry storage.
Characteristics	-
Reference *3GPP 27.007*	

Parameter

<index>	Integer type. Location number of phonebook memory storage.
<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>	Integer type. Octet address type (See *3GPP TS 24.008 subclause 10.5.4.7* for details). 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 code. For more details, see ***Chapter 13.5***.

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 phonebook memory storage, the number of used locations and the number of total locations in the phonebook memory storage when supported by manufacturer. The Test Command returns supported storage options as a compound value.

AT+CPBS Select Phonebook Memory Storage	
Test Command **AT+CPBS=?**	Response **+CPBS: (**list of supported **<storage>**s**)** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Read Command **AT+CPBS?**	Response **+CPBS: <storage>[,<used>,<total>]** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Write Command **AT+CPBS=<storage>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP 27.007*	

Parameter

<storage>	String type.

	"SM" (U)SIM phonebook "DC" MT dialed call list (**AT+CPBW** may not be applicable to this storage) "FD" (U)SIM fix dialing-phone book (**AT+CPBW** needs PIN2 authorization) "LD" (U)SIM last dialing-phone book (**AT+CPBW** may not be applicable to this storage) "MC" MT missed (unanswered) call list (**AT+CPBW** may not be applicable to this storage) "ME" Mobile equipment phonebook "RC" MT received call 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 number (MSISDN) list
<used>	Integer type. Count of used location(s) in selected phonebook memory storage.
<total>	Integer type. Count of total location(s) in selected phonebook memory storage.
<err>	Error code. For more details, see ***Chapter 13.5***.

7.5. AT+CPBW Write Phonebook Entry

This command writes phonebook entry with location number **<index>** in the current phonebook memory storage selected with **AT+CPBS**. It can also delete a phonebook entry with 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** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Write Command **AT+CPBW=[<index>][,<number>[,<type>[,<text>]]]**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP 27.007*	

Parameter

<index>	Integer type. Location number of phonebook memory storage.
<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>	Integer type. Octet address type (See *3GPP TS 24.008 subclause 10.5.4.*). 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 code. For more details, see ***Chapter 13.5***.

Example

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

8 Short Message Service Commands

8.1. AT+CSMS Select Message Service

This command selects message service and queries the type of the message 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: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<service>	Integer type. Messaging service type. 0 See *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 See *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 message. 0 Type not supported 1 Type supported
<mo>	Integer type. Mobile originated message. 0 Type not supported 1 Type supported
<bm>	Integer type. Broadcast type message. 0 Type not supported 1 Type supported
<err>	Error code. For more details, see ***Chapter 13.6***.

Example

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

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

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

OK
```

8.2. AT+CMGF Set Message Format

This command specifies the input and output format of the short messages. **<mode>** indicates the format of messages used with message send, list, read and write commands and URCs 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 messages given as separate parameters). Text mode uses the value of **<chset>** specified by **AT+CSCS** to inform the character set to be used in the message body in the TA-TE interface.

AT+CMGF Set Message Format	
Test Command **AT+CMGF=?**	Response **+CMGF: (**list of supported **<mode>**s**)** **OK**
Read Command **AT+CMGF?**	Response **+CMGF: <mode>** **OK**
Write Command/Execution Command **AT+CMGF[=<mode>]**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<mode>	Integer type. Short message input and output format.	
	0	PDU mode
	1	Text mode

8.3. AT+CSCA Set Service Center Address

The Write Command updates the SMSC address through which mobile originated SMSs 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 **<pdu>** that equals zero.

AT+CSCA Set 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 are saved automatically.
Reference *3GPP TS 27.005*	

Parameter

<sca>	String type. Service center address. See *3GPP TS 24.011* RP SC address Address-Value field; 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*).
<tosca>	Integer type. Type of service center address in octet. See *3GPP TS 24.011* RP SC address Type-of-Address.
<pdu>	String type. Service center address in hexadecimal. In case of SMS: *3GPP TS 24.011* SC address followed by *3GPP TS 23.040* TPDU: ME/TA converts each octet of TPDU into two IRA characters, with each octet represented by a pair of hexadecimal numbers (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)).

Example

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

OK
```

8.4. AT+CPMS Select Message Memory Storage

This command selects memory storage to be used for reading, writing, etc.

AT+CPMS Select Message Memory 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: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.
Reference *3GPP TS 27.005*	

Parameter

<mem1>	String type. Message to be read and deleted from this memory storage. "SM" (U)SIM message storage "ME" Mobile equipment message storage "MT" Same as "ME" storage "SR" SMS status report storage location
<mem2>	String type. Message to be written and sent to this memory storage. "SM" (U)SIM message storage "ME" Mobile equipment message storage "MT" Same as "ME" storage "SR" SMS status report storage location
<mem3>	String type. Received message to be placed in this memory storage if routing to PC is not set (see **AT+CNMI**). "SM" (U)SIM message storage "ME" Mobile equipment message storage "MT" Same as "ME" storage "SR" SMS status report storage location
<used>	Integer type. Number of current message(s) in **<mem*n*>**.
<total>	Integer type. Number of total message(s) that can be stored in **<mem*n*>**.

<err>	Error code. For more details, see ***Chapter 13.6***.

NOTE

Executing **AT+CPMS=<mem1>[,<mem2>[,<mem3>]]** writes data to NVM. Please proceed with caution.

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 to "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 Message

This command deletes short message from the preferred message storage **<mem1>** location **<index>**. If **<delflag>** is presented and not set to 0, ME ignores **<index>** and follows the rules of **<delflag>** shown 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: **ERROR** Or **+CMS ERROR:<err>**

Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<index>	Integer type. Location number supported by the memory storage .
<delflag>	Integer type. Flag indicating message deletion request. 0 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>**
<mem1>	String type. Messages to be read and deleted from the 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 code. For more details, see ***Chapter 13.6***.

NOTE

Executing **AT+CMGD=<index>[,<delflag>]** writes data to NVM. Please proceed with caution.

Example

```
AT+CMGD=1                    //Delete the message specified in location 1.
OK
AT+CMGD=1,4                  //Delete all messages from the memory storage.
OK
```

8.6. AT+CMGL Read Message by Status

This command returns message(s) with status parameter **<stat>** from preferred message storage **<mem1>** to 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 parameter **<stat>**, it reports the list of SMS with "REC UNREAD" status.

AT+CMGL Read Message by Status	
Test Command **AT+CMGL=?**	Response **+CMGL: (**list/range of supported **<stat>**s**)** **OK**
Write Command **AT+CMGL[=<stat>]**	Response If in text mode (**AT+CMGF=1**) and the command is executed successfully: For SMS-SUBMITs and/or SMS-DELIVERs: **+CMGL: <index>,<stat>,<oa/da>,[<alpha>],[<scts>][,<toa/toda>,<length>]<CR><LF><data>[<CR><LF>]** **[...]** For SMS-STATUS-REPORTs: **+CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[<CR><LF>]** **[...]** For SMS-COMMANDs: **+CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF>]** **[…]** For CBM storage: **+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[<CR><LF>]** **[...]** **OK** If in PDU mode (**AT+CMGF=0**) and the command is executed successfully: **+CMGL: <index>,<stat>,[<alpha>],<length><CR><LF><pdu>[<CR><LF>]** **[...]** **OK** If there is any error: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	The response time of **<stat>** operation depends on the

	storage of listed messages. The maximum response time is 300 ms.
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<mem1>	String type. Messages to be read and deleted from the memory storage. "SM" (U)SIM message storage "ME" Mobile equipment message storage "MT" Same as "ME" storage "SR" SMS status report storage location
<stat>	Integer type (PDU mode), or string type (text mode). Message status in the storage. In text mode: "REC UNREAD" Received unread message "REC READ" Received read message "STO UNSENT" Stored unsent message "STO SENT" Stored sent message "ALL" All messages In PDU mode: 0 Received unread message 1 Received read message 2 Stored unsent message 3 Stored sent message 4 All messages
<index>	Integer type. Location number supported by the memory storage.
<da>	String type. Destination address. See *3GPP TS 23.040* TP-Destination-Address Address-Value field. 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>	String type. Originating address. See *3GPP TS 23.040* TP-Originating-Address Address-Value field. 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>**.
<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 *3GPP TS 27.007*).
<scts>	String type. Service center time stamp. See *3GPP TS 23.040* TP-Service-Centre-Time-Stamp (format see **<dt>** in ***Chapter 8.7***).
<toda>	Integer type. Type of destination address in octet. See *3GPP TS 24.011* TP-Destination-Address Type-of-Address.

<tooa>	Integer type. Type of originating address in octet. See *3GPP TS 24.011* TP-Originating-Address Type-of-Address.
<length>	Integer type. Message length. Unit: byte. In text mode (**AT+CMGF=1**): length of the message body **<data>** in characters. In PDU mode (**AT+CMGF=0**): length of the actual TPDU in octet (i.e. the RP layer SMSC address octets are not counted in the length).
<data>	In 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) 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 characters, with each octet represented by a pair of hexadecimal numbers (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). In the case 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 characters, with each octet represented by a pair of hexadecimal numbers.
<fo>	Integer type. It depends on the command or result code: the first octet of *3GPP TS 23.040* SMS-DELIVER, SMS-SUBMIT (default value 17), SMS-STATUS-REPORT, or SMS-COMMAND (default value 2).
<mr>	Integer type. Message reference. See *3GPP TS 23.040* TP-Message-Reference.
<ra>	String type. Recipient address. See *3GPP TS 23.040* TP-Recipient-Address Address-Value field; BCD numbers (or GSM 7-bit default alphabet characters) are converted to characters of the currently selected TE character set (see command **AT+CSCS** in *3GPP TS 27.007*).
<tora>	Integer type. Type of recipient address in octet. See *3GPP TS 24.011* TP-Recipient-Address Type-of-Address.
<dt>	String type. *3GPP TS 23.040* TP-Discharge-Time. 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>	Integer type. See *3GPP TS 23.040* TP-Status.

<ct>	Integer type. Default value: 0. See *3GPP TS 23.040* TP-Command-Type.
<sn>	Integer type. See *3GPP TS 23.041* CBM Serial Number.
<mid>	Integer type. See *3GPP TS 23.041* CBM Message Identifier.
<page>	Integer type. See *3GPP TS 23.041* CBM Page Parameter bits 4–7.
<pages>	Integer type. See *3GPP TS 23.041* CBM Page Parameter bits 0–3.
<pdu>	String type. Service center address in hexadecimal. In case of SMS: *3GPP TS 24.011* SC address followed by *3GPP TS 23.040* TPDU: 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)).
<err>	Error code. For more details, see ***Chapter 13.6***.

Example

```
AT+CMGF=1                          //Set SMS format to 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 Message by Index

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

	p>],<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: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	Depends on the length of message content.
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<index>	Integer type. Location number supported by the memory storage.
<stat>	Integer type (PDU mode), or string type (text mode). Message status in the storage. In text mode: "REC UNREAD" Received unread message

	"REC READ"	Received read message
	"STO UNSENT"	Stored unsent message
	"STO SENT"	Stored sent message
	"ALL"	All messages
	In PDU mode:	
	0	Received unread message
	1	Received read message
	2	Stored unsent message
	3	Stored sent message
	4	All messages
<oa>	String type. Originating address. See *3GPP TS 23.040* TP-Originating-Address Address-Value field. 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>**.	
<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 *3GPP TS 27.007*).	
<scts>	String type. Service center time stamp. See *3GPP TS 23.040* TP-Service-Centre-Time-Stamp (see **<dt>**).	
<tooa>	Integer type. Type of originating address in octet. See *3GPP TS 24.011* TP-Originating-Address Type-of-Address.	
<fo>	Integer type in octet. It depends on the command or result code: the first octet of *3GPP TS 23.040* SMS-DELIVER, SMS-SUBMIT (default value 17), SMS-STATUS-REPORT, or SMS-COMMAND.	
<pid>	Integer type. Protocol identifier. Default value: 0. See *3GPP TS 23.040* TP-Protocol-Identifier.	
<dcs>	Integer type. Data coding scheme. It depends on the command or result code: *3GPP TS 23.038* SMS Data Coding Scheme (default value 0), or Cell Broadcast Data Coding Scheme.	
<sca>	String type. Service center address. See *3GPP TS 24.011* RP SC address Address-Value field. 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>	Integer type. Type of service center address in octet. See *3GPP TS 24.011* RP SC address Type-of-Address.	
<length>	Integer type. Message length. Unit: byte. In text mode (**AT+CMGF=1**): length of the message body **<data>** (or **<cdata>**) in characters. In PDU mode (**AT+CMGF=0**): length of the actual TPDU in octet (i.e. the RP layer SMSC address octets are not counted in the length).	
<data>	String type. Text of short message.	
<da>	String type. Destination address. See *3GPP TS 23.040* TP-Destination-Address Address-Value field. 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>**.
<toda>	Integer type. Type of destination address in octet. See *3GPP TS 24.011* TP-Destination-Address Type-of-Address.
<vp>	Integer type or time-string type. Validity period. It depends on SMS-SUBMIT **<fo>** setting: *3GPP TS 23.040* TP-Validity-Period (format see **<dt>**).
<mr>	Integer type. Message reference. See *3GPP TS 23.040* TP-Message-Reference.
<ra>	String type. Recipient address. See *3GPP TS 23.040* TP-Recipient-Address Address-Value field. 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>	Integer type. Type of recipient address in octet. See *3GPP TS 24.011* TP-Recipient-Address Type-of-Address.
<dt>	String type. *3GPP TS 23.040* TP-Discharge-Time. 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>	Integer type. See *3GPP TS 23.040* TP-Status.
<ct>	Integer type. See *3GPP TS 23.040* TP-Command-Type (default value 0).
<mn>	Integer type. Message number. See *3GPP TS 23.040* TP-Message-Number.
<cdata>	String type. See 3GPP TS 23.040 TP-Command-Data in text mode responses; ME/TA converts each 8-bit octet into two IRA characters, with each octet represented by a pair of hexadecimal numbers (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)).
<sn>	Integer type. See *3GPP TS 23.041* CBM Serial Number.
<mid>	Integer type. See *3GPP TS 23.041* CBM Message Identifier.
<page>	Integer type. See *3GPP TS 23.041* CBM Page Parameter bits 4–7.
<pages>	Integer type. See *3GPP TS 23.041* CBM Page Parameter bits 0–3.
<pdu>	String type. Service center address in hexadecimal. In case of SMS: 3GPP TS 24.011 SC address followed by 3GPP TS 23.040 TPDU: ME/TA converts each octet of TP data unit into two IRA characters, with each octet represented by a pair of hexadecimal numbers (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)).
<err>	Error code. For more details, see ***Chapter 13.6***.

Example

```
+CMTI: "SM",3                                   //A new message has been received and saved
AT+CSDH=1                                       //Show the values in result codes.
OK
AT+CMGR=3                                       //Read message.
+CMGR: "REC UNREAD","+8615021012496",,"13/12/13,15:06:37+32",145,4,0,0,"+8613800210500",145,27
<This is a test from Quectel>
```

OK

8.8. AT+CMGS Send Message

This command sends a short message from TE to the network (SMS-SUBMIT). After invoking the Write Command, wait for the prompt **>** and then write the message. After that, tap **CTRL** + **Z** to indicate the ending of PDU and initiate message sending. Tap **Esc** to cancel the sending. Abortion is acknowledged with **OK**, though the message will not be sent. On successful message delivery, the message reference **<mr>** is returned to TE. The value can be used to identify the message upon unsolicited delivery of a status report result code.

AT+CMGS Send Message	
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 returned, input the message to be sent. Tap **CTRL** + **Z** to send the message or tap **Esc** to cancel the sending. If the message is sent successfully: **+CMGS: <mr>** **OK** If there is any error: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	120 s, determined by the network.
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<da>	String type. Destination address. See *3GPP TS 23.040* TP-Destination-Address Address-Value field. 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>**.
<toda>	Integer type. Type of destination address in octet. See *3GPP TS 24.011* TP-

	Destination-Address Type-of-Address.
<length>	Message length. In text mode (**AT+CMGF=1**): length of the message body in characters. In PDU mode (**AT+CMGF=0**): length of the actual TPDU in octet (i.e. the RP layer SMSC address octets are not counted in the length).
<mr>	Integer type. Message reference. See *3GPP TS 23.040* TP-Message-Reference.
<err>	Error code. For more details, see ***Chapter 13.6***.

Example

```
AT+CMGF=1                          //Set SMS message format to text mode.
OK
AT+CSCS="GSM"                      //Set character set to GSM used by TE.
OK
AT+CMGS="15021012496"
>This is a test from Quectel      //Enter the message and tap CTRL + Z to send message.
+CMGS: 247

OK
```

8.9. AT+CMMS Send Multiple Messages

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

AT+CMMS Send Multiple 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** If there is any error: **ERROR** Or **+CMS ERROR: <err>**

Maximum Response Time	120 s, determined by network.
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<n>	Integer type. 0 Feature disabled 1 Keep enabled until the time between the response of the latest command 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 closes the link automatically and switches **<n>** back to 0. 2 Feature enabled. If the time between the response of the latest command to be sent and the next command to be sent exceeds 1–5 seconds (the exact value is up to ME implementation), ME closes the link but MT does not automatically switch **<n>** back to 0.
<err>	Error code. For more details, see ***Chapter 13.6***.

NOTE

Once the Read Command is executed, a delay of 5–10 seconds is required before issuing the Write Command. Otherwise **+CMS ERROR: 500** may be returned.

8.10. AT+CMGW Write Message to Memory Storage

This command stores short messages from TE to memory storage **<mem2>**, and then the location **<index>** of the stored message is returned. Message status will be set to "STO UNSENT" by default; but **<stat>** also allows entering other status values.

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

AT+CMGW Write Message to Memory Storage	
Test Command **AT+CMGW=?**	Response **OK**
Write Command 1) If in text mode (**AT+CMGF=1**): **AT+CMGW=<oa/da>[,<tooa/toda>[,<stat>]]**	Response **>** After **>** is returned, input the message to be sent. Tap **CTRL** + **Z** to send the message or tap **Esc** to cancel the sending.

2) If in PDU mode (**AT+CMGF=0**): **AT+CMGW=<length>[,<stat>]**	If message writing is successful: **+CMGW: <index>** **OK** If there is any error: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<da>	String type. Destination address. See *3GPP TS 23.040* TP-Destination-Address Address-Value field. 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>	String type. Originating address. See *3GPP TS 23.040* TP-Originating-Address Address-Value field. 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>	Integer type. Type of originating address in octet. See *3GPP TS 24.011* TP-Originating-Address Type-of-Address.
<stat>	Integer type (PDU mode), or string type (text mode). Message status in the storage. In text mode: "REC UNREAD" Received unread message "REC READ" Received read message "STO UNSENT" Stored unsent message "STO SENT" Stored sent message "ALL" All messages In PDU mode: 0 Received unread message 1 Received read message 2 Stored unsent message 3 Stored sent message 4 All messages
<toda>	Integer type. Type of destination address in octet. See *3GPP TS 24.011* TP-Destination-Address Type-of-Address.
<length>	Integer type. Message length. Unit: byte.

	In text mode (**AT+CMGF=1**): length of the message body in characters. In PDU mode (**AT+CMGF=0**): length of the actual TPDU in octet (i.e. the RP layer SMSC address octets are not counted in the length).
<index>	Integer type. Index of message in the memory storage **<mem2>**.
<mem2>	String type. Message to be written and sent to the 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 code. For more details, see ***Chapter 13.6***.

NOTE

1. Executing **AT+CMGW** writes data to NVM. Please proceed with caution.
2. For details about **<pdu>**, See ***Chapter 8.2***.

Example

```
AT+CMGF=1                                  //Set SMS message format to text mode.
OK
AT+CSCS="GSM"                              //Set character set to GSM used by TE.
OK
AT+CMGW="15021012496"
>This is a test from Quectel              //Enter message in text and tap CTRL + Z to write message.
+CMGW: 4

OK
AT+CMGF=0                                  //Set SMS message format to PDU mode.
OK
AT+CMGW=18
>0051FF00000008000A0500030002016D4B8BD5
+CMGW: 5

OK
```

8.11. AT+CMSS Send Messages from Memory Storage

This command sends a message with location parameter **<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 old one contained in the message stored in the memory storage. Reference value **<mr>** is returned to TE on successful message delivery. The value can be used to identify the message upon unsolicited delivery status report result code.

AT+CMSS Send Messages from Memory 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: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	120 s, determined by network.
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<index>	Integer type. Location number supported by the memory storage.
<da>	String type. Destination Address. 3GPP TS 23.040 TP-Destination-Address Address-Value field. 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>**.
<toda>	Integer type. Type of destination address in octet. See *3GPP TS 24.011* TP-Destination-Address Type-of-Address.
<mr>	Integer type. Message reference. See *3GPP TS 23.040* TP-Message-Reference.
<scts>	String type. Service center time stamp. See *3GPP TS 23.040* TP-Service-Centre-Time-Stamp (format see **<dt>** in ***Chapter 8.7***).
<ackpdu>	String type. *3GPP TS 23.040* RP-User-Data element of RP-ACK PDU. Format is the same with **<pdu>** in case of SMS, but without *3GPP TS 24.011* SC address field.
<mem2>	String type. Messages to be written and sent to the 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 code. For more details, see ***Chapter 13.6*.**	

Example

```
AT+CMGF=1                    //Set SMS message format to text mode.
OK
AT+CSCS="GSM"                //Set character set to GSM used by TE.
OK
AT+CMGW="15021012496"
>Hello                       //Enter message in text and tap CTRL + Z to send message.
+CMGW: 4

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

OK
```

8.12. AT+CNMA New Message Acknowledgement

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

AT+CNMA New Message Acknowledgement	
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** If there is any error: **ERROR**

	Or **+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** If there is any error: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<n>	Integer type. Parameter required only for PDU mode 0 Command operates similarly as in text mode 1 Send positive (**RP-ACK**) acknowledgement to the network. Accepted only in PDU mode. 2 Send negative (**RP-ERROR**) acknowledgement to the network. Accepted only in PDU mode.
<length>	Integer type. Message length. Unit: byte. Length of actual TPDU in octets (i.e. the RP layer SMSC address octets are not counted in the length) in PDU mode (**AT+CMGF=0**).
<err>	Error code. For more details, see ***Chapter 13.6***.

NOTE

The Execution and Write Commands are only used when **<service>** of **AT+CSMS** equals 1 (phase 2+) and an appropriate URC has been issued by MT, i.e.:

1) **+CMT** when **<mt>**=2 in **AT+CNMI**, i.e. incoming message classes 0, 1, 3 and none.
2) **+CMT** when **<mt>**=3 in **AT+CNMI**, i.e. incoming message classes 0 and 3.
3) **+CDS** when **<ds>**=1 in **AT+CNMI**.

Example

```
AT+CSMS=1
OK
AT+CNMI=1,2,0,0,0
OK
AT+CMGF=1                    //Set SMS message format to text mode.
OK
```

```
AT+CSDH=1                          //Show the values in result codes
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 upon incoming SMS.
AT+CNMA                            //Send ACK to the network.
OK
AT+CNMA                            //Send ACK to the network.
+CMS ERROR: 340                    //An error is returned on the second attempt; only one ACK is required.
```

8.13. AT+CNMI Set New Message Indication

This command selects how the received new message from the network are indicated to 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)), the message should be received as specified in *3GPP TS 23.038*.

AT+CNMI Set New Message Indication	
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** If there is any error: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.
Reference *3GPP TS 27.005*	

Parameter

<mode>	Integer type. 0 Buffer URC in MT. If MT result code buffer is full, the indication can be buffered in some other place or the oldest indication may be discarded and replaced with the new received indication. 1 Discard the indication and reject new received message URC when MT-TE link is reserved (e.g. in data mode). Otherwise, forward directly to TE. 2 Buffer URC in MT when MT-TE link is reserved (e.g. in data mode) and flush URC to TE after reservation. Otherwise forward directly to TE.
<mt>	Integer type. Rule for storing received message, which depends on its data coding scheme (see *3GPPTS 23.038*) and preferred memory storage (**AT+CPMS**) setting. 0 No SMS-DELIVER indication is routed to TE. 1 If SMS-DELIVER is stored into ME/TA, the indication of the memory location is routed to TE by URC: **+CMTI: <mem>,<index>**. 2 SMS-DELIVER (except Class 2) is routed directly to TE by URC: **+CMT: [<alpha>],<length><CR><LF><pdu>** (PDU mode enabled) or URC **+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 message results in indication as defined in **<mt>**=1. 3 Class 3 SMS-DELIVER is routed directly to TE by URC defined in **<mt>**=2. Message of other classes results in indication as defined in **<mt>**=1.
<bm>	Integer type. Rule for storing received CBM, which depends on its data coding scheme (see *3GPP TS 23.038*) and the setting of selected CBM types (**AT+CSCB**). 0 No CBM indication is routed to TE. 2 New CBM is routed directly to TE by URC: **+CBM: <length><CR><LF><pdu>** (PDU mode enabled); or URC **+CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>** (text mode enabled).
<ds>	Integer type. 0 No SMS-STATUS-REPORT is routed to TE. 1 SMS-STATUS-REPORT is routed to TE by URC: **+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, the indication of the memory location is routed to TE by URC: **+CDSI: <mem>,<index>**
<bfr>	Integer type. 0 TA buffer of URC defined within this command is flushed to TE when **<mode>** is 1 or 2 (response **OK** shall be given before flushing). 1 TA buffer of URC defined within this command is cleared when **<mode>** is 1 or 2.
<err>	Error code. For more details, see ***Chapter 13.6***.

NOTE

1.	URC **+CMTI: <mem>,<index>**	A new message has been received.
2.	URC **+CMT: [<alpha>],<length><CR><LF><pdu>**	A short message is output directly.
3.	URC **+CBM: <length><CR><LF><pdu>**	A cell broadcast message is output directly.

Example

```
AT+CMGF=1                    //Set SMS message format to text mode.
OK
AT+CSCS="GSM"                //Set character set to GSM, which is used by TE.
OK
AT+CNMI=1,2,0,1,0            //Set SMS-DELIVER to be routed directly to TE.
OK
AT+CSDH=1                    //Show text mode parameter.
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 output directly when an SMS is incoming.
```

8.14. AT+CSCB Select Cell Broadcast Message Type

This command selects the types of CBMs 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: **ERROR** Or **+CMS ERROR: <err>**
Maximum Response Time	300 ms

Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

<mode>	Integer type. 0 Message type specified in **<mids>** and **<dcss>** is accepted 1 Message type specified in **<mids>** and **<dcss>** is 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 code. For more details, see ***Chapter 13.6***.

8.15. AT+CSDH Show Text Mode Parameter

This command controls whether to show detailed header information in text mode result codes.

AT+CSDH Show Text Mode Parameter	
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 detailed header information: for SMS-DELIVERs and SMS-SUBMITs in text mode, URCs **+CSCA** and **+CSMP** do not contain **<sca>**, **<tosca>**, **<fo>**, **<vp>**, **<pid>** or **<dcs>** and URCs **+CMT**, **+CMGL** and **+CMGR** do not contain **<length>**, **<toda>** or **<tooa>**.
	1	Show the values in result codes

Example

```
AT+CSDH=0                  //Disable text mode parameter presentation.
OK
AT+CMGR=2                  //Read the message whose <index> is 2.
+CMGR: "STO UNSENT","",
<This is a test from Quectel>

OK
AT+CSDH=1                  //Enable text mode parameter presentation.
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 Parameter

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 also possible to set the validity period starting from when a short message is received by SMSC (**<vp>** ranges from 0 to 255) or define the absolute time of validity period termination (**<vp>** is a string).

AT+CSMP Set Text Mode Parameter	
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**

]]	Or **ERROR**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.005*	

Parameter

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

9 Packet Domain Commands

9.1. AT+CGATT Attach to or Detach from PS

This command attaches or detaches MT to/from the packet domain service. After the command has been completed, MT remains in V.250 command state. If MT is already in the requested state, the command will be ignored and the **OK** response returned. If the requested state cannot be achieved, an **ERROR** or **+CME ERROR** response will be returned.

AT+CGATT Attach to or Detach from 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** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	140 s, determined by the network.
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

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

	Other values are reserved and will result in an **ERROR** response to the Write Command.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

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

OK
```

9.2. AT+CGACT Activate or Deactivate PDP Context

This command activates or deactivates the specified PDP context(s). If a PDP context is already in the requested state, the state for that context remains unchanged. Failure to achieve the requested state will result in an **ERROR** or **+CME ERROR**. Extended error response is enabled by **AT+CMEE**.

If MT is not PS attached when the activation command is executed, MT will first attempt attachment and then activate the specified context. In case of attachment failure, MT responds with **ERROR** or, if extended error response is enabled, with the appropriate failure-to-attach error message.

For EPS, in case of an attempt to disconnect the last PDN connection, MT responds with **ERROR**, or, if extended error response is enabled, it responds with **+CME ERROR**. The activation request for an EPS bearer resource will be answered by the network by either an EPS dedicated bearer activation or an EPS bearer modification request. The request must be accepted by MT before the PDP context can be set to an established state.

For 5GS, the command is used to request or delete the specified QoS flow. The request for a specific QoS flow will be answered by the network by either a PDU session establishment accept message or a PDU session modification command message. The message must be accepted by the MT before the QoS flow can be set to active state.

AT+CGACT Activate or Deactivate PDP Context	
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>[,<cid1>[,<cid2>[,…]]]]**	Response **OK** Or **NO CARRIER** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	150 s, determined by network.
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<state>	Integer type. PDP context activation status. 0 Deactivated 1 Activated Other values are reserved and will result in an **ERROR** response to the Write Command.
<cid>	Integer type. Particular PDP context definition (see **AT+CGDCONT**).
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

```
AT+CGDCONT=4,"IP","UNINET"          //Define a PDP context.
OK
AT+CGACT=1,4                        //PDP activated.
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                        //PDP deactivated.
OK
```

9.3. AT+CGDATA Enter Data State

This Write Command causes MT to perform the necessary action to establish communication between TE and the network using one or more packet domain PDP type(s). This may include performing a PS attachment and one or more PDP context activation(s). Any command following **AT+CGDATA** in the AT command line will not be processed by MT.

If the **<L2P>** value is unacceptable to MT, MT returns an **ERROR** or **+CME ERROR**. Otherwise, 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 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** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<L2P>	String type. Layer 2 protocol to be used between TE and MT: "PPP" Point to Point protocol for PDP such as IP Other values are not supported and will result in an **ERROR** response to the Write Command.
<cid>	Integer type. Particular PDP context definition (see **AT+CGDCONT**).
<err>	Error code. For more details, see ***Chapter 13.5***.

9.4. 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=[<cid1>[,<cid2>[,…]]]**	Response **+CGPADDR: <cid>,<PDP_addr>** **[…]** **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<cid>	Integer type. Particular PDP context definition (see **AT+CGDCONT**).
<PDP_addr>	String type. MT in the address space applicable to PDP. The address may be static or dynamic. For a static address, it is the one set by **AT+CGDCONT** when the context is 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.
<err>	Error code. For more details, see ***Chapter 13.5***.

Example

```
AT+CGDCONT=1,"IP","UNINET"          //Define a PDP context.
OK
AT+CGACT=1,1                        //PDP activated.
OK
```

```
AT+CGPADDR=1                    //Show the PDP address.
+CGPADDR: 1,"10.76.51.180"

OK
```

9.5. AT+CGEREP Report Packet Domain Event

This command enables/disables sending of URC **+CGEV** from MT to TE in case of certain event occurring in the packet domain MT or the network. **<mode>** controls the processing of URC specified within this command. **<bfr>** controls the effect on buffered code 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** If there is any error: **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 URC in MT. If MT result code buffer is full, the oldest ones can be discarded. No codes are forwarded to TE.

	1 Discard URC when MT-TE link is reserved (e.g. in on-line data mode); otherwise forward directly to TE. 2 Buffer URC in MT when MT-TE link is reserved (e.g. in on-line data mode) and flush URC to TE when MT-TE link becomes available; otherwise forward directly to TE.
<bfr>	Integer type. 0 MT buffer of URC defined within this command is cleaned when **<mode>** 1 or 2 is specified. 1 MT buffer of URC defined within this command is flushed to TE when **<mode>** 1 or 2 is specified (**OK** should be given before flushing).

NOTE

The URCs and the corresponding events are defined as follows:

1. **+CGEV: REJECT <PDP_type>,<PDP_addr>**: A network request for PDP context activation occurs when MT is unable to report it to TE with URC **+CRING** and is automatically rejected. 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. **<cid>** used to reactivate the context is provided if known to MT This event is not applicable for EPS.
3. **+CGEV: NW DEACT <PDP_type>,<PDP_addr>,[<cid>]**: The network has forced a context deactivation. **<cid>** used to activate the context is provided if known to MT.
4. **+CGEV: ME DEACT <PDP_type>,<PDP_addr>,[<cid>]**: The mobile equipment has forced a context deactivation. **<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 contexts 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 contexts 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** in *3GPP 27.007 subclause 10.1.7*).
8. **+CGEV: ME CLASS<class>**: The mobile equipment has forced a change of MS class. The highest available class is reported (see **AT+CGCLASS** in *3GPP 27.007 subclause 10.1.7*).
9. **+CGEV: PDN ACT<cid>**: activate a context. The context represents a PDN connection in LTE or a primary PDP context in GSM/UMTS.
10. **+CGEV: PDN DEACT<cid>**: deactivate a context. The context represents a PDN connection in LTE or a primary PDP context in GSM/UMTS.

Parameter

<PDP_type>	String type. Packet data protocol type.	
	"IP"	IPv4
	"PPP"	PPP
	"IPV6"	IPv6
	"IPV4V6"	IPv4v6

<PDP_addr>	String type. MT in the address space applicable to PDP. If the value is null or omitted, then a value may be provided by TE during PDP.
<cid>	Integer type. PDP context identifier. The parameter is local to the TE-MT interface and is used in other PDP context-related commands. The range of permitted values (minimum value=1) are returned by the test form of **AT+CGDCONT**.
<class>	String type. 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             //A context activated.
OK

+CGEV: PDN ACT2
AT+CGACT=0,2             //A context deactivated.
OK

+CGEV: PDN DEACT2
```

9.6. AT+CGSMS Select Service for MO SMS Messages

This command specifies the service or service preference that 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: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<service>	Integer type. 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 code. For more details, see ***Chapter 13.5***.	

NOTE

Executing **AT+CGSMS=<service>** writes data to NVM. Please proceed with caution.

9.7. AT+QGDNRCNT Packet Data Counter (5G Supported)

This command queries the data traffic information sent and received by MT. Compared with **AT+QGDCNT**, this AT command further supports the packet data counter in 5G network.

AT+QGDNRCNT Packet Data Counter (5G Supported)	
Test Command **AT+QGDNRCNT=?**	Response **+QGDNRCNT: (**list of supported **<op>**s**)**

	OK
Read Command **AT+QGDNRCNT?**	Response **+QGDNRCNT: <bytes_sent>,<bytes_recv>** **OK**
Write Command **AT+QGDNRCNT=<op>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference	-

Parameter

<op>	Integer type. Operation about packet data counter. 0 Reset the packet data counter 1 Save the result of the packet data counter to NVM
<bytes_sent>	Integer type. Byte(s) of sent data traffic.
<bytes_recv>	Integer type. Byte(s) of received data traffic.
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

1. Once MT is powered on, it retrieves the values for **<bytes_recv>** and **<bytes_sent>** from the packet data counter in NVM. The default value in NVM is 0.
2. **AT+QGDNRCNT=1** can write the data traffic 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 the data traffic to NVM, it is recommended that the interval between such operations is more than 60 seconds.
3. Executing **AT+QGDNRCNT=0** or **AT+QGDNRCNT=1** writes data to NVM. Please proceed with caution.

Example

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

OK
```

```
AT+QGDNRCNT?          //Query the current sent and received data.
+QGDNRCNT: 3832,4618

OK
AT+QGDNRCNT=1         //Write the data traffic to NVM.
OK
AT+QGDNRCNT=0         //Reset the packet data counter.
OK
```

9.8. AT+QAUGDCNT Auto Save Packet Data Counter

This command allows **AT+QGDNRCNT** to save the result 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** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference	-

Parameter

<value>	Integer type. Time-interval for **AT+QGDNRCNT** to save the result to NVM automatically. Range: 0, 30–65535. Default value: 0. Unit: second. If it is set to 0, auto-save feature is disabled.
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

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

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
```

9.9. AT+QNETDEVSTATUS Query RmNet Device Status

This command queries 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 is in progress, **<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 is not 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 RmNet call is disconnected 1 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 number: **+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: **ERROR**

	Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<reads>	Integer type. Call forwarding condition. 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. Operation type. 0 Disable 1 Enable 2 Query status 3 Register 4 Erasure
<number>	String type. Phone number of forwarding address in format specified by **<type>**.
<type>	Integer type. Address type. The default value is 145 when the dialing string includes international access code character "+"; otherwise 129.
<subaddr>	String type. Sub-address in the format specified by **<satype>**.
<satype>	Integer type. Sub-address type.
<class>	Integer type. Each represents a class of information. 1 Voice (telephony) 2 Data (various bearer services included, with exceptions in cases where TA does not support values 16, 32, 64 and 128 with **<mode>**=2) 4 Fax (facsimile services) 7 Voice, data and fax 8 Short message service 16 Data circuit synchronization 32 Data circuit asynchronization 64 Dedicated packet access 128 Dedicated PAD access
<time>	Integer type. Time in seconds to wait before a call is forwarded when "no reply", "all call forwarding" or "all conditional call forwarding" is enabled or queried. Range: 1–30. Default value: 20
<status>	Integer type.

	0	Not active
	1	Active
<err>	Error code. For more details, see ***Chapter 13.5***.	

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: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<n>	Integer type. Enable or disable URC presentation. When call waiting is enabled and active on MT, and a terminating call occurs during an ongoing call, an URC is returned in the following format: **+CCWA: <number>,<type>,<class>[,<alpha>][,<CLI_validity>[,<subaddr>,<satype>[,<priority>]]]** 0 Disable 1 Enable
<mode>	Integer type. When **<mode>** is omitted, the network is not interrogated. 0 Disable 1 Enable 2 Query status
<class>	Integer type. Each represents a class of information. 1 Voice (telephony) 2 Data (various bearer services included, with exceptions in cases where 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. It indicates 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>	Integer type. Address type in octet. 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 the phonebook.
<CLI_validity>	Integer type. Reason 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 24.008table 10.5.135a/3GPP TS 24.008* code "Reject by user") 2 CLI is not available due to interworking problems or limitations of originating network (see *3GPP TS 24.008 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") If CLI is unavailable (**<CLI_validity>**=2, 3 or 4), **<number>** is an empty string ("") and **<type>** 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 CLIP is provisioned with the "override category" option (see *3GPP TS 22.081 and 3GPP TS 23.081*), both **<number>** and **<type>** are provided. Otherwise, TA returns the same settings for **<number>** and **<type>** as if CLI is unavailable.
<subaddr>	String type. Sub-address of format specified by **<satype>**.
<satype>	Integer type. Sub-address in octet (see *3GPP TS 24.008 subclause 10.5.4.8*).
<priority>	Optional digit type. eMLPP priority level of the incoming call. Priority level value is as defined in eMLPP specification *3GPP TS 22.067*.
<err>	Error code. For more details, see ***Chapter 13.5***.

NOTE

1. **<status>**=0 should be returned only if the service is not active for **<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. Executing **AT+CCWA=<n>,<mode>,<class>** writes data to NVM. Please proceed with caution.

Example

```
AT+CCWA=1,1                    //Enable URC presentation.
OK
ATD10086;                      //Establish a call.
```

OK

+CCWA: "02154450293",129,1 //Waiting call.

10.3. AT+CHLD Call-Related Supplementary Services

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

- Temporary disconnection of a call from MT, while retaining the connection with the network;
- Multiparty conversation (conference calls);
- The served subscriber with two calls (one on hold and the other either active or alerting) can connect other parties and release their own connection.

The call 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*);
- 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: **ERROR** Or **+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 or held call).
	1X	Terminate the specific call number X (X = 1–7)
	2	Place all active calls on hold (if any) and accept the other call (waiting call or held call) as the active call.
	2X	Place all active calls except call X (X = 1–7) on hold
	3	Add a held call to active calls
	4	Connect the two calls and disconnect the subscriber from both calls (ECT)
<err>	Error code. For more details, see ***Chapter 13.5***.	

Example

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

+CCWA: "02154450293",129,1                  //Indication of a waiting call.
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 active calls to set up a conference
                                             (multiparty) call.
OK
AT+CLCC
+CLCC: 1,0,0,0,1,"10086",129                //The first call is active.
+CLCC: 2,1,0,0,1,"02154450293",129          //The second call is active.
```

OK

10.4. AT+CLIP Present Calling Line Identification

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 Present Calling Line Identification	
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: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	15 s, determined by network.
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<n>	Integer type. Enable or disable reporting of URC presentation status to TE. When the CLIP presentation at TE is enabled (and permitted by the calling subscriber), an URC is returned after every **RING** (or **+CRING: <type>**) at a mobile terminating call: **+CLIP: <number>,<type>,[subaddr],[satype],[<alpha>],<CLI_validity>** 0 Disable URC 1 Enable URC
<m>	Integer type. 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>	Integer type. Sub-address type in octet (see *3GPP TS 24.008 subclause 10.5.4.8*)	
<type>	Integer type. Address type in octet.	
	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 the phonebook.	
<CLI_validity>	Integer type. Reason 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 code. For more details, see ***Chapter 13.5***.	

Example

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

RING

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

10.5. AT+CLIR Restrict Calling Line Identification

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 Restrict Calling Line Identification	
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: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	15 s, determined by network.
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<n>	Integer type. Outgoing call adjustment. 0 Presentation indicator is used according to the subscription of the CLIR service 1 CLIR invocation 2 CLIR suppression
<m>	Integer type. 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 code. For more details, see ***Chapter 13.5***.

10.6. AT+COLP Present Connected Line Identification

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 COL presentation at TE for a

mobile originated a call. It has no effect on the execution of the supplementary service COLR in the network.

AT+COLP Present Connected Line Identification	
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** Or **ERROR**
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 MT. 0 Disable 1 Enable. When enabled (and permitted by the calling subscriber), an intermediate result code is returned before any +CR or V.25ter responses: **+COLP: <number>,<type>,[<subaddr>],[<satype>],[<alpha>]**
<m>	Integer type. 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. Address type in octet. 129 Unknown type (ISDN format number) 145 International number type (ISDN format)
<subaddr>	String type. Sub-address of format specified by **<satype>**.
<satype>	Integer type. Sub-address type in octet (see *3GPP TS 24.008 subclause 10.5.4.8*).
<alpha>	Optional string. Alphanumeric representation of **<number>** corresponding to the entry found in the phonebook.

Example

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

OK
```

10.7. AT+CSSN Supplementary Service Notification

This command enables or disables the presentation of notification result codes from TA to TE.

AT+CSSN Supplementary Service Notification	
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** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<n>	Integer type. Enable or disable the **+CSSI** intermediate result code presentation status to TE. When **<n>**=1 and a supplementary service notification is received after a mobile originated call is set up, the **+CSSI: <code1>** intermediate result code is sent to TE before

	any other MO call setup result code. 0 Disable 1 Enable
<m>	Integer type. Enable or disable the **+CSSU** URC presentation status to TE. When **<m>**=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, the **+CSSU: <code2>** URC is sent to TE. 0 Disable 1 Enable
<code1>	Integer type. It is specified by manufacturer and supports the following codes: 0 Unconditional call forwarding is active 1 Some of the conditional call forwarding options are active 2 Call has been forwarded 3 Call is waiting 5 Outgoing call is barred
<code2>	Integer type. It is specified by manufacturer and supports the following codes: 0 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 terminated by another party 10 Additional incoming call forwarded
<err>	Error code. For more details, see ***Chapter 13.5***.

10.8. AT+CUSD Unstructured Supplementary Service Data

This command allows control of the USSD (Unstructured Supplementary Service Data) according to *3GPP TS 22.090*. Both network and mobile initiated operations are supported.

<mode> disables/enables the presentation of an URC. The value **<mode>**=2 cancels an ongoing USSD session. For USSD response from the network, or 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** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	120 s, determined by the network.
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<mode>	Integer type. Enable or disable the result code presentation status to TE. 0 Disable 1 Enable 2 Cancel session (not applicable to the Read Command response)
<reqstr>	String type. USSD to be sent to the network. If this parameter is omitted, the network is not queried.
<rspstr>	String type. USSD received from the network
<dcs>	Integer type. See *3GPP TS 23.038* Cell Broadcast Data Coding Scheme (default value 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 code. For more details, see ***Chapter 13.5***.

11 Hardware-Related Commands

11.1. AT+QPOWD Power off

This command powers off MT. Once the command is executed successfully, UE returns **OK** immediately and 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** If there is any error: **ERROR**
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 and queries the real time clock (RTC) of MT. The current setting is retained until MT is totally disconnected from the power supply.

AT+CCLK Clock	
Test Command **AT+CCLK=?**	Response **OK**
Read Command **AT+CCLK?**	Response **+CCLK: <time>** **OK**
Write Command **AT+CCLK=<time>**	Response **OK** If there is any error: **ERROR** Or **+CME ERROR: <err>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is not saved.
Reference *3GPP TS 27.007*	

Parameter

<time>	String type. Format: "yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicating the difference, expressed in quarter(s) 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 code. For more details, see ***Chapter 13.5***.

Example

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

OK
```

11.3. AT+CBC Battery Charge

This command returns battery charge status **<bcs>** and battery charge level **<bcl>** of MT.

AT+CBC Battery Charge	
Test Command **AT+CBC=?**	Response **+CBC: (**range of supported **<bcs>**s**),(**range of supported **<bcl>**s**),<voltage>** **OK**
Execution Command **AT+CBC**	Response **+CBC: <bcs>,<bcl>,<voltage>** **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	-
Reference *3GPP TS 27.007*	

Parameter

<bcs>	Integer type. Battery charge status.	
	0	ME is not charging
	1	ME is charging
	2	Charging has been finished
<bcl>	Integer type. Battery charge level in percent. Range: 0–100	
<voltage>	Battery voltage. Unit: mV.	
<err>	Error code. For more details, see ***Chapter 13.5***.	

11.4. 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. ADC channel number. 0 ADC channel 0 1 ADC channel 1
<status>	Integer type. Whether the ADC value has been read successfully. 0 Failed 1 Successful
<value>	Integer type. Voltage of specified ADC channel. Unit: uV.

11.5. AT+QSCLK Set Sleep Mode

This command controls whether to enable MT to enter sleep mode. When sleep mode is enabled, MT can enter sleep mode directly.

AT+QSCLK Set 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** If there is any error: **ERROR**
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 Do not save 1 Save

NOTE

Executing **AT+QSCLK=0,1** or **AT+QSCLK=1,1** writes data to NVM. Please proceed with caution.

11.6. 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** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.

Parameter

<type>	Integer type. Set up AP or PMU.

	0 AP 1 PMU
<gpio_num>	Integer type. GPIO number. When **<type>** is 0, the range is 0–107. When **<type>** is 1, the range is 1–16.
<value>	Integer type. GPIO output level. 0 Low level 1 High level

NOTE

PMU GPIO range: 1–16.

Example

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

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

12 QMAP-Related Commands

12.1. AT+QMAP Configure QMAP-Related Parameters

This command configures QMAP-related parameters.

AT+QMAP Configure QMAP-Related Parameters	
Test Command **AT+QMAP?**	Response **+QMAP: "WWAN",(**list of supported **<status>**s**),(**range of supported **<profileID>**s**),(**list of supported **<IP_family>**s**),<IP_address>** **+QMAP: "DMZ",(**list of supported **<enable>**s**),(**list of supported **<IP_family>**s**),<IP_address>** **+QMAP: "GRE",(**list of supported **<enable>**s**),<IP_address>** **+QMAP: "LAN",<IP_address>** **+QMAP: "LANIP",<LAN_IP_start_address>,<LAN_IP_end_address>,<GW_IP_address>,(**list of supported **<effect>**s**)** **+QMAP: "VLAN",(**list 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**),(**list of supported **<VLAN_ID>**s**),(**range of supported **<IPPT_mode>**s**),(**list of supported **<auto_connect>**s**),<ippt_info>** **+QMAP: "IPPT_NAT",(**list of supported **<IPPT_NAT>**s**)** **+QMAP: "connect",(**range of supported **<rule_num>**s**),(**list of supported **<connect>**s**)** **+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: "DHCPV4DNS",(**list of supported **<status>**s**)** **+QMAP: "DHCPV6DNS",(**list of supported **<status>**s**)** **OK**

Maximum Response Time	300 ms
Characteristics	-

12.2. AT+QMAP="WWAN" Query IP Address of Default QMAP Data Call

This command queries the status and IP address of the default QMAP data call.

AT+QMAP="WWAN" Query IP Address of Default QMAP Data Call	
Write Command **AT+QMAP="WWAN"**	Response **+QMAP: "WWAN",<status>,<profileID>,<IP_family>,<IP_address>** **+QMAP: "WWAN",<status>,<profileID>,<IP_family>,<IP_address>** **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<status>	Integer type. Status of default QMAP data call. 0 Disconnected 1 Connected
<profileID>	Integer type. Profile ID of default QMAP data call. Range: 1–16.
<IP_family>	String type IP type. "IPV4" IPv4 "IPV6" IPv6
<IP_address>	String type. IP address of default QMAP data call. If IPv4 network is not connected, the address is "0.0.0.0". If IPv6 network is not connected, the address is "0:0:0:0:0:0:0:0".

Example

```
AT+QMAP="WWAN"                  //Query IP address of default QMAP data call
+QMAP: "WWAN",0,1,"IPV4","0.0.0.0"
+QMAP: "WWAN",0,1,"IPV6","0:0:0:0:0:0:0:0"

OK
```

12.3. AT+QMAP="DMZ" Query/Set DMZ of Default QMAP Data Call

This command queries or sets DMZ (Demilitarized Zone) of the default QMAP data call.

AT+QMAP="DMZ" Query/Set DMZ of Default QMAP Data Call	
Write Command **AT+QMAP="DMZ"[,<enable>,<IP_family>[,<IP_address>]]**	Response If the optional parameters are omitted, query the current setting: **+QMAP: "DMZ",<enable>,<IP_family>[,<IP_address>]** **+QMAP: "DMZ",<enable>,<IP_family>[,<IP_address>]** **OK** If any of the optional parameters is specified, enable or disable DMZ: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.

Parameter

<enable>	Integer type. Enable or disable DMZ of default QMAP data call. 0 Disable 1 Enable
<IP_family>	Integer type. IP type. 4 IPv4 6 IPv6
<IP_address>	String type. Dotted decimal IPv4 or IPv6 address without double quotes IPv4 or IPv6 address. It is valid only when **<enable>** is 1.

NOTE

1. After DMZ is enabled, to change the DMZ address, disable DMZ first.
2. Executing **AT+QMAP="DMZ"[,<enable>,<IP_family>[,<IP_address>]]** writes data to NVM. Please proceed with caution.

Example

```
AT+QMAP="DMZ"                    //Query the current setting of DMZ.
+QMAP: "DMZ",0,4
+QMAP: "DMZ",0,6

OK
AT+QMAP="DMZ",1,4,192.168.225.50        //Enable DMZ of IPv4 and the address is 192.168.225.50.
OK
AT+QMAP="DMZ",0,4                //Disable DMZ of IPv4.
OK
```

12.4. AT+QMAP="GRE" Query/Set GRE Data Acceleration

This command queries or configures GRE data acceleration.

AT+QMAP="GRE" Query/Set GRE Data Acceleration	
Write Command **AT+QMAP="GRE"[,<enable>[,<IP_address1>[,<IP_address2>[,…]]]]**	Response If the optional parameters are omitted, query the current setting: **+QMAP: "GRE",<enable>[,<IP_address1>[,<IP_address2>[,…]]]** **OK** If any of the optional parameters is specified, set GRE data acceleration and the IP address of GRE server: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configurations are saved automatically.

Parameter

<enable>	Integer type. Enable or disable GRE data acceleration. 0 Disable 1 Enable
<IP_address>	String type. IP address of GRE server. It is valid only when **<enable>** is 1.

NOTE

1. After the GRE data acceleration function is enabled, if you want to change/add the IP address of GRE server, disable the function first (**AT+QMAP="GRE",0**), then you can configure a new IP address.
2. For modules with firmware versions containing "R01" and "R02", you can only execute **AT+QMAP="GRE"[,<enable>[,<IP_address>]]** to configure one IP address.
3. For modules with firmware version containing "R03", you can execute **AT+QMAP="GRE"[,<enable>[,<IP_address1>[,<IP_address2>…]]]** to set multiple GRE server IP addresses (maximum ten GRE server IP addresses can be set).
4. Executing **AT+QMAP="GRE"[,<enable>[,<IP_address1>[,<IP_address2>…]]]** writes data to NVM. Please proceed with caution.

Example

```
AT+QMAP="GRE"              //Query the current setting of GRE data acceleration.
+QMAP: "GRE",0

OK
AT+QMAP="GRE",1,192.168.2.1   //Enable GRE data acceleration and the address is 192.168.2.1.
OK
AT+QMAP="GRE"              //Query the current setting of GRE data acceleration.
+QMAP: "GRE",1,192.168.2.1

OK
```

12.5. AT+QMAP="LAN" Query/Lock Single IP Address for Default LAN Interface

This command queries or locks the single IP address for the default LAN interface (VLAN0).

AT+QMAP="LAN" Query/Lock Single IP Address for Default LAN Interface	
Write Command **AT+QMAP="LAN"[,<IP_address>]**	Response If the optional parameter is omitted, query the current setting: **+QMAP: "LAN"[,<IP_address>]** **OK** If the optional parameter is specified, lock the single IP address for the default LAN interface:

	OK If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect after the module is rebooted. The configuration is saved automatically.

Parameter

<IP_address>	String type. Dotted decimal IP address without double quotes. Single IP address of the default LAN interface.

NOTE

1. **<IP_address>** must belong to the network segment of the current default LAN interface. The segment of the LAN interface is 192.168.225.x by default.
2. After a successful configuration, only the IP address specified by **<IP_address>** can be assigned under the default LAN interface.
3. Executing **AT+QMAP="LAN"[,<IP_address>]** writes data to NVM. Please proceed with caution.

Example

```
AT+QMAP="LAN"                 //Query the current setting.
+QMAP: "LAN"

OK
AT+QMAP="LAN",192.168.225.50  //Lock the single IP address for the default LAN interface.
OK
AT+QMAP="LAN"                 //Query the current setting.
+QMAP: "LAN",192.168.225.50

OK
```

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

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

AT+QMAP="LANIP" Query/Modify DHCP Address Pool of Default LAN Interface	
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 any of the optional parameters is specified, set DHCP address pool of the default LAN interface: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	Whether the command takes effect immediately depends on **<effect>**. The configurations are saved automatically.

Parameter

<LAN_IP_start_address>	String type. Start address of DHCP address pool of default LAN interface. Format: dotted decimal IPv4 address without double quotes.
<LAN_IP_end_address>	String type. End address of DHCP address pool of default LAN interface. Format: dotted decimal IPv4 address without double quotes.
<GW_IP_address>	String type. Gateway address of DHCP address pool of 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 reboots 1 Take effect immediately

NOTE

Executing **AT+QMAP="LANIP"[,<LAN_IP_start_address>,<LAN_IP_end_address>,<GW_IP_address>[,<effect>]]** writes data to NVM. Please proceed with caution.

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
//Set the DHCP address pool and the setting takes effect immediately.
AT+QMAP="LANIP",192.168.111.20,192.168.111.60,192.168.111.1,1
OK
//Set the DHCP address pool and the setting takes effect after the module reboots.
AT+QMAP="LANIP",192.168.111.20,192.168.111.60,192.168.111.1
OK
```

12.7. AT+QMAP="VLAN" Query/Set VLAN

This command queries or sets VLAN of the module, including enabling or disabling VLAN and querying current enabled VLAN.

AT+QMAP="VLAN" Query/Set 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_ID1>,<VLAN_type1>** **[[+QMAP: "VLAN",<VLAN_ID2>,<VLAN_type2>]** **[…]]** **OK** If any of the optional parameters is specified, enable or disable the specified VLAN: **OK** If there is any error: **ERROR**
Maximum Response Time	5 s
Characteristics	See the note below for whether the command takes effect immediately or not. The configurations are saved automatically.

Parameter

<VLAN_ID>	Integer type. VLAN ID. Range: 0, 2–255. 0 is displayed only in the response string and indicates the physical default LAN interface 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

NOTE

1. If **<VLAN_type>**=1/2/3, the module reboots automatically when you enable the first VLAN of any type or disable the last VLAN of the specified type.
2. In other conditions, VLAN enabling or disabling takes effect immediately and the module does not reboot automatically.
3. Executing **AT+QMAP="VLAN"[,<VLAN_ID>,<enable>[,<VLAN_type>]]** writes data to NVM. Please proceed with caution.

Example

```
AT+QMAP="VLAN"                  //Query the list of 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
```

12.8. AT+QMAP="MPDN_rule" Query/Modify QMAP Multiple Data Call Rule

This command queries or modifies the QMAP multiple data call rules.

AT+QMAP="MPDN_rule" Query/Modify QMAP Multiple Data Call Rule	
Write Command **AT+QMAP="MPDN_rule"[,<rule_num>[,<profileID>,<VLAN_ID>,<IPPT_mode>,<auto_connect>[,<IPPT_info>]]]**	Response If the optional parameters are omitted, query the current setting: **+QMAP: "MPDN_rule",<rule_num>,<profileID>,<VLAN_ID>,<IPPT_mode>,<auto_connect>** **[…]** **OK** If only **<rule_num>** is specified, disable a specified QMAP data call rule: **OK** If any of the optional parameters is specified, set the specified QMAP data call rule: **OK** If there is any error: **ERROR**
Maximum Response Time	5 s
Characteristics	See the note below for whether the command takes effect immediately or not. The configurations are saved automatically.

Parameter

<rule_num>	Integer type. Rule ID of QMAP multiple data call. Range: 0–3.
<profileID>	Integer type. APN profile ID used by QMAP data call rule. Range: 1–16.
<VLAN_ID>	Integer type. VLAN ID used by QMAP data call rule. Range: 0, 2–4094. 0 is displayed only in the response string and indicates physical default LAN interface rather than a VLAN ID.
<IPPT_mode>	Integer type. Enable or disable IPPT mode (IP Passthrough mode) in QMAP data call rule.

	0 Disable IPPT mode 1 Enable IPPT mode (ETH) 2 Enable IPPT mode (Wi-Fi) 3 Enable IPPT mode (USB-ECM/RNDIS) 4 Enable IPPT mode (Any Device) 5 Enable IPPT mode (ETH-NIC2, supported only on RG520N Series, RG525F-NA, RG520F Series, RG530F Series, RM520N Series and RM530N-GL modules.)
<auto_connect>	Integer type. Enable or disable automatic connecting in QMAP data call rule. 1 Enable 0 Disable
<IPPT_info>	String type. If **<IPPT_mode>** is 0, **<IPPT_info>** does not need to be filled in. If **<IPPT_mode>** is 1, **<IPPT_info>** is the peer NIC MAC address bound in IPPT mode. ● If **<IPPT_info>** is set to "FF:FF:FF:FF:FF:FF", the module will always deliver the public network address to the newly connected ETH device. ● If **<IPPT_info>** is set to "00:00:00:00:00:00", the module will only deliver the public network address to the first connected ETH device. ● If **<IPPT_info>** is set to the MAC address of an ethernet device, the module will only deliver the public network address to the ETH device. If **<IPPT_mode>** is 2, **<IPPT_info>** is the peer NIC MAC address bound in IPPT mode. ● If **<IPPT_info>** is set to "FF:FF:FF:FF:FF:FF", the module will always deliver the public network address to the newly connected Wi-Fi device. ● If **<IPPT_info>** is set to "00:00:00:00:00:00", the module will only deliver the public network address to the first connected Wi-Fi device. ● If **<IPPT_info>** is set to the MAC address of a Wi-Fi device, the module will only deliver the public network address to the Wi-Fi device. If **<IPPT_mode>** is 3, **<IPPT_info>** is the peer host name bound in IPPT mode. ● If **<IPPT_info >** is set to "FF:FF:FF:FF:FF:FF", the module will always deliver the public network address to the newly connected USB device. ● If **<IPPT_info>** is set to "00:00:00:00:00:00", the module will only deliver the public network address to the first connected USB device. ● When using the first two methods, please ensure that the NIC MAC address of the host's USB network card [ECM/RNDIS] remains unchanged, otherwise the module will consider it a different device. ● If **<IPPT_info>** is set to the hostname of a USB device, the module will only deliver the public network address to the USB device. If **<IPPT_mode>** is 4, **<IPPT_info>** means that the module can deliver the public IP address to any device with any interface type. The value can only be set as follows:

- If **<IPPT_info>** is set to "FF:FF:FF:FF:FF:FF", the module will always deliver the public IP address to the latest connected device of any interface type.
- If **<IPPT_info>** is set to "00:00:00:00:00:00", the module will only deliver the public network address to the first connected device of any interface type.
- In this case **<IPPT_info>** cannot be set to other values.

If **<IPPT_mode>** is 5, **<IPPT_info>** is the peer NIC MAC address bound in IPPT mode.

- If **<IPPT_info>** is set to "FF:FF:FF:FF:FF:FF", the module will always deliver the public network address to the newly connected ETH-NIC2 device.
- If **<IPPT_info>** is set to "00:00:00:00:00:00", the module will only deliver the public network address to the first connected ETH-NIC2 device.
- If **<IPPT_info>** is set to the MAC address of an ethernet device, the module will only deliver the public network address to the ETH-NIC2 device.

When IPPT mode is enabled,

- If the IPPT NAT working mode is WithNAT (**AT+QMAP="IPPT_NAT",1**), the LAN device specified by **<IPPT_info>** will obtain the public network address, other LAN devices will obtain the private network address, and the module will perform network address translation on all LAN device data.
- If the IPPT NAT working mode is WithoutNAT (**AT+QMAP="IPPT_NAT",0**), the LAN device specified by **<IPPT_info>** will obtain the public network address, and the module will not perform network address translation on the data of the LAN device, and other LAN devices will not obtain any IP addresses. In addition, in this mode, the IPPT function, as applied to the latest devices, will be invalid, and "FF:FF:FF:FF:FF:FF" will be treated as equivalent to "00:00:00:00:00:00".

NOTE

1. If only the physical default LAN interface is required to access network and there is no need to support QMAP multiple data call, you should set **<rule_num>**=0 and **<VLAN_ID>**=0.
2. The QMAP multiple data call 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 network through the corresponding WAN interface.
3. When configuring QMAP data call 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.
4. IPPT mode (IP Passthrough mode), is a function of transparently transmitting the IP address (Public IP) assigned by the operator to the LAN device.
5. By default, when using a USB (ECM/RNDIS) interface to start a QMAP data call, 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>**. In most cases, the MAC address of the USB virtual Ethernet interface (ECM/RNDIS) is not fixed. However, 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, WLAN belongs to VLAN0. In actual use, to assign the public IP to the WLAN device, you need to set **<IPPT_mode>** to 2, and **<VLAN_ID>** can only be 0.
7. By default, the data call initiated with the first rule (**<rule_num>**=0) is the default QMAP data call.
8. The default QMAP data call is bound to the physical LAN interface (VLAN0) by default. If you change the bound LAN/VLAN interface of the default QMAP data call, the module reboots automatically. For example, execute **AT+QMAP="MPDN_rule",0,1,2,0,1** (bind the default QMAP data call rule to **<VLAN_ID>**=2). If **AT+QMAP="MPDN_rule",0** is executed to disable the default QMAP data call rule, the LAN/VLAN interface bound to the default QMAP data call rule automatically changes the physical LAN interface from **<VLAN_ID>**=2, and the module reboots automatically.
9. The module accesses the network through the data connection initiated by the default QMAP data call rule. That is, if **<rule_num>**=0 does not initiate a data connection, the module cannot access network.
10. Executing **AT+QMAP="MPDN_rule"[,<rule_num>[,<profileID>,<VLAN_ID>,<IPPT_mode>,<auto_connect>[,<IPPT_info>]]]** writes data to NVM. Please proceed with caution.

Example

```
AT+QMAP="MPDN_rule"                    //Query the current QMAP data call rules.
+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 and enable QMAP data call rule 0
OK
AT+QMAP="MPDN_rule",1,5,2,0,1          //Configure and enable QMAP data call rule 1.
OK
AT+QMAP="MPDN_rule"                    //Query the current QMAP data call rules.
+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                  //Disable QMAP data call rule 1.
OK
AT+QMAP="MPDN_rule"                    //Query the current QMAP data call rules.
+QMAP: "MPDN_rule",0,1,0,0,1
+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
```

12.9. AT+QMAP="IPPT_NAT" Query/Set IPPT NAT Working Mode of QMAP Data Call

This command queries or configures whether to use NAT (Network Address Translation) in IPPT mode.

AT+QMAP="IPPT_NAT" Query/Set IPPT NAT Working Mode of QMAP Data Call	
Write Command **AT+QMAP="IPPT_NAT"[,<IPPT_NAT>]**	Response If the optional parameter is omitted, query the current setting: **+QMAP: "IPPT_NAT",<IPPT_NAT>** **OK** If the optional parameter is specified, set IPPT NAT working mode: **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configuration is saved automatically.

Parameter

<IPPT_NAT>	Integer type. IPPT NAT working mode. 0 WihoutNAT. NAT is not used in IPPT mode. 1 WithNAT. NAT is used in IPPT mode.

NOTE

1. Changing IPPT NAT working mode disconnects all QMAP data call connections. The disconnected QMAP data call can be reconnected automatically if automatic connecting is enabled. If it is disabled, manually execute **AT+QMAP="connect"** to start a QMAP data call after changing IPPT NAT working mode.

2. If you change the IPPT NAT working mode to WithoutNAT from WithNAT, the IPPT modes configured in all QMAP data call rules change to WithoutNAT automatically. If you change the IPPT NAT working mode to WithNAT from WithoutNAT, the IPPT modes configured in all QMAP data call rules change to WithNAT automatically.
3. Executing **AT+QMAP="IPPT_NAT"** writes data to NVM. Please proceed with caution.

Example

```
AT+QMAP="IPPT_NAT"                  //Query current setting.
+QMAP: "IPPT_NAT",0

OK
AT+QMAP="IPPT_NAT",1                //Set to using NAT in IPPT mode.
OK
```

12.10. AT+QMAP="connect" Initiate/Terminate QMAP Data Call

This command initiates or terminates a QMAP data call.

AT+QMAP="connect" Initiates/Terminates QMAP Data Call	
Write Command **AT+QMAP="connect",<rule_num>,<connect>**	Response **OK** Or **ERROR**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<rule_num>	Integer type. Rule ID of QMAP multiple data call. Range: 0–3.
<connect>	Integer type. Initiate or terminate QMAP data call. 0 Terminate 1 Initiate

NOTE

1. If **<auto_connect>**=1 (see **AT+QMAP="MPDN_rule"**), the specified QMAP data call rule initiates an automatic data call, and you cannot initiate or terminate this data connection over **AT+QMAP="connect"**. If you want to control QMAP data call manually with

AT+QMAP="connect", you should disable automatic connecting in the rule with **AT+QMAP="MPDN_rule"**.

2. Executing **AT+QMAP="connect",<rule_num>,<connect>** writes data to NVM. Please proceed with caution.

Example

```
AT+QMAP="connect",0,1      //Initiate QMAP data call of rule 0.
OK
AT+QMAP="connect",0,0      //Terminate QMAP data call of rule 0.
OK
```

12.11. AT+QMAP="auto_connect" Query/Modify Automatic Connection of QMAP Data Call

This command queries or modifies automatic connection of QMAP data call.

AT+QMAP="auto_connect" Query/Modify Automatic Connection of QMAP Data Call	
Write Command **AT+QMAP="auto_connect"[,<rule_num>[,<auto_connect>[,<profileID>]]]**	Response If the optional parameters are omitted, query the current settings of all QMAP data call rules: **+QMAP: "auto_connect",<rule_num>,<auto_connect>** **[…]** **OK** If only **<rule_num>** is specified, query the current setting of the specified QMAP data call rule: **+QMAP: "auto_connect",<rule_num>,<auto_connect>** **OK** If only **<rule_num>** and **<auto_connect>** are specified, enable or disable automatic connecting for the specified QMAP data call rule: **OK** If any of the optional parameters is specified, enable automatic connecting and set the APN Profile ID, or disable automatic connecting for the specified QMAP data call rule:

	OK If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately. The configurations are saved automatically.

Parameter

<rule_num>	Integer type. Rule ID of QMAP multiple data call. Range: 0–3.
<auto_connect>	Integer type. Enable or disable automatic connection in QMAP data call. 0 Disable 1 Enable
<profileID>	Integer type. APN Profile ID used by QMAP data call rule. Range: 1–16.

NOTE

1. Before modifying **<auto_connect>** of the specified QMAP data call rule, first ensure that the specified rule has been configured and enabled with **AT+QMAP="MPDN_rule"**.
2. Executing **AT+QMAP="auto_connect"[,<rule_num>[,<auto_connect>[,<profileID>]]]** writes data to NVM. Please proceed with caution.

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 automatic connection of rule 0.
+QMAP: "auto_connect",0,1

OK
AT+QMAP="auto_connect",1,1              //Set automatic connection of rule 2.
OK
AT+QMAP="auto_connect",2,1,6            //Set automatic connection of rule 2 and modify
                                        <profileID> to 6.
OK
```

12.12. AT+QMAP="MPDN_status" Query QMAP Multiple Data Call Status

This command queries status of QMAP multiple data call.

AT+QMAP="MPDN_status" Query QMAP Multiple Data Call Status	
Write Command **AT+QMAP="MPDN_status"**	Response **+QMAP: "MPDN_status",<rule_num>,<profileID>,<IPPT_status>,<connect_status>** **[…]** **OK** If there is any error: **ERROR**
Maximum Response Time	300 ms
Characteristics	-

Parameter

<rule_num>	Integer type. Rule ID of QMAP multiple data call. Range: 0–3.
<profileID>	Integer type. APN profile ID used by QMAP data call rule. Range: 1–16.
<IPPT_status>	Integer type. Whether IPPT mode is enabled in QMAP data call rule. 0 Enabled 1 Disabled
<connect_status>	Integer type. Status of QMAP data call. 0 Disconnected 1 Connected

Example

```
AT+QMAP="MPDN_status"          // Query status of QMAP multiple data call.
+QMAP: "MPDN_status",0,1,1,1
+QMAP: "MPDN_status",1,2,0,1
+QMAP: "MPDN_status",2,3,0,0
+QMAP: "MPDN_status",3,0,0,0

OK
```

12.13. AT+QMAP="SFE" Query/Set SFE Software Acceleration

This command queries or sets software acceleration of the module.

AT+QMAP="SFE" Query/Set 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** If there is any error: **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 "disable" Disable

NOTE

1. Only if the module does not support hardware acceleration (IPA), the SFE function can provide limited performance optimization. If the module supports hardware acceleration (IPA), this function is invalid.
2. Executing **AT+QMAP="SFE"[,<status>]** writes data to NVM. Please proceed with caution.

Example

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

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

```
OK
```

12.14. AT+QMAP="domain" Query/Set Gateway Domain Name of LAN/VLAN Interface

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

AT+QMAP="domain" Query/Set Gateway Domain Name of LAN/VLAN Interface	
Write Command **AT+QMAP="domain"[,<domain_name>]**	Response If the optional parameter is omitted, query the current setting: **+QMAP: "domain",<domain_name>** **OK** If the optional parameter is specified, set gateway domain name of LAN/VLAN interface: **OK** If there is any error: **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".

NOTE

Executing **AT+QMAP="domain"[,<domain_name>]** writes data to NVM. Please proceed with caution.

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
```

12.15. AT+QMAP="DHCPV6DNS" Query/Set IPv6 DNS of QMAP Data Call

This command queries or configures IPv6 DNS of QMAP data call.

AT+QMAP="DHCPV6DNS" Query/Set IPv6 DNS of QMAP Data Call	
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** If there is any error: **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

NOTE

Executing **AT+QMAP="DHCPV6DNS"[,<status>]** writes data to NVM. Please proceed with caution.

Example

```
AT+QMAP="DHCPV6DNS"                 //Query current setting
+QMAP: "DHCPV6DNS","disable"
```

```
OK
AT+QMAP="DHCPV6DNS","enable"      //Enable IPv6 DNS
OK
```

12.16. AT+QMAP="DHCPV4DNS" Query/Set IPv4 DNS Proxy of QMAP Data Call

This command queries or sets IPv4 DNS proxy of QMAP data call.

AT+QMAP="DHCPV4DNS" Query/Set IPv4 DNS Proxy of QMAP Data Call	
Write Command **AT+QMAP="DHCPV4DNS"[,<status>]**	Response If the optional parameter is omitted, query the current setting: **+QMAP: "DHCPV4DNS",<status>** **OK** If the optional parameter is specified, enable or disable IPv4 DNS: **OK** If there is any error: **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 IPv4 DNS. "enable" Enable "disable" Disable

NOTE

1. After enabling the IPv4 DNS proxy function, all LAN ports will restart. If multiple data-calls are set up, multiple restarts may occur. To obtain the new DNS parameters, the host needs to send DHCP packets.
2. Executing **AT+QMAP="DHCPV4DNS"[,<status>]** writes data to NVM. Please proceed with caution.

Example

```
AT+QMAP="DHCPV4DNS"                 //Query current setting
+QMAP: "DHCPV4DNS","enable"

OK

AT+QMAP="DHCPV4DNS","disable"       //Disable IPv4 DNS
OK
```

13 Appendix References

13.1. Terms and Abbreviations

Table 5: 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
CUG	Closed User Group
DCE	Data Communication Equipment
DCS	Data Coding Scheme
DF	Dedicated File
DHCP	Dynamic Host Configuration Protocol
DL	Downlink
DNS	Domain Name Server
DPCH	Dedicated Physical Channel
DPR	Dynamic Power Reduction
DSS	Dynamic Spectrum Sharing
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
ECM	Ethernet Control Model
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
ETH	Ethernet
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
GRE	Generic Routing Encapsulation
GPIO	General-Purpose Input/Output
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HLR	Home Location Register
HSDPA	High Speed Downlink Packet Access

HSUPA	High Speed Uplink Packet Access
ICCID	Integrated Circuit Card ID
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
LAN	Local Area Network
LLC	Logical Link Control
LTE	Long-Term Evolution
MAC	Medium Access Control
MCC	Mobile Country Code
ME	Mobile Equipment
MNC	Mobile Network Code
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
NAT	Network Address Translation
NCI	NR Cell Identifier
NCGI	NR Cell Global Identifier
NG-RAN	Next-Generation Radio Access Network
NIC	Network Interface Controller
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
PCO	Protocol Configuration Options
PDN	Public Data Network
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PIN	Personal Identification Number
PLMN	Public Land Mobile Network
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
RI	Ring Indicator
RLP	Radio Link Protocol
RNDIS	Remote Network Driver Interface Specification
RP	Relay Protocol
RRC	Radio Resource Control
RSRP	Reference Signal Received Power
RSRQ	Reference Signal Received Quality
RSSI	Received Signal Strength Indicator
RTC	Real-Time Clock
SA	Standalone
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/Service Type

TA	Terminal Adapter
TDD	Time Division Duplex
TFT	Traffic Flow Template
TPDU	Transport Protocol Data Unit
UART	Universal Asynchronous Receiver/Transmitter
UCS2	Universal Character Set (UCS-2) Format
UDUB	User Determined User Busy
UE	User Equipment
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
VLAN	Virtual Local Area Network
VLR	Visitor Location Register
WCDMA	Wideband Code Division Multiple Access
WIM	Wireless Identity Module
WLAN	Wireless Local Area Network

13.2. Factory Default Settings Restorable with AT&F

Table 6: Factory Default Settings Restorable with AT&F

AT Command	Parameter	Factory Default
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

13.3. AT Command Settings Storable with AT&W

Table 7: 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

13.4. AT Command Settings Storable with ATZ

Table 8: AT Command Settings Storable with ATZ

AT Command	Parameter	Factory Default
ATE	**<value>**	1
ATQ	**<n>**	0
ATS0	**<n>**	0
ATS7	**<n>**	0
ATS10	**<n>**	15
ATV	**<value>**	1
ATX	**<value>**	4
AT+CREG	**<n>**	0
AT+CGREG	**<n>**	0
AT+CEREG	**<n>**	0

13.5. Summary of CME ERROR Codes

Final result code **+CME ERROR: <err>** indicates an error related to mobile equipment or network. The operation is similar to **ERROR** result code. If **+CME ERROR: <err>** is the result code for any of the commands in a command line, none of the following commands in the same command line is executed (neither **ERROR** nor **OK** result code should be returned as a result of a completed command line execution).

<err> values are mostly used by common message commands. The following table lists most general and GRPS-related **ERROR** codes. For some GSM protocol failure causes described in GSM specifications, the corresponding **ERROR** codes are not included.

Table 9: Summary of General +CME ERROR: <err> Codes

Numeric <err> value	Verbose <err> value
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

13.6. 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 mostly used by common message commands:

Table 10: Summary of General +CMS ERROR: <err> Codes

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 exceeded
514	Invalid request parameters
515	ME storage failure
517	Invalid service mode
528	More message to send state error
529	MO SMS is not allowed
531	ME storage full

13.7. Summary of URC

Table 11: Summary of URC

Index	URC Display	Meaning	Condition
1	**+QUSIM: 1**	(U)SIM card initialization status	-
2	**+QSIMSTAT: <enable>,<inserted_status>**	(U)SIM card insertion status	**AT+QSIMSTAT=1**
3	**+CREG: <stat>**	MT registration status	**AT+CREG=1**
4	**+CREG: <stat>[,<lac>,<ci>[,<AcT>]]**	:MT network registration status and location information	**AT+CREG=2**

5	**+CGREG: <stat>**	MT network registration status	**AT+CGREG=1**
6	**+CGREG: <stat>[,[<lac>],[<ci>],[<AcT>],[<rac>]]**	MT network registration and location information	**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>**	EPS network registration status change in E-UTRAN	**AT+CEREG=1**
10	**+CEREG: <stat>[,<tac>,<ci>[,<AcT>]]**	Network cell change in E-UTRAN	**AT+CEREG=2**
11	**+C5GREG: <stat>**	Network registration status change in 5GS	**AT+C5GREG=1**
12	**+C5GREG: <stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>]]**	Network cell change in 5GS or whether there is a 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 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 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>]**	COL (connected line) presentation at 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 TE with URC instead of 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>**	+CSSI intermediate result code presentation status to TE	**AT+CSSN=1**
26	**+CSSU: <code2>**	+CSSU URC presentation status to TE	**AT+CSSN=<n>,1**
27	**RDY**	MT initialization is successful	N/A
28	**+CFUN: 1**	All MT functions are 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 automatically rejected.	**AT+CGEREP=2,1**
35	**+CGEV: NW REACT <PDP_type>,<PDP_addr>,[<cid>]**	Network request PDP reactivation	**AT+CGEREP=2,1**
36	**+CGEV: NW DEACT <PDP_type>,<PDP_addr>,[<cid>]**	Network-forced context deactivation	**AT+CGEREP=2,1**
37	**+CGEV: ME DEACT <PDP_type>,<PDP_addr>,[<cid>]**	ME-forced context deactivation.	**AT+CGEREP=2,1**
38	**+CGEV: NW DETACH**	Network-forced packet domain detach.	**AT+CGEREP=2,1**
39	**+CGEV: ME DETACH**	Mobile equipment-forced packet domain detach.	**AT+CGEREP=2,1**
40	**+CGEV: NW CLASS <class>**	Network-forced change of MS class.	**AT+CGEREP=2,1**
41	**+CGEV: ME CLASS <class>**	Mobile equipment-forced change of MS class.	**AT+CGEREP=2,1**
42	**+CGEV: PDN ACT<cid>**	Context activated.	**AT+CGEREP=2,1**
43	**+CGEV: PDN DEACT<cid>**	Context deactivated.	**AT+CGEREP=2,1**
44	**+QIND: "csq",<rssi>,<ber>**	Signal strength and channel bit error rate changed.	**AT+QINDCFG="csq",1**

45	**+QIND: "smsfull",<storage>**	SMS storage is full.	**AT+QINDCFG="smsfull",1**
46	**RING**	Incoming call.	**AT+QINDCFG="ring",1**
47	**+QIND: "act",<actvalue>**	Network access technology changed.	**AT+QINDCFG="act",1**
48	**^DSCI: <id>,<dir>,<stat>,<type>,<number>,<num_type>**	Call status indication.	**AT^DSCI=1**
49	**+CLIP: <number>,<type>,[subaddr],[satype],[<alpha>],<CLI_validity>**	Calling line identity (CLI) of calling party of a mobile terminated call	**AT+CLIP=1**
50	**+CUSD: <status>[,<rspstr>,[<dcs>]]**	USSD response from network, or a network initiated operation.	**AT+CUSD=1**
52	**+CR: <serv>**	Service reporting control.	See **AT+CR**

13.8. SMS Character Sets Conversions

In *3GPP TS 23.038* Data Coding Scheme (DCS), 3GPP defines three kinds of alphabets in SMS: GSM 7-bit default, 8-bit data, and UCS2 (16-bit) alphabets. **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 12: SMS Text Input or Output Methods

DCS	AT+CSCS	SMS Text Input or Output Methods
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. Only characters 0-9 and A-F supported. Input: UE converts UCS2 hex string to GSM characters. Output: UE converts GSM characters to UCS2 hex string.
UCS2	-	Ignore the value of **AT+CSCS**, input or output a hex string similar to PDU mode. Only characters 0-9 and A-F supported.
8-bit	-	Ignore the value of **AT+CSCS**, input or output a hex string similar to PDU mode. Only characters 0-9 and A-F supported.

When DCS = GSM 7-bit, the input or output needs conversion. The detailed conversion tables are shown below.

Table 13: Input Conversion Table (DCS=GSM 7-bit and AT+CSCS="GSM")

No.	0	1	2	3	4	5	6	7
0	00	10	20	30	40	50	60	70
1	01	11	21	31	41	51	61	71
2	02	12	22	32	42	52	62	72
3	03	13	23	33	43	53	63	73
4	04	14	24	34	44	54	64	74
5	05	15	25	35	45	55	65	75
6	06	16	26	36	46	56	66	76
7	07	17	27	37	47	57	67	77
8	08	18	28	38	48	58	68	78
9	09	19	29	39	49	59	69	79
A	0A	Submit	2A	3A	4A	5A	6A	7A
B	0B	Cancel	2B	3B	4B	5B	6B	7B
C	0C	1C	2C	3C	4C	5C	6C	7C
D	0D	1A	2D	3D	4D	5D	6D	7D
E	0E	1E	2E	3E	4E	5E	6E	7E
F	0F	1F	2F	3F	4F	5F	6F	7F

Table 14: Output Conversion Table (DCS=GSM 7-bit and AT+CSCS="GSM")

No.	0	1	2	3	4	5	6	7
0	00	10	20	30	40	50	60	70
1	01	11	21	31	41	51	61	71

2	02	12	22	32	42	52	62	72
3	03	13	23	33	43	53	63	73
4	04	14	24	34	44	54	64	74
5	05	15	25	35	45	55	65	75
6	06	16	26	36	46	56	66	76
7	07	17	27	37	47	57	67	77
8	08	18	28	38	48	58	68	78
9	09	19	29	39	49	59	69	79
A	0D0A		2A	3A	4A	5A	6A	7A
B	0B		2B	3B	4B	5B	6B	7B
C	0C	1C	2C	3C	4C	5C	6C	7C
D	0D	1A	2D	3D	4D	5D	6D	7D
E	0E	1E	2E	3E	4E	5E	6E	7E
F	0F	1F	2F	3F	4F	5F	6F	7F

Table 15: 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 16: Input Conversion 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 17: IRA Extended Characters

No.	A	B	C	D	E	F
0	20	20	20	20	7F	20
1	40	20	20	5D	20	7D
2	20	20	20	20	20	08
3	01	20	20	20	20	20
4	24	20	5B	20	7B	20
5	03	20	0E	20	0F	20
6	20	20	1C	5C	1D	7C
7	5F	20	09	20	20	20
8	20	20	20	0B	04	0C
9	20	20	1F	20	05	06
A	20	20	20	20	20	20
B	20	20	20	20	20	20
C	20	20	20	5E	07	7E
D	20	20	20	20	20	20
E	20	20	20	20	20	20
F	20	60	20	1E	20	20

Table 18: Output Conversion Table (DCS = GSM 7-bit and AT+CSCS="IRA")

No.	0	1	2	3	4	5	6	7
0	40	20	20	30	A1	50	BF	70

1	A3	5F	21	31	41	51	61	71
2	24	20	22	32	42	52	62	72
3	A5	20	23	33	43	53	63	73
4	E8	20	A4	34	44	54	64	74
5	E9	20	25	35	45	55	65	75
6	F9	20	26	36	46	56	66	76
7	EC	20	27	37	47	57	67	77
8	F2	20	28	38	48	58	68	78
9	C7	20	29	39	49	59	69	79
A	0D0A		2A	3A	4A	5A	6A	7A
B	D8		2B	3B	4B	C4	6B	E4
C	F8	C6	2C	3C	4C	D6	6C	F6
D	0D	E6	2D	3D	4D	D1	6D	F1
E	C5	DF	2E	3E	4E	DC	6E	FC
F	E5	C9	2F	3F	4F	A7	6F	E0

Table 19: 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 DCS= GSM 7-bit and **AT+CSCS="GSM"** is similar to **AT+CSCS="GSM"**.
- The conversion table of DCS = GSM 7-bit and **AT+CSCS="IRA"** is similar to **AT+CSCS="IRA"**.
- The conversion table of DCS = GSM 7-bit and **AT+CSCS="UCS2"** is similar to **AT+CSCS="IRA"**.

The method of SMS text input or output is different. See ***Table 13*** for more details.

13.9. Release Cause Text List of AT+CEER

Table 20: 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 CUG member
Incompatible destination
Invalid transit network selection
Semantically incorrect message
Invalid mandatory information
Message non-existent/not implemented
Message type not compatible with state
IE non-existent/not implemented
Conditional IE error
Message not compatible with state
Recovery on timer expiry
Protocol error, unspecified
Interworking, unspecified
CS Network Reject
IMSI unknown in HLR
Illegal MS

IMSI unknown in VLR
IMEI not accepted
Illegal ME
GPRS services not allowed
GPRS and non GPRS services not allowed
MS identity cannot be derived
Implicitly detached
PLMN not allowed
Location area not allowed
Roaming not allowed
GPRS services not allowed in PLMN
No suitable cells in location area
MSC temporary not reachable
Network failure
MAC failure
Synch failure
Congestion
GSM authentication unacceptable
Service option not supported
Requested service option not subscribed
Service option temporary out of order
Call cannot be identified
No PDP context activated
Semantically incorrect message
Invalid mandatory information

Message type non-existent
Message type not compatible with state
Information element non-existent
Message not compatible with state
RR release indication
RR random access failure
RRC release indication
RRC close session indication
RRC open session failure
Low level failure
Low level failure, no redial allowed
Invalid SIM
No service
Timer T3230 expired
No cell available
Wrong state
Access class blocked
Abort message received
Other cause
Timer T303 expired
No resources
Release pending
Invalid user data
PS Internal Cause
Invalid connection identifier

Invalid NSAPI
Invalid primary NSAPI
PDP establish timeout
Invalid field
SNDCP failure
RAB setup failure
No GPRS context
PDP activate timeout
PDP modify timeout
PDP inactive max timeout
PDP lower layer error
PDP duplicate
Access technology change
PDP unknown reason
CS PS Network Cause
LLC or SNDCP failure
Insufficient resources
Missing or unknown APN
Unknown PDP address or PDP type
User authentication failed
Activation rejected by GGSN
Activation rejected, unspecified
Service option not supported
Requested service option not subscribed
Service option temporary out of order

NSAPI already used (not sent)
Regular deactivation
QoS not accepted
Network failure
Reactivation required
Feature not supported
Semantic error in the TFT operation
Syntactical error in the TFT operation
Unknown PDP context
PDP context without TFT already activated
Semantic errors in packet filter
Syntactical errors in packet filter
Invalid transaction identifier
Semantically incorrect message
Invalid mandatory information
Message non-existent/not implemented
Message type not compatible with state
IE non-existent/not implemented
Conditional IE error
Message not compatible with state
Protocol error, unspecified