



HUAWEI MU509-b HSDPA LGA Module

AT Command Interface Specification

Issue 01

Date 2014-09-03

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About This Document

Revision History

Document Version	Date	Chapter	Descriptions
01	2014-09-03		Creation

Summary

Keywords: UMTS, Module, WCDMA, GPRS, GSM

Abstract: This document describes the AT command interface between TE and MS of Huawei UMTS Module. The interface can implement the functions such as SMS, phonebook service, internet service, GPRS service and network setting.

This document includes:

Chapter	Details
1 Scope	Describes interface design principles and change principles
2 Interface Introduction	Describes interface simply
3 Configuration Commands	Describes AT command of configuration
4 Identification Commands	Describes AT command of identification
5 Serial Interface Control Commands	Describes AT command of serial interface control
6 Short Message Service Commands	Describes AT command of short message service
7 Security Commands	Describes AT command of security
8 GPRS Service Commands	Describes AT command of GPRS service
9 Call Control Commands	Describes AT command of call control
10 Supplementary Service Commands	Describes AT command of supplementary services
11 Audio Commands	Describes AT command of voice control



Chapter	Details
12 Phonebook Commands	Describes AT command of phonebook
13 Status Control Commands	Describes AT command of status control
14 Network Service Commands	Describes AT command of network service
15 Internet Service Commands	Describes AT command of internet service
16 FTP(S) Commands	Describes AT command of FTP and FTPS
17 HTTP(S) Commands	Describes AT command of HTTP and HTTPS
18 SMTP(S) Commands	Describes AT command of SMTP and SMTPS
19 SSL Commands	Describes AT command of SSL
20 MUX Commands	Describes AT command of CMUX
21 STK Commands (Raw Data Mode)	Describes AT command of STK
22 FOTA Commands	Describes AT command of FOTA
23 Overall Design Constraints	Describes overall design constraints
24 Appendixes	Appendixes



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1 Scope

1.1 Terminal Display

This document describes the AT interface of Huawei UMTS Module MU509-b. The description on the AT interface is only limited to the interface packet itself, the usage and use procedure of TE and MS, and does not cover the contents which are not directly related to the interface.

Please read the Release Notes released with the firmware before using MU509-b module and this document.

1.1.1 Interface Overview

HUAWEI UMTS Module is a wireless terminal of UART or USB interface. It is used to provide data service, voice and SMS functions.

This document describes the AT interface.

In the subsequent AT command parameters, two formats are involved: <> and [], as described below:

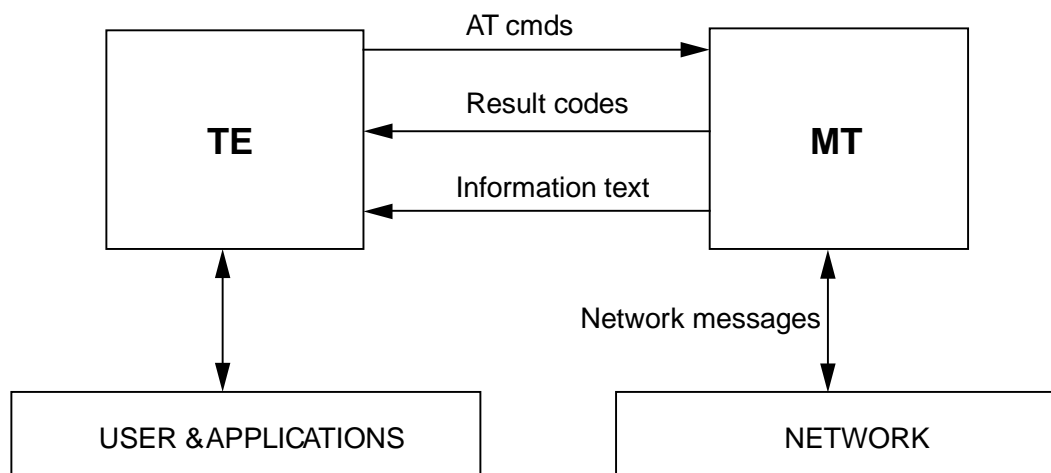
<...>: Parameters enclosed in angle brackets must be completed. Brackets themselves do not appear in the command line.

[...]: Optional subparameter of a command is enclosed in square brackets. Brackets themselves do not appear in the command line or response.

<CR>: Carriage returns character, which value is specified with command S3.

<LF>: Linefeed character, which value is specified with command S4.

Figure 1-1 Block diagram of interaction between TE and MT



1.2 Interface Design Principles

1. Each interface should be functionally convergent.
2. Since the AT command is a packet transmitted via communication port, the packet size is limited. For the transmission of AT command, in addition to the two characters "AT", a maximum of 1600 characters can be received (including the empty characters at the end). For the "response" message or URC reported by the board, the maximum length is limited to 1600 characters.
3. Each command line can include only one AT command. For the URC instruction or response reported from MS to TE, only one AT command is allowed in a command line.
4. In order to make the commands and response formats more readable and standard, except the original interfaces of Qualcomm, in all newly added interfaces, e.g. no space can be contained in the commands such as AT^XXX: <arg0>, <arg1>, or behind ^, colon or comma. No redundant space is allowed at the head or end.
5. After delivering each AT command, the TE cannot deliver the second AT command until the MS has made response to this AT command. Otherwise, the second AT command will not be executed.
6. For the AT command to which the response is given only after a long time, in order to prevent interference on other events, it is recommended to report the final execution result asynchronously. If the MS responds to the TE only after a long time of waiting, e.g. the "AT+COPS=?" command receives a response only after a long time after the command is delivered, the MS may have received the reported instruction of +CREG: XXX on this occasion. Namely, the reporting of +CREG: XXX may interrupt other responses, and other URCs will not interrupt the response of command, and the interrupted part of the response will continue being reported.
7. Unless otherwise specified, all default codes between TE and MS take on this format: GSM 7 bit Default Alphabet. See also Section 6 in protocol 23.038. The character @ is transmitted on the interface still according to 0x00 of 7bit coding. The board software and API should be able to process this character. The board

uploads the carriage return character (<CR>) and linefeed character (<LF>) in the string in the form of space.

8. A sort of compounding between quotation and comma can not exist in the string in this current version. For the data format of UCS2 code, the code value should be reported in the string format (if the code value is 0x553a, 553a should be reported).
9. The "Possible response" sent from MS to TE is composed of "Information text" and "Result code", where "Information text" is optional, and "Result code" is mandatory. The format of "Possible response" is controlled by the ATV command, as detailed in the ATV command description. All "Possible responses" listed in the tables in this documents are in the ATV1 format.
10. When module is power on, it returns OK that sends AT to UART1, MODEM or PCUI means module initializes successfully, could deal with AT command normally.

1.3 Interface Change Principles

For the extended interface, parameters can be added behind the AT command. If the interface fails to meet the new requirements as detected in the later stage of product development, new parameters can be added on the basis of the original interface. In addition, for all the currently available interfaces, if the command received by MS is not identifiable, the "result code" of ERROR will be reported; if there is one surplus command parameter, the MS will report the "result code" of the corresponding TOO MANY PARAMETERS. No equal mark itself is deemed a surplus command parameter.

All extended AT command interfaces of MU509 begin with "^". It specifies that: In the AT command such as "AT^XXX", the number of X cannot be more than 9 currently.

2 Interface Introduction

All interfaces herein refer to the interfaces between TE and MS, and are used for guiding the implementation of the function requirements. The interface covers short message receiving and sending, phone book statistics, and MS network system information setting.

For the commands sent from TE to MS, see also the detailed description in Appendix 24 . Note that in the returned results of the TEST command, "," and "-" are different. For example, the returned result of "+CMGD=?" is: +CMGD: (1,5),(0-4), which means that the first parameter value may be 1 or 5, and the second parameter value may range from 0 to 4.

3 Configuration Commands

3.1 E-Enable Command Echo

3.1.1 Command Syntax

Command	Possible response(s)
E[<value>]	<CR><LF>OK<CR><LF>

3.1.2 Description

This command is used to set whether MS will echo the characters received from TE.

3.1.3 Defined Values

<value>:

0: MS does not echo the characters received from TE.

1: MS echoes the characters received from TE (default value).

If no <value> is included, it is equivalent to the effect that the <value> is 1.

Note:

After boot up, the value will be 1 by default.

3.2 S3-Set Command Line Carriage Return Character

3.2.1 Command Syntax

Command	Possible response(s)
S3=<value>	<CR><LF>OK<CR><LF>
S3?	<CR><LF><value><CR><LF><CR><LF>OK<CR><LF>

3.2.2 Description

This command is used to set the command line carriage return character S3. S3 saves the command line carriage return character in the form of ASCII code value. This character is sent by TE. It means the end of a command line, and is identified by the MS. This character is also sent by MS, and serves as a part of the header, tail and end mark of the "result code" and "information response".

When using the "S3=<value>" command to set S3, the current S3 character can serve as carriage return character of this command line, and the "result code" of this command line will use the newly set S3 character immediately, rather than waiting until the next command line.

3.2.3 Defined Values

<value>:

000–127: The S3 character is set in the form of ASCII code value.

Default value is 013.

Note:

If you want to set <value>=1, you can input "ATS3=001", or "ATS3=1", the result is same.

3.3 S4-Set Response Formatting Character

3.3.1 Command Syntax

Command	Possible response(s)
S4=<value>	<CR><LF>OK<CR><LF>
S4?	<CR><LF><value><CR><LF><CR><LF>OK<CR><LF>

3.3.2 Description

This command is used to set the response format character S4. S4 saves the response format character in the form of ASCII code value. This character is sent by MS, and serves as a part of the header, tail and end mark of the "result code" and "information response".

If the S4 character is changed in a command line, the "result code" of this command line will use the new S4 character immediately, rather than waiting until the next command line.

3.3.3 Defined Values

<value>:

000–127: The S4 character is set in the form of ASCII code value.

Default value is 010.

Note:

If you want to set <value>=1, you can input "ATS4=001", or "ATS4=1", the result is same.

3.4 S5–Set Backspace Character

3.4.1 Command Syntax

Command	Possible response(s)
S5=<value>	<CR><LF>OK<CR><LF>
S5?	<CR><LF><value><CR><LF><CR><LF>OK<CR><LF>

3.4.2 Description

This command is used to set the backspace character S5. S5 saves the backspace character in the form of ASCII code value. This character is sent by TE, and means to delete the previous character. It is identified by MS.

3.4.3 Defined Values

<value>:

000–127: The S5 character is set in the form of ASCII code value.

Default value is 008.

Note:

If you want to set <value>=1, you can input "ATS5=001", or "ATS5=1", the result is same.

3.5 V-Set ME Response Format

3.5.1 Command Syntax

Command	Possible response(s)
V[<value>]	<CR><LF>OK<CR><LF>

3.5.2 Description

This command is used to set the format of "result code" and "information response" of the AT command, including the composition of the header and tail, and the form of the result code contents. The result code contents may be in the form of numerals or detailed strings. The following table describes the influence of format setting on the format of "result code" and "information response". <CR> means S3 character, and <LF> means S4 character.

Table 3-1 Influence of V parameter on the response format

	V0	V1
Information responses	<text><CR><LF>	<CR><LF><text><CR><LF>
Result codes	<numeric code><CR>	<CR><LF><verbose code><CR><LF>

3.5.3 Defined Values

<value>:

0: MS sends the abbreviated header and tail, and uses the result code in the numeral form.

1: MS sends the complete header and tail, and uses the result code in the form of detailed strings (default value).

If no <value> is included, it is equivalent to the effect that the <value> is 1.

3.6 A/-Repeat Previous Command Line

3.6.1 Command Syntax

Command	Possible response(s)
A/	Repeats the responses returned by the previous AT command.

3.6.2 Description

This command is used to repeat previous command line. <CR> is not needed.

3.6.3 Defined Values

NA

3.6.4 Examples

If the last command is:

AT+CGSN

351782030028946

OK

A/

351782030028946

OK

3.7 Q-Set Result Code Presentation Mode

3.7.1 Command Syntax

Command	Possible response(s)
Q[value]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>

3.7.2 Description

This command sets whether or not the TA transmits result code to the TE.

3.7.3 Defined Values

<value>:

0: DCE transmits result code (default value).

1: Result codes are suppressed and not transmitted.

Note:

ATQ will set value to 0.

3.8 Z-Resume User Settings

3.8.1 Command Syntax

Command	Possible response(s)
Z	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>

3.8.2 Description

The SET command resumes the user settings which are stored by AT&W command.

The commands and parameters which can be resumed are as follows:

Table 3-2 The commands and parameters which can be resumed

Command	Parameter
E	<value>
V	<value>
Q	<value>
&C	<value>
&D	<value>
&S	<value>
+IFC	<DCE_by_DTE>,<DTE_by_DCE>
S0	<value>

3.9 &W-Store User Settings

3.9.1 Command Syntax

Command	Possible response(s)
&W	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

3.9.2 Description

The SET command stores some user settings to the profile, which can be resumed by ATZ command.

The commands and parameters which can be stored are as follows:

Table 3-3 The commands and parameters which can be stored

Command	Parameter
E	<value>
V	<value>
Q	<value>
&C	<value>
&D	<value>
&S	<value>
+IPR	<rate>
+IFC	<DCE_by_DTE>,<DTE_by_DCE>
+ICF	<format>,<parity>
S0	<value>

3.10 &F-Set to Factory Defined Configuration

3.10.1 Command Syntax

Command	Possible response(s)
&F	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

3.10.2 Description

The SET command sets to factory defined configuration.

The commands and parameters which can be set to factory configuration are as follows:

Table 3-4 The commands and parameters which can be set to factory configuration

Command	Parameter
E	1
V	1
Q	0
&C	1
&D	2
&S	0
S0	0
S3	13
S4	10
S5	8
+IFC	0,0
+ICF	3,3
+CNMI	0,0,0,0,0
+CRC	0
+CMMS	0
+CPMS	"SM","SM","SM"

Note:

If the user profile's item is exist in this factory list, after execute this command, this user profile's item will be set to factory default too.

3.11 &V-Query Current Configuration

3.11.1 Command Syntax

Command	Possible response(s)
&V	<CR><LF>(list of stored setting)<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

3.11.2 Description

This command is used to query the current configuration.

Table 3-5 The commands and parameters which can be queried

Command	Parameter
E	<value>
V	<value>
Q	<value>
&C	<value>
&D	<value>
&S	<value>
S0	<value>
S3	<value>
S4	<value>
S5	<value>
+CRC	<mode>
+CMGF	<mode>
+CSDH	<show>
+CNMI	<mode>,<mt>,<bm>,<ds>,<bfr>
+IPR	<rate>

Command	Parameter
+CMEE	<n>
+CSMS	<service>
+CREG	<n>
+COPS	<mode>,<format>,<oper>,<rat>
+CGSMS	<service>

Note:

The parameters of +COPS will be displayed depending on registration status of UE.

3.12 +CMEE–Set Terminal Error Reporting Format

3.12.1 Command Syntax

Command	Possible response(s)
+CMEE[=<n>]	<CR><LF>OK<CR><LF>
+CMEE?	<CR><LF>+CMEE: <n><CR><LF><CR><LF>OK<CR><LF>
+CMEE=?	<CR><LF>+CMEE: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

3.12.2 Description

This command is used to set whether to use result code: +CME ERROR: <err> indicates the error related to MS. When you set to use result code, the MS-related error will generate a result code: +CME ERROR: <err>, which will replace the ordinary ERROR result code. If the error reasons are not related to MS, the ordinary ERROR will still be returned.

3.12.3 Defined Values

<n>:

0: Do not use +CME ERROR : <err>result code, only ERROR is returned in case of error occurrence.

1: Use +CME ERROR : <err>result code, <err> adopts the error code value.

2: Use +CME ERROR : <err>result code, <err> adopts the detailed string value of the error (default value).

<err>: the value is given in the CME ERROR list in the Appendix 24.2 .

The "AT+CMEE" will be set <n> to 0.

3.13 +CFUN-Set Operation Mode

3.13.1 Command Syntax

Command	Possible response(s)
+CFUN[=<fun>[,<rst>]]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CFUN?	<CR><LF>+CFUN: <fun><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CFUN=?	<CR><LF>+CFUN: (list of supported <fun>s),(list of supported <rst>s)<CR><LF><CR><LF>OK<CR><LF>

3.13.2 Description

The SET command is used to set the MS mode or restart the MS.

The READ command is used to return the current mode.

The TEST command is used to return the supported parameter values.

3.13.3 Defined Values

<fun>:

0: Set as LPM (low power consumption) mode (previous mode must not be offline).

Shut down RF-circuits whereby MU509-b logs off from the network. Disables all AT commands whose executioner quires a radio connection. (eg.+CHLD, ^FOTADDET)

1: Set as online mode (default value) (previous mode must not be offline). The subscriber can get full services.

<rst>: whether to restart MT before setting.

0: Do not reset the MT before setting it to <fun> power level (default value).

1: Reset the MT before setting it, and <fun> must be set to 1.

Note:

AT+CFUN without value will set as LPM mode.

3.14 +CCLK-Return Current Time of the Module

3.14.1 Command Syntax

Command	Possible response(s)
+CCLK=<time>	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
+CCLK?	<CR><LF>+CCLK: <time><CR><LF><CR><LF>OK<CR><LF>
+CCLK=?	<CR><LF>OK<CR><LF>

3.14.2 Description

The SET command sets the real-time clock of the MS. If setting fails in an MS error, ERROR is returned.

The READ command returns the current setting of the clock.

3.14.3 Defined Values

<time>: string without double quotation marks; format is yyyy/MM/dd, hh:mm:ss±zz, where characters indicate year, month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -47 to +48). e.g. 6th of May 1994, 22:10:00 GMT+2 hours equals to 1994/05/06, 22:10:00+08.

Notes:

- If MS does not support time zone information, then the three last characters of <time> are not returned by +CCLK?.
- The time can be set only between 1980/01/06, 00:00:00 and 2100/01/01, 00:00:00.

3.14.4 Examples

AT+CCLK?

+CCLK: 2009/09/14,14:58:16

OK

3.15 +CSCS-Select TE Character Set

3.15.1 Command Syntax

Command	Possible response(s)
+CSCS[=<chset>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
+CSCS?	<CR><LF>+CSCS: <chset><CR><LF><CR><LF>OK<CR><LF>
+CSCS=?	<CR><LF>+CSCS: (list of supported <chset>s)<CR><LF><CR><LF>OK<CR><LF>

3.15.2 Description

The SET command informs TA which character set <chset> is used by the TE. TA is then able to convert character strings correctly between TE and MT character sets.

When TA-TE interface is set to 8-bit operation and used TE alphabet is 7-bit, the highest bit shall be set to zero. Read command shows current setting and test command displays conversion schemes implemented in the TA.

3.15.3 Defined Values

<chset>:

"GSM": GSM 7 bit default alphabet (3GPP TS 23.038); this setting causes easily software flow control (XON/XOFF) problems.

"IRA": International reference alphabet (ITU-T T.50) (default value).

"UCS2": 16-bit universal multiple-octet coded character set (ISO/IEC10646); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99.

3.16 +CRSM-Restricted SIM Access

3.16.1 Command Syntax

Command	Possible response(s)
+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>]]]	<CR><LF>+CRSM: <sw1>,<sw2>[,<response>]<CR><LF><CR><LF> OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CRSM=?	<CR><LF>OK<CR><LF>

3.16.2 Description

This command offers easy access of the elementary files on the SIM in the restricted state.

3.16.3 Defined Values

<command>: SIM command number.

176: Read binary

178: Read record

192: Get response

214: Update binary

220: Update record

242: Get status

<fileid>: identifier of EF file (Elementary data File) on SIM. Integer value, it is necessary for the non-query commands.

<P1>, <P2>, <P3>: necessary for the commands except the get-response commands and query commands. The value information refers to GSM 11.11 or 3GPP TS 31.101, 3GPP TS 31.102.

<data>: information with hexadecimal character format.

<sw1>, <sw2>: the response from SIM after the execute command completed.

<response>: response data in case of a successful completion of the previously issued command. It is empty after "update binary" and "update record" commands.



3.17 ^HS-Handshake Between MS and TE

3.17.1 Command Syntax

Command	Possible response(s)
^HS=<id>,<action>	<CR><LF>^HS:<id>,<protocol>,<is_offline>,<product_class>,<product_id>,<software_id><CR><LF><CR><LF>OK<CR><LF>

3.17.2 Description

This command is used to shake hand between MS and TE.

3.17.3 Defined Values

<id>: 8 digits, used to recognize MS.

<action>: represent the action type of TE.

0: TE is living.

1: TE is stopped.

<protocol>: indicate the protocol state of the module.

0: Module is running at APP.

1: Module is running at BOOT.

<is_offline>:

0: Online

1: Offline (reserved, not supported currently)

2: LPM

<product_class>: product class

0: GSM/WCDMA

<product_id>: product id

6: MU509

<software_id>: reserved

3.17.4 Examples

```
AT^HS=0,0
```

```
^HS:46500001,0,0,0,6
```

```
OK
```

3.18 ^RESET-Delay the Module Reset Function

3.18.1 Command Syntax

Command	Possible response(s)
^RESET[=<delay_time>]	<CR><LF>OK<CR><LF>
^RESET?	<CR><LF>^RESET:<delay_time><CR><LF><CR><LF> >OK<CR><LF>
^RESET=?	<CR><LF>^RESET:(list of supported <delay_time>s)<CR><LF><CR><LF>OK<CR><LF>

3.18.2 Description

This command is used to delay the module reset by user.

3.18.3 Defined Values

<delay_time>: delay time.

0: Module reset immediately.

1–65535: Delay time, indicates in second.

Notes:

- "AT^RESET" has the same function with "AT^RESET=0".
- Delay time out and start to reset. But the reset action would spend some time to complete.

3.19 ^CURC-Control Unsolicited Report

3.19.1 Command Syntax

Command	Possible response(s)
^CURC=<mode>	<CR><LF>OK<CR><LF>
^CURC?	<CR><LF>^CURC: <mode><CR><LF><CR><LF>OK<CR><LF>
^CURC=?	<CR><LF>^CURC: (list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

3.19.2 Description

The SET command is used to set mode value to open or close unsolicited reports. The unsolicited reports it can control are listed below: ^RSSI, ^MODE, ^SRVST, ^MODE, ^SMMEMFULL. The unsolicited reports are closed if the mode value is set to 0 and the unsolicited reports are open if the mode value is set to 1. The default value of mode is set to 0. So, "^CURC=1" should be executed if all the unsolicited reports need to be open.

The READ command returns the current mode value.

The TEST command returns the value range it supports.

Unsolicited report is disabled after reset. In sleep mode, unsolicited reports will be ignored, since the ports are closed.

3.19.3 Defined Values

<mode>:

0: The unsolicited reports closed (default value).

1: The unsolicited reports open.

3.20 ^SLEEPCFG—Configure Module's Sleep Function by Host

3.20.1 Command Syntax

Command	Possible Response(s)
^SLEEPCFG=<para>,<val>	If the command is successfully executed: <CR><LF>OK<CR><LF> If the command is unsuccessfully executed: <CR><LF>ERROR<CR><LF>
^SLEEPCFG?	<CR><LF>^SLEEPCFG: <para>,<value>[<CR><LF>^SLEEPCFG: <para1>,<value1>[<CR><LF>^SLEEPCFG: <para2>,<value2>...]]<CR><LF><CR><LF>OK<CR><LF>
^SLEEPCFG=?	<CR><LF>^SLEEPCFG: (list of supported <para>s)<CR><LF><CR><LF>OK<CR><LF>

3.20.2 Description

This command is used to adjust some module sleep-related parameters to cooperate with the host in harmony.

The SET command is used to set the sleep configuration parameters.

The READ command is used to query the settings of the sleep configuration parameters.

The TEST command is used to return all supported sleep configuration parameters.

3.20.3 Defined Values

<para>: specifies the sleep configuration parameter to set.

0: Delay time of SMS report when the module wakeup the host by PIN channel.

5: Whether to keep the data services connection when pull down WAKEUP_IN#.

<value>: specifies the value for the sleep configuration parameter to set.

If <para> is set to 0, the available values for <value> are an integer ranging from 0 to 5000. The unit of the <value> is millisecond, and the default value is 1500 ms.

If <para> is set to 5, the available values for <value> are:

0: Disconnect the data services when pull down WAKEUP_IN#. (default value)

1: Keep the data services connection when pull down WAKEUP_IN#.

3.20.4 Property Description

Saving upon Power-off	PIN
Y	N

3.20.5 Implementation

The values that NV saved are not influenced by factory default recovery and will not backup when update.

3.20.6 Examples

- Set Command

If configure the delay time of SMS report to 3000 ms, the set parameter should like below:

```
AT^SLEEPCFG=0,3000
```

```
OK
```

If keep the data services connection when pull down WAKEUP_IN#, the set parameter should like below:

```
AT^SLEEPCFG=5,1
```

```
OK
```

- Read command

```
AT^SLEEPCFG?
```

```
^SLEEPCFG: 0,3000
```

^SLEEPCFG: 5,1

OK

- Test command

AT^SLEEPCFG=?

^SLEEPCFG: (0-9)

OK

3.21 ^MSO-Power Off Module

3.21.1 Command Syntax

Command	Possible response(s)
^MSO	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>

3.21.2 Description

This command is used to power off the module.

3.22 ^IOC-Set GPIO Pin Output Level

3.22.1 Command Syntax

Command	Possible response(s)
^IOC=<Pin selection>,<Data vector>	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>
^IOC?	<CR><LF>^IOC:<data vector><CR><LF><CR><LF>OK<CR><LF>
^IOC=?	<CR><LF>^IOC:(list of supported <pin selection>s),(list of supported <data vector>s)<CR><LF><CR><LF>OK<CR><LF>

3.22.2 Description

This command defines values of eight GPIO pins.

3.22.3 Defined Values

<pin selection>: defines the GPIO which are chosen. 8 bits string with character '0' or '1', every bit is associated with one GPIO pin.

0: Not operate the GPIO pin.

1: Operate the GPIO pin.

<data vector>: describe the physical level of every GPIO pin. 8 bits string with character '0' or '1', only GPIO chosen in <pin selection> takes effect.

0: Physical low level

1: Physical high level

3.23 ^IOCTRL-Control the GPIO

3.23.1 Command Syntax

Command	Possible response(s)
^IOCTRL=<sel>,<options>,<value>	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>
^IOCTRL?	<CR><LF>^IOCTRL:<options>,<value><CR><LF><CR><LF>OK<CR><LF>
^IOCTRL=?	<CR><LF>^IOCTRL:(list of supported <sel>s),(list of supported <options>s),(list of supported <value>s)<CR><LF><CR><LF>OK<CR><LF>

3.23.2 Description

The interface is provided to the GPIO pins on the AT command to the guest operating.

The TEST command is used to return the parameters and the range of the AT commands supported.

This command controls 8 GPIO pins, set the command for each parameter (from left to right) corresponding to the LGA pins are as follows:

GPIO PIN:	8	7	6	5	4	3	2	1
LGA PIN:	109	105	113	46	44	45	51	55

3.23.3 Defined Values

<sel>: enable GPIOs.

00000000: Disable any GPIO.

00000001: Enable GPIO1.

00000010: Enable GPIO2.

... ..: Enable or disable some GPIO.

11111111: Enable ALL GPIO.

<options>: set the GPIO's mode.

00000000: All GPIO input mode.

00000001: GPIO1 output mode, others are input mode.

00000010: GPIO2 output mode, others are input mode.

... ..: Set some GPIO's mode.

11111111: All GPIO output mode.

<value>: if the GPIO mode is output, the value can be set.

00000000: All GPIO are set LOW.

00000001: GPIO1 is set HIGH, others are LOW.

00000010: GPIO2 is set HIGH, others are LOW.

... ..: Set some GPIO's value.

11111111: All GPIO are set HIGH.

Resetting the module will reset the value to default value.

4 Identification Commands

4.1 I-Display Product Identification Information

4.1.1 Command Syntax

Command	Possible response(s)
I[value]	<CR><LF><module info><CR><LF><CR><LF>OK<CR><LF>

4.1.2 Description

This command delivers a product information text.

4.1.3 Defined Values

<value>: 0–255, it is for internal use, you can set any value between 0–255, or without value followed.

<module info>: it is the ID information about the MS, including:

Manufacturer (+GMI)

Product model (+GMM)

Software version (+GMR)

ESN/IMEI (+GSN)

4.1.4 Examples

ATI

Manufacturer: huawei

Model: MU509

Revision: 13.815.04.00.00

IMEI: 352340010000564

OK

4.2 +CGMM/+GMM-Query Product Model ID

4.2.1 Command Syntax

Command	Possible response(s)
+CGMM or +GMM	<CR><LF><model><CR><LF><CR><LF>OK<CR><LF>
+CGMM=? or +GMM=?	<CR><LF>OK<CR><LF>

4.2.2 Description

This command is used to get product model ID, the function of +CGMM and +GMM are identical. But the command +CGMM can be used when module have not SIM/USIM card. Product mode ID is composed of character string, the maximum length can not beyond 2048 byte, including the end character '\0'.

4.2.3 Defined Values

<model>: at present, the value of model ID including: MU509.

4.2.4 Examples

AT+CGMM

MU509

OK

AT+GMM

MU509

OK

4.3 +CGMI/+GMI-Query Manufacturer Information

4.3.1 Command Syntax

Command	Possible response(s)
+CGMI or +GMI	<CR><LF><manufacturer><CR><LF><CR><LF>OK<CR><LF>
+CGMI=? or +GMI=?	<CR><LF>OK<CR><LF>

4.3.2 Description

This command is used to query the manufacturer information.

4.3.3 Defined Values

<manufacturer>: manufacturer information. Its value is a string with out double quotation marks.

4.3.4 Examples

AT+CGMI

huawei

OK

AT+GMI

huawei

OK

4.4 +CGMR/+GMR-Query Software Version Number

4.4.1 Command Syntax

Command	Possible response(s)
+CGMR or +GMR	<CR><LF><softversion><CR><LF><CR><LF>OK<CR><LF>
+CGMR=? or +GMR=?	<CR><LF>OK<CR><LF>

4.4.2 Description

The SET command returns the software version number of ME.

4.4.3 Defined Values

<softversion>: software version number. It is a string composed of 31 characters at most.

4.4.4 Examples

```
AT+CGMR
11.810.03.00.00
```

```
OK
AT+GMR
11.810.03.00.00
```

```
OK
```

4.5 +CGSN/+GSN-Query IMEI

4.5.1 Command Syntax

Command	Possible response(s)
+CGSN or +GSN	<CR><LF><IMEI><CR><LF><CR><LF>OK<CR><LF>
+CGSN=? or +GSN=?	<CR><LF>OK<CR><LF>

4.5.2 Description

This command is used to query the International Mobile Equipment Identity (IMEI) of board.

4.5.3 Defined Values

<IMEI>: the IMEI value of the board is returned directly. The returned value is a string composed of:

Table 4-1 The structure of IMEI

8 char	6 char	1 char
TAC	SNR	Spare

TAC: Type code allocated for device
SNR: Sequence number of the device
Spare: For standby purpose

4.5.4 Examples

If TAC is "35178203", SNR is "002894", and Spare is "6", then

AT+CGSN

351782030028946

OK

4.6 +CIMI-Request IMSI

4.6.1 Command Syntax

Command	Possible response(s)
+CIMI	<CR><LF><IMSI><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CIMI=?	<CR><LF>OK<CR><LF>

4.6.2 Description

This command is used to query International Mobile Subscriber Identity (IMSI) of SIM/USIM.

4.6.3 Defined Values

<IMSI>: string values without quote, the IMSI stored in the SIM/USIM. The digits are decimal numbers that range from 0 to 9.

Table 4-2 The structure of IMSI

3 char	2 char or 3 char	
The length is less than 15 characters.		
MCC	MNC	MSIN

MCC: country ID

MNC: network ID

MSIN: MT ID, used to identify the mobile user.

4.6.4 Examples

If the value of MCC is "123", the value of MNC is "45"; the value of MSIN is "12345678",

AT+CIMI

1234512345678

OK

4.7 +CCID-Query Card Identification

4.7.1 Command Syntax

Command	Possible response(s)
+CCID	<CR><LF>+CCID: <ccid><CR><LF><CR><LF>OK<CR><LF>
+CCID?	<CR><LF>+CCID: <ccid><CR><LF><CR><LF>OK<CR><LF>
+CCID=?	<CR><LF>OK<CR><LF>

4.7.2 Description

This command instructs the module to query the integrated circuit card identity (ICCID) of a SIM card.

4.7.3 Defined Values

<ccid>: ICCID, a unique identification number for the SIM card. It is encoded hex code.

4.8 ^HWVER-Query Hardware Version Number

4.8.1 Command Syntax

Command	Possible response(s)
^HWVER	<CR><LF>^HWVER:<hardversion><CR><LF><CR><LF> >OK<CR><LF>

4.8.2 Description

The SET command returns the hardware version number of ME.

4.8.3 Defined Values

<hardversion>: hardware version number. It is a string composed of 31 characters at most.

4.8.4 Examples

```
AT^HWVER
```

```
^HWVER:"MD1MU509M"
```

```
OK
```

4.9 ^SPN-Get Service Provider Name

4.9.1 Command Syntax

Command	Possible response(s)
<code>^SPN=<spn_type></code>	<code><CR><LF>^SPN:<disp_rplmn>,<coding>,<spn_name><CR><LF><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>+CME ERROR: <err><CR><LF></code> or <code><CR><LF>ERROR<CR><LF></code>
<code>^SPN=?</code>	<code><CR><LF>^SPN:(list of supported <spn_type>s)<CR><LF><CR><LF>OK<CR><LF></code>

4.9.2 Description

This command is used for TE to query the SPN file of 2G/3G currently stored on the SIM/USIM card through the ME.

4.9.3 Defined Values

<spn_type>:

0: GSM_SPN

1: UMTS_SPN

<disp_rplmn>:

0: Do not display RPLMN

1: Display RPLMN

99: This field is invalid, and it is not necessary to read the spn_name field any longer.

<coding>: coding scheme. It means the character code of the spn_name field, and specifies the language.

0: GSM 7 bit Default Alphabet

1: UCS2 (namely, upload the spn_name in the format of original data).

<spn_name>: a string. In case of GSM7bit code, the string is composed of 16 characters at most. When the coding scheme is 1, and the contents of the string are data described by "hexadecimal text value", the string will not be greater than 32. When the coding mode reported on the board is "UCS2", this parameter should be completed as a hexadecimal numeral with 0x removed.

4.9.4 Examples

For example: When the 7 bit coding format of SPN is read as "China Mobile", the following will be fed back after the read result is reported: ^SPN:0,0, China Mobile; if it is "China Mobile" in the USC2 coding format, the following will be fed back: ^SPN:1,1, "804E2D56FD79FB52A8".

4.10 ^CARDMODE-Query SIM/USIM Type

4.10.1 Command Syntax

Command	Possible response(s)
^CARDMODE	<CR><LF>^CARDMODE: <sim_type><CR><LF><CR><LF>OK<CR><LF>

4.10.2 Description

This command is used for TE to query the type of SIM card. If the SIM card isn't present or the operation fails, the command returns CME ERROR, which refers to Appendix 24.2 .

4.10.3 Defined Values

<sim_type>: the type of SIM card

0: Unknown

1: SIM card

2: USIM card

4.11 ^SIMRESET-Report SIM Reset Event

4.11.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^SIMRESET: <type><CR><LF>

4.11.2 Description

As long as the SIM reset event happens, the MS will report the event to the TE. The SIM reset can be generated by STK refresh command if the refresh command's type is 4 or 5.

4.11.3 Defined Values

<type>: specifies the type of a SIM reset event. It ranges from 1 to 5. The values are as follows:

- 1: UICC reset caused by STK refresh command. Please refer to 3GPP TS 31.111. If the PIN code is enabled, re-entering the PIN is requested.
- 2: USIM application reset caused by STK refresh command. Please refer to 3GPP TS 31.111. If the PIN code is enabled, re-entering the PIN is requested.

Other values are reserved.

4.11.4 Examples

^SIMRESET: 2

5

Serial Interface Control Commands

5.1 &C-Set DCD Line Mode

5.1.1 Command Syntax

Command	Possible response(s)
&C[value]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>

5.1.2 Description

The command determines how ITU-T V.25 circuit 109 (or equivalent) relates to the detection of received line signal from remote end (recommended default 1 i.e. 109 operation relates to detection of received signal).

5.1.3 Defined Values

<value>:

0: Carrier Detection (DCD) line always is ON.

1: DCD line is in ON in the presence of data carrier only (default value).

Note:

AT&C will set value to 0.

5.2 &D-Set DTE Ready (DTR) Line Mode

5.2.1 Command Syntax

Command	Possible response(s)
&D[value]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>

5.2.2 Description

The command determines how DCE responds when ITU-T V.25 circuit 108/2 (or equivalent) is changed from ON to OFF condition during online data state.

5.2.3 Defined Values

<value>:

0: DCE ignores status of DTR.

1: Change to command mode and retain the connected call when DTR changes from ON to OFF (reserved, not supported currently).

2: Disconnect data call (CSD, PS data service), change to command mode when DTR changes from ON to OFF (default value).

Note:

AT&D will set value to 0.

5.3 &S-Set Data Set Ready (DSR) Line Mode

5.3.1 Command Syntax

Command	Possible response(s)
&S<value>	<CR><LF>OK<CR><LF>

5.3.2 Description

The command determines how ITU-T V.25 circuit 107 (or equivalent) relates to the detection of received line signal from remote end (recommended default 0 i.e. 109 operation relates to detection of received signal).

5.3.3 Defined Values

<value>:

0: DSR line always is ON.

1: DSR line is ON when connected (reserved, not supported currently).

5.4 +ICF-Set Character Framing

5.4.1 Command Syntax

Command	Possible response(s)
+ICF[=<format>[,<parity>]]	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
+ICF?	<CR><LF>+ICF: <format>[,<parity>]<CR><LF><CR><LF>OK<CR><LF>
+ICF=?	<CR><LF>+ICF: (list of supported <format>s),(list of supported <parity>s)<CR><LF><CR><LF>OK<CR><LF>

5.4.2 Description

This extended-format compound parameter is used to determine the local serial port start-stop (asynchronous) character framing that the DCE shall use while accepting DTE command set and while transmitting information text and result codes to the DTE, if this is not automatically determined (see +IPR).

We only support the setting AT+ICF=3,3.

5.4.3 Defined Values

<format>: valid numeric value

3: 8Data 1Stop (default value)

<parity>: defined numeric value

0: Odd (reserved, not supported currently)

1: Even (reserved, not supported currently)

2: Mark (reserved, not supported currently)

3: Space (default value)

5.5 +IPR–Set Fixed Data Rate

5.5.1 Command Syntax

Command	Possible response(s)
+IPR[=<rate>]	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
+IPR?	<CR><LF>+IPR: <rate><CR><LF><CR><LF>OK<CR><LF>
+IPR=?	<CR><LF>+IPR: (list of supported auto detectable <rate>s),(list of supported fixed-only <rate>s)<CR><LF><CR><LF>OK<CR><LF>

5.5.2 Description

This numeric extended-format parameter specifies the data rate at which the DCE will accept command set. It may be used to select operation at rates at which the DCE is not capable of automatically detecting the data rate being used by the DTE. The default value is 115200 bps.

If <rate> is not included in the command, the baud rate will be set to 115200 bps.

The settings will be stored in NV automatically, and will be restored from NV when the module is powered on.

Notes:

- The auto detectable rates are not support currently, the interface is reserved for extended use, so the first parameters of the TEST command will return brackets without value.
- If the UART baud rate is higher than the radio bearer rate, and the transmit data rate is high, the data may be lost.

5.5.3 Defined Values

<rate>: valid numeric values, bps

600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600

5.6 +IFC-Control Local Flow

5.6.1 Command Syntax

Command	Possible response(s)
+IFC[=<DCE_by_DTE>[,<DTE_by_DCE>]]	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
+IFC?	<CR><LF>+IFC: <DCE_by_DTE>,<DTE_by_DCE><CR><LF><CR> <LF>OK<CR><LF>
+IFC=?	<CR><LF>+ICF: (list of supported <DCE_by_DTE>s),(list of supported <DTE_by_DCE>s)<CR><LF><CR><LF>OK<CR><LF>

5.6.2 Description

The command AT+IFC can be used to set or query the data flow control for both data directions.

5.6.3 Defined Values

<DCE_by_DTE>: specifies the method used by the DTE when receiving data from the TA.

0: None (default value)

1: XON/XOFF, terminate flow control in the Cellular Engine (reserved, not supported currently)

2: RTS line

3: XON/XOFF, evaluate flow control in the Cellular Engine and pass it (over the air) to the opposite TE (Reserved, not supported currently)

<DTE_by_DCE>: specifies the method used by the TA when receiving data from the TE.

0: None (default value)

1: XON/XOFF (reserved, not supported currently)

2: CTS line

Note:

AT+IFC will set value to 0, 0.

6 Short Message Service Commands

6.1 +CSMS–Select the SMS Type

6.1.1 Command Syntax

Command	Possible response(s)
+CSMS=<service>	<CR><LF>+CSMS: <mt>,<mo>,<bm><CR><LF><CR><LF>OK<CR><LF>
+CSMS?	<CR><LF>+CSMS: <service>,<mt>,<mo>,<bm><CR><LF><CR><LF>OK< CR><LF>
+CSMS=?	<CR><LF>+CSMS: (list of supported <service>s)<CR><LF><CR><LF>OK<CR><LF>

6.1.2 Description

The SET command is used to set the message service type. The returned <mt>, <mo> and <bm> mean whether this service type is supported for the messages received by the terminal, messages sent by the terminal.

6.1.3 Defined Values

<service>: message service type.

0: 3GPP TS 23.040, 3GPP TS 23.041 (the syntax of SMS AT commands is compatible with GSM 07.05 Phase 2 version 4.7.0) (default value)

1: 3GPP TS 23.040, 3GPP TS 23.041 (the syntax of SMS AT commands is compatible with GSM 07.05 Phase 2+ version.)

<mt>, <mo>, <bm>: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages.

0: Reserved, not supported currently.

1: Supported (default value).

Note:

Command AT+CNMA requires that <service> is set to 1.

6.2 +CMGF-Set Message Format

6.2.1 Command Syntax

Command	Possible response(s)
+CMGF[=<mode>]	<CR><LF>OK<CR><LF>
+CMGF?	<CR><LF>+CMGF: <mode><CR><LF><CR><LF>OK<CR><LF>
+CMGF=?	<CR><LF>+CMGF: (list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

6.2.2 Description

The SET command is used to set the format of the short message. The format has two modes, and depends on the <mode> parameter. The two modes are: PDU mode and TEXT mode. The TEXT mode is unable to display Chinese. The format of message in PDU mode refers to +CMGS command.

The READ command is used to return the current mode selection.

The TEST command returns the applicable <mode> values.

6.2.3 Defined Values

<mode>:

0: PDU modes (default value)

1: TEXT mode

If no <mode> is included, it is equivalent to the effect that the <mode> is 0.

Note:

In TEXT mode, when choose GSM 7 bit coding mode, only support GSM 7 bit basic characters, not support GSM 7 bit extended characters.

6.3 +CNMI-Set New Message Notification

6.3.1 Command Syntax

Command	Possible response(s)
+CNMI[=<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CNMI?	<CR><LF>+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr><CR><LF><CR><LF>OK<CR><LF>
+CNMI=?	<CR><LF>+CNMI: (list of supported <mode>s),(list of supported <mt>s),(list of supported <bm>s),(list of supported <ds>s),(list of supported <bfr>s)<CR><LF><CR><LF>OK<CR><LF>

6.3.2 Description

The SET command is used to set the program of reporting new message to TE.

<mode> and <bfr> are used to set the mode of reporting the new message notification (including four types: +CMT, +CMTI, +CDSI, +CDS) to the TE.

<mt> is used to set whether reporting the new message to the TE, or storing the new message in the MS and reporting the storage position when a new message is received.

<bm> is not in use currently.

<ds> is used to set whether to report the message state report (+CDSI, +CDS).

The TEST command returns the supported parameter values.

It is possible that ME/TA result code buffer is in volatile memory. In this case messages may get lost if the power of ME/TA is switched off before codes are sent to TE. Thus, it is not allowed to use direct message routing (<mt>=2 or 3, or <ds>=1) with <mode> value 0 or 2.

If ME does not get acknowledgement within required time (network timeout), both <mt> and <ds> values of +CNMI will be cleared to 0.

Notes:

- The set value of this command will be cleared to 0 after the MS is restarted. In this case, no new message will be reported. The "AT+CNMI=0, 0, 0, 0, 0" mode is not recommended.
- The "AT+CNMI" command will set all parameters to 0.
- If AT+CSMS <service> is set to 1, it should be set before AT+CNMI.

6.3.3 Defined Values

<mode>: set the message notification mode.

0: Buffer the message in the ME. If the buffer of ME is full, the new notification will overwrite the old notification (default value).

1: Send the message notification to the TE directly. When it is impossible to send the notification (e.g. when in the online data mode), the notification will be discarded.

2: Report the message notification and message state report to the TE directly. When it is impossible to send them (e.g. when in the online data mode), the message notification will be buffered in the ME, and will be sent to the TE at a time later (reserved, not supported currently).

Note:

The message notifications are buffered in the volatile storage. If the MS is powered off before sending the message, the message will probably be lost. Therefore, in case of <mode>=0 or 2, it is not allowed to use direct forwarding of message (<mt>=2 and 3).

<mt>: set the rules of storing and notifying the received messages. New messages can be stored and notified in the following four modes:

0: No SMS-DELIVER indications are routed to the TE (default value).

1: If SMS-DELIVER is stored into MS, indication of the memory location is routed to the TE.

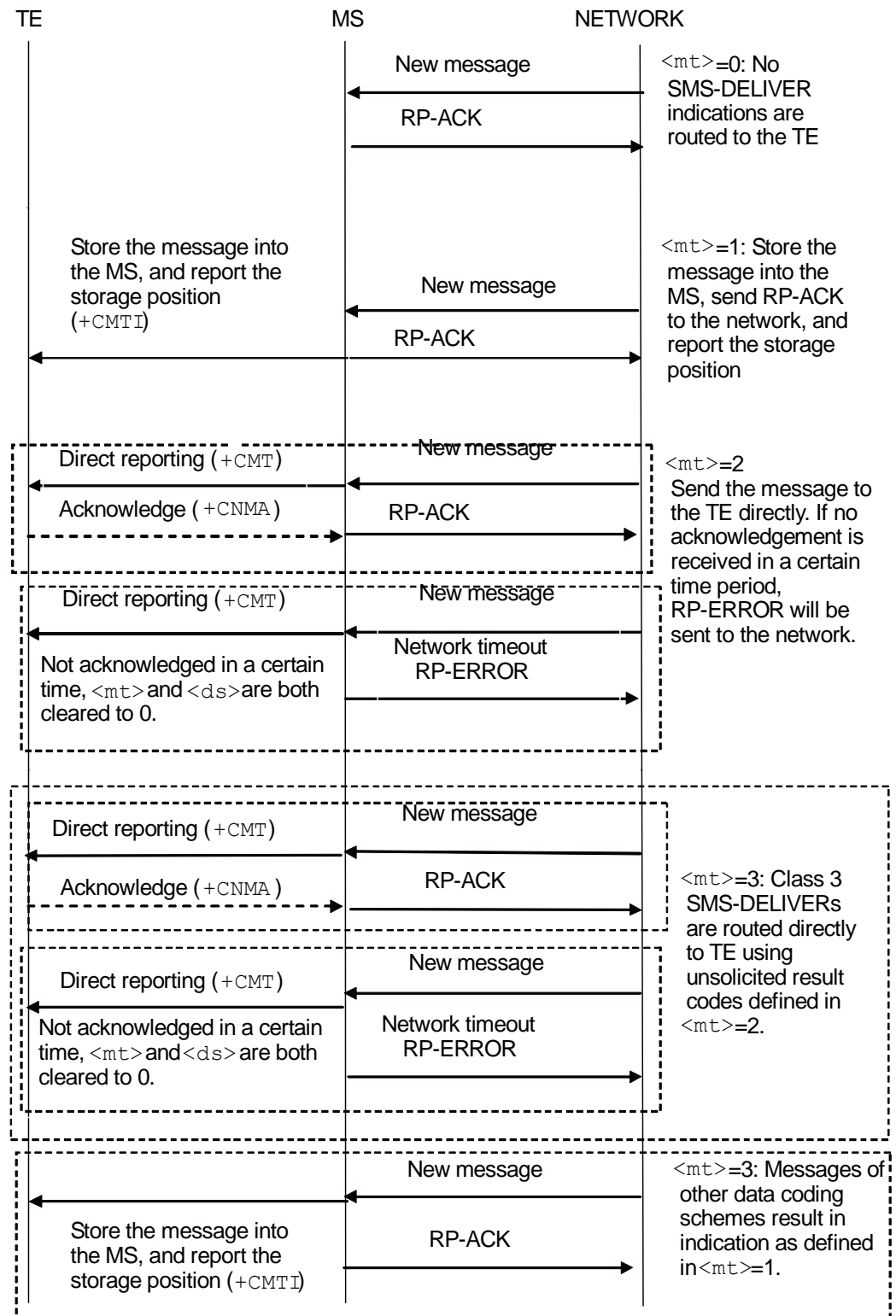
+CMTI: <mem>,<index>

2: If SMS-DELIVER is not stored into MS, SMS-DELIVERs are routed directly to TE.

<CR><LF>+CMT: [<reserved>],<length><CR><LF><pdu>

3: Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1.

Figure 6-1 The function of <mt> parameter



The relationship between the parameter value of <mt> and the mode of storing and notifying various messages is shown in the following table.

Table 6-1 SMS-DELIVER result code and acknowledgement summary

<mt>	no class or class 1	class 0 or message waiting indication group (discard)	class 2 or message waiting indication group (store)	class 3
1	+CMTI	[+CMTI]	+CMTI	+CMTI
2	+CMT & +CNMA	+CMT [& +CNMA]	+CMTI	+CMT & +CNMA
3	+CMTI	[+CMTI]	+CMTI	+CMT & +CNMA

Notes:

- The class of message is given by the TP-DCS domain of the message. For details, see the DCS parameter description of the "+CMGS" command.
- +CMT & +CNMA means requiring TE to send a confirmation (+CNMA).

<bm>: for use of setting the cell broadcast information. It is reserved, not supported currently. The default value is 0.

<ds>: for use of setting the message acknowledgement.

0: Do not send message acknowledgement to the TE (default value)

1: Do not store message acknowledgement in MS, route message acknowledgement directly to TE.

When mode=0 or 2, <ds> cannot be set to 1.

+CDS: <length><CR><LF><pdu>

2: If the message acknowledgement is stored in the MS, a storage position notification will be sent to the TE via "+CDSI".

+CDSI: <mem>,<index>

Note:

Because "SR" is not supported, +CDSI can be sent out, but new message state report will be lost.

<bfr>: for use of setting buffer processing after transition from <mode>=0 to <mode>=1, 2. It is reserved, not supported currently.

0: If <mode>=1 or 2, the buffered unsolicited result codes will be sent to the TE at a time (default value).

1: If <mode>=1 or 2, the buffered unsolicited result codes will be emptied.

6.3.4 Examples

AT+CNMI=1,1,0,1,0

OK

It indicates that the new class1 messages will be stored in the MS first, and the storage position will be reported (+CMTI: "ME", 1); the message state reports will be reported directly (+CDS:).

When it is impossible to report the message notification (e.g. when in the online data mode), the message notification will be discarded.

6.4 +CMTI-Indicate Message Arrival

6.4.1 Command Syntax

Command	Possible response(s)
	<CR><LF>+CMTI: <mem>,<index><CR><LF>

6.4.2 Description

Indicate that a new message is received.

6.4.3 Defined Values

<mem>: currently, "SM" and "ME" are supported.

"BM": Broadcast message storage (reserved, not supported currently)

"ME": ME message storage

"MT": ME-associated storage (reserved, not supported currently)

"SM": (U)SIM message storage

"TA": TA message storage (reserved, not supported currently)

"SR": State report storage (reserved, not supported currently)

<index>: integer value, which indicates the position in the storage.

6.5 +CMT-Report New Message Indication Directly

6.5.1 Command Syntax

Command	Possible response(s)
	If PDU mode (+CMGF=0): <CR><LF>+CMT: [<reserved>],<length><CR><LF><pdu><CR><LF> If TEXT mode (+CMGF=1): <CR><LF>+CMT: <oa>,[<reserved>],<scts>[,<tooa>,<fo>,<pid>,<dcsc>,<sca>,<tosca>,<length>]<CR><LF><message in text><CR><LF>

6.5.2 Description

Received new messages are not stored, but reported to TE directly.

6.5.3 Defined Values

<reserved>: reserved.

- PDU mode:
 - <length>: integer value, which indicates the number of bytes of PDU data.
 - <pdu>: protocol data unit. Its format is the same as defined in section "Message list command".
- TEXT mode:
 - <oa>: Originating-Address.
 - <scts>: Service-Centre-Time-Stamp.
 - <tooa>: Type-of-Originating-Address.
 - <fo>: First-Octet.
 - <pid>: Protocol-Identifier.
 - <dcsc>: Data-Coding-Scheme.
 - <sca>: Service-Center-Address.
 - <tosca>: Type-of- Service-Center-Address.
 - <length>: length of user data.
 - <message in text>: user data.

The details about this parameters refer to the +CMGS command.

6.6 +CDSI-Report New Message State Report

6.6.1 Command Syntax

Command	Possible response(s)
	<CR><LF>+CDSI: <mem>,<index><CR><LF>

6.6.2 Description

This command indicates that a new message state report is received, and specifies the storage position.

Note:

Because "SR" is not supported, +CDSI can be received, but new message state report in "SR" cannot be read, will be lost.

6.6.3 Defined Values

<mem>: currently, only "SM" is supported.

"SM": U(SIM) message storage

<index>: integer value, which indicates the position in the storage.

6.7 +CDS-Report New Message State Report Indication Directly

6.7.1 Command Syntax

Command	Possible response(s)
	If PDU mode (+CMGF=0): <CR><LF>+CDS: <length><CR><LF><pdu><CR><LF> If TEXT mode (+CMGF=1): <CR><LF>+CDS: <fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st><CR><LF>

6.7.2 Description

This command indicates that received new message state reports are not stored, but reported to TE directly.

6.7.3 Defined Values

<length>: an integer value, which indicates the number of bytes of PDU data.

<pdu>: protocol data unit. The data structure is as follows:

Table 6-2 The data structure of PDU

[<SCA>]			
<sc_len>	<type_addr>	<numbers>	TPDU

Where, the <SCA>, <sc_len>, <type_addr>, and <numbers> fields are defined in the same way as in the section "Message sending command".

The data structure of TPDU is as follows:

Table 6-3 The data structure of TPDU

Abbr.	Reference	P1)	R2)
TP-MTI	TP-Message-Type-Indicator	M	2b
TP-UDHI	TP-User-Data-Header-Indication	O	b
TP-MMS	TP-More-Messages-to-Send	M	b
TP-SRQ	TP-Status-Report-Qualifier	M	b
TP-MR	TP-Message-Reference	M	l
TP-RA	TP-Recipient-Address	M	2–12o
TP-SCTS	TP-Service-Centre-Time-Stamp	M	7o
TP-DT	TP-Discharge-Time	M	7o
TP-ST	TP-Status	M	o
TP-PI	TP-Parameter-Indicator	O	o
TP-PID	TP-Protocol-Identifier	O	o
TP-DCS	TP-Data-Coding-Scheme	O	o
TP-UDL	TP-User-Data-Length	O	o
TP-UD	TP-User-Data	O	

1) Mandatory (M) or Optional (O).

2) Integer (l), bit (b), 2 bits (2b), Octet (o), 7 octets (7o), 2–12 octets (2–12o).

<fo>:depending on the command or result code: first octet of 3GPP TS 23.040 SMS-DELIVER, SMS-SUBMIT (the default value is 17), SMS-STATUS-REPORT, or SMS-COMMAND (the default value is 2) in integer format.

<mr>: message-reference.

<ra>: recipient-address.
<tora>: receive-address type.
<scts>: service-centre-time-stamp.
<dt>: discharge-time.
<st>: status.

6.8 +CMGD-Delete Message

6.8.1 Command Syntax

Command	Possible response(s)
If delflag value is 0: +CMGD=<index>[,<delflag>] If delflag value is not 0: +CMGD=[<index>],<delflag>	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CMGD=?	<CR><LF>+CMGD: (list of supported <index>s),(list of supported <delflag>s)<CR><LF><CR><LF>OK<CR><LF>

6.8.2 Description

The SET command deletes message from memory <mem1> location <index>. For the setting of <mem1> and description, see the "+CPMS command". If the second parameter <delflag> is present and not set to 0 then the ME shall ignore <index> and follow the rules for <delflag> shown below. If deleting fails, +CMS ERROR: <err> is returned.

The TEST command returns the storage position where the message is currently stored, and the supported <delflag> values.

6.8.3 Defined Values

<index>: storage position of message

<delflag>:

0: Delete the messages specified by <index> (default value).

1: Delete all read messages from preferred message storage, leaving unread messages stored mobile originated messages (whether sent or not) untouched.

2: Delete all read messages from preferred message storage and sent mobile originated messages, leaving unread messages and unsent mobile originated messages untouched.

3: Delete all read messages from preferred message storage, sent and unsent mobile originated messages leaving unread messages untouched.

4: Delete all messages from preferred message storage including unread messages.

Note:

If the message does not exist, the READ command will return OK.

6.9 +CNMA-Acknowledge New Message

6.9.1 Command Syntax

Command	Possible response(s)
If +CMGF=0: +CNMA[=<n>[,<length>[<CR> PDU is given<ctrl-Z/ESC>]]] If +CMGF=1: +CNMA<CR>	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CNMA=?	If +CMGF=0: <CR><LF>+CNMA: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF> If +CMGF=1: <CR><LF>OK<CR><LF>

6.9.2 Description

The SET command confirms reception of a new message which is routed directly to the TE. This acknowledgement command shall be used when +CSMS parameter <service> equals 1. For the usage of this command, see also description of "+CNMI" command.

In PDU mode, it is possible to send either positive (RP-ACK) or negative (RP-ERROR) acknowledgement to the network. Parameter <n> defines which one will be sent.

Optionally, an acknowledgement TPDU (SMS-DELIVER-REPORT for RP-ACK or RP-ERROR) may be sent to the network. The entering of PDU is done similarly as specified in command send message +CMGS, except that the format of <ackpdu> is used instead of <pdu>. PDU shall not be bounded by double quotes.

MS shall not send another +CMT result code to TE before previous one is acknowledged.

If ME does not get acknowledgement within required time (network timeout), ME should send RP-ERROR to network, and should shall automatically disable routing to TE by setting both <mt> and <ds> values of +CNMI to zero.

To make the MS report the message notification again, you need to set <mt> and <ds> again.

If the command is executed but no message is available for confirmation, the "+CMS ERROR: <err>" will be returned

The TEST command returns the supported <n> values. If only 0 is supported, it indicates that the command does not support TPDU sending.

6.9.3 Defined Values

<n>:

0: This option is not supported currently.

1: If the sending is successful, acknowledge with "RP-ACK" (or receiving buffered result code successfully).

2: If the sending is unsuccessful, acknowledge with "RP-ERROR".

<ackpdu> description:

Table 6-4 Basic elements

Abbr.	Reference	P1)	P2)	Description
TP-MTI	TP-Message Type Indicator	M	2b	TP-message type
TP-UDHI	TP-User-Data-Header-Indication	O	b	Indicate that TP-UD has a header
TP-PI	TP-Parameter-Indicator	M	o	Indicate which optional parameters exist
TP-PID	TP-Protocol-Identifier	O	o	Protocol ID
TP-DCS	TP-Data-Coding-Scheme	O	o	Data coding scheme
TP-UDL	TP-User-Data-Length	O	o	User data length
TP-UD	TP-User-Data	O	3)	User data

Notes:

- 1) Whether it is mandatory or optional: Mandatory (M) or Optional (O).
- 2) Indicates: Integer (I), Bit (b), 2 bits (2b), octet (o).
- 3) Depends on TP-DCS.

Table 6-5 Bit number

Number of Octets	7	6	5	4	3	2	1	0	
1									TP-MTI, TP-UDHI
1									TP-PI

Number of Octets	7	6	5	4	3	2	1	0	
0,1									TP-PID
0,1									TP-DCS
0,1									TP-UDL
0 to 159									TP-UD

The 7th bit and bits 2–5 of the first byte are not used in SMS-DELIVER-REPORT, and the sender should set them to 0. If any bit of them is not 0, the receiver should ignore them.

Description:

<TP-MTI>: TP-message type. Bits 0 and 1 in the first byte.

bit1	bit0	Message type
0	0	SMS-DELIVER (in the direction SC to MS)
0	0	SMS-DELIVER REPORT (in the direction MS to SC)
1	0	SMS-STATUS-REPORT (in the direction SC to MS)
1	0	SMS-COMMAND (in the direction MS to SC)
0	1	SMS-SUBMIT (in the direction MS to SC)
0	1	SMS-SUBMIT-REPORT (in the direction SC to MS)
1	1	Reserved

<TP-UDHI>: indicates that TP-UD has a header. It is located in bit 6 in the first byte.

0: TP-UD domain contains only messages.

1: The beginning of TP-UD domain has a header.

<TP-PI>: indicates which optional parameters exist. If the bit is set as 1, it means no corresponding parameter exists.

Table 6-6 The contents of bit number

bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Extension bit	Reserved	Reserved	Reserved	Reserved	TP-UDL	TP-DCS	TP-PID

<TP-PID>: protocol ID. The default value set by TE when sending the message is 00000000. If the transmitting address is an E-mail, the TE should fill in 00110010=0x32.

<TP-DCS>: while sending the message, the TE selects the TP-DCS mode.

Table 6-7 The description of setting the bit number

bit7~bit6(while sending the message, the TE selects the TP-DCS mode)	00, while sending the message , the TE selects this value.	bit5	0	If TE sets bit5 to be 0, it indicates no message is compressed.
			1	If bit5 is 1, it indicates the sent message is compressed, and TE does not select this value.
		bit4	0	If TE sets bit4 to be 0, it indicates that bit1 and bit0 are reserved, and the value is 00.
			1	If bit4 is 1, it indicates that bit1 and bit0 have the meaning of message type (The message type depends on the user's settings. If the message type is set by the user, TE sets bit4 to be 1, e.g. set class 1 or class 2).
		bit3~2 (message code format)	00	GSM 7 bit default code
			01	8bit data
			10	UCS2 code mode. When the user inputs Chinese characters, the TE will select this value.
		bit1~0 (message type, its value is selected by TE according to the user's options)	00	Class 0, provided to the interface to display and reply that the SC has received but not stored it.
			01	Class 1, stored to the MS (i.e., NV), or stored to the SIM card when the MS is full
			10	Class 2, for special use of SIM. After the message is stored, the storage state will be replied to the SC. If the SIM card is full, the SC failure and the reasons will be reported.
			11	Class 3, stored to the TE. When the MS receives the message, but has not transmitted it to the TE, it will give a response to the SC.
bit7~4 (while sending the message, the TE does not select this TP-DCS mode)	1100 and 1101 (GSM 7 bit code), 1110 (uncompressed UCS2 code)	bit3	0	The message wait prompt function is invalid. Currently, the functions that require prompting, e.g. enforcement message, E-mail and voice mail, are not supported.
			1	Activate the message waiting prompt function
		bit2	0	Reserved bits, which make no sense.
		bit1~0 (message waiting type)	00	With voice message waiting.
			01	With fax message waiting.
			10	With E-mail message waiting.
			11	Message waiting of other unknown types
	1111 (TE does not select this value either)	bit3	0	Reserved bits, which make no sense.
		bit2	0	7bit code
			1	8bit data
		bit1~0	00	Class 0, providing display and reply to SC that the message is received but not stored.

			01	Class 1, stored to the MS (i.e., NV), or stored to the SIM card
			10	Class 2, for use of SIM only. After storing it, the storage state is returned to the SC.
			11	Class 3, stored to the TE. When the MS receives the message, but has not transmitted it to the TE, it will give a response to the SC.

<TP-UDL>: number of bytes occupied by the "user data" domain. If the value is 0, the "User data" domain does not exist.

<TP-UD>: the "user data" domain may include "user data header". If it includes the header (namely, the value of bit6 in byte0 is 1), the value of TP-UDL is equal to the length filled in the "User-Data-Header" plus the length of "User-Data". The value of TP-UDL depends on the specific coding mode. If it is a 7-bit default code, it indicates that there are a total of how many septets; if it is a 8-bit code, it indicates there are a total of how many Octets; if it is a UCS2 code, the TP-UDL still means a total of how many Octets; if there are compressed 7-bit or 8bit or UCS2 codes, the TP-UDL indicates there are a total of how many Octets after compression. The specific representation structure in the "User data" domain is shown in the following diagram:

Figure 6-2 Format of User data of the default 7bit code

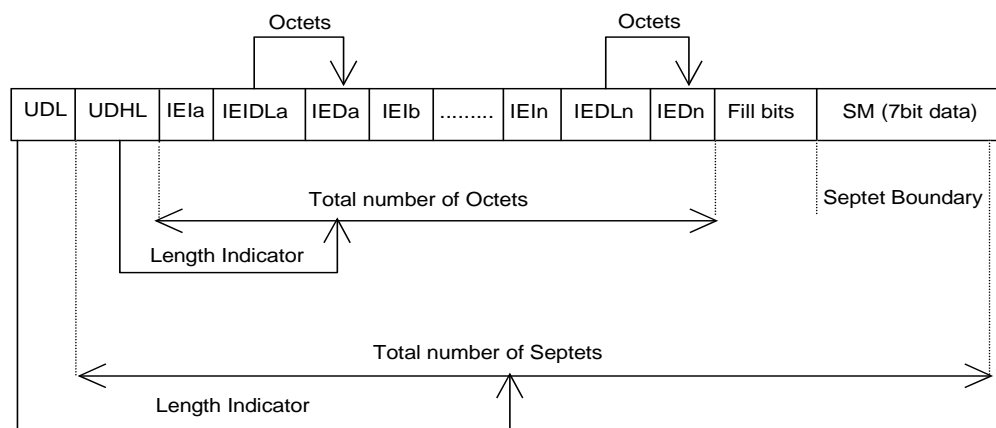
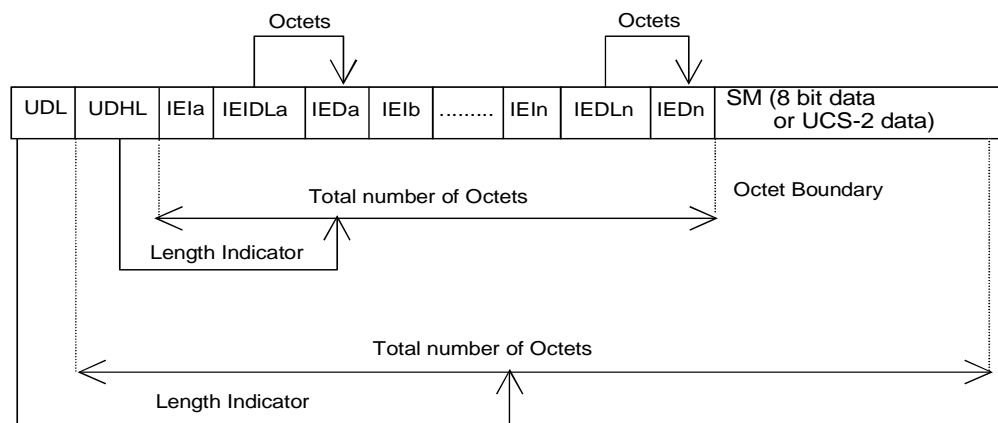


Figure 6-3 Format of User data of 8bit code or UCS2 code


The above two diagrams show the format of filling in the user data, where IEI means "Information Element Identifier".

Notes:

- 1) Set AT+CSMS=1 before AT+CNMI settings.
- 2) The unsolicited report CDS is not supported to be confirmed by the command AT+CNMA currently.

6.10 +CPMS-Select Message Storage

6.10.1 Command Syntax

Command	Possible response(s)
+CPMS=<mem1>[,<mem2>[,<mem3>]]	<p><CR><LF>+CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3><CR><LF><CR><LF>OK<CR><LF></p> <p>In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF></p>
+CPMS?	<p><CR><LF>+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3><CR><LF><CR><LF>OK<CR><LF></p> <p>In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF></p>
+CPMS=?	<p><CR><LF>+CPMS: (list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>s)<CR><LF><CR><LF>OK<CR><LF></p>

6.10.2 Description

The SET command is used to set the message storage media corresponding to the message read/write operations, and return the current use state of the selected media. The READ command returns the name and use state of the currently selected media. The TEST command returns all the media types supported by the MS.

Note:

The third parameter of +CPMS command is stored in NV automatically when +CPMS command executes, the other two are not. So after module resets, only the third value is the same as user set.

6.10.3 Defined Values

<mem1>: string value. It indicates the media for use of reading and deleting messages. Optional values are:

"SM": Which means the (U)SIM card (default value).

"ME": Which means NV.

"SR": Indicates the status report storage place in (U)SIM card (reserved, not supported currently).

<mem2>: string value. It indicates the media for use of writing and sending messages. Optional values are:

"SM": Which means the (U)SIM card (default value).

"ME": Which means NV.

<mem3>: string value. It indicates the media for use of storing the received message. The optional values are the same as those of <mem2>.

<total1>: integer value. It indicates the total number of messages that can be saved in <mem1>.

<total2>: integer value. It indicates the total number of messages that can be saved in <mem2>.

<total3>: integer value. It indicates the total number of messages that can be saved in <mem3>.

<used1>: integer value. It indicates the total number of messages currently stored in <mem1>.

<used2>: integer value. It indicates the total number of messages currently stored in <mem2>.

<used3>: integer value. It indicates the total number of messages currently stored in <mem3>.

6.11 +CSCA-Set SMSC Number

6.11.1 Command Syntax

Command	Possible response(s)
+CSCA=<sca>[,<tosca>]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CSCA?	<CR><LF>+CSCA: <sca>,<tosca><CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CSCA=?	<CR><LF>OK<CR><LF>

6.11.2 Description

The SET command is used to set the SMSC number. For the message in the PDU mode, the setting of this command can be used only if the SMSC-related parameter `sc_len` has the value of 0 (for the PDU format, see the "+CMGS" command) in the PDU.

6.11.3 Defined Values

<sca>: string value. It indicates the SMSC number. The number is composed '*', '#', '+' and '0'–'9'. The '+' must be the very beginning of the number. The number contains 20 characters at most.

<tosca>: integer value. It indicates the number type, where "145" means an international call. For the specific values, see also the definition of the "type_addr" parameter in the SC number, as described in the section "Short message sending +CMGS".

If no <tosca> parameter is included, it is equivalent to the effect that the <tosca> parameter is not modified.

6.11.4 Examples

AT+CSCA?

+CSCA: "+8613902900", 145

OK

6.12 +CMGS-Send Message

6.12.1 Command Syntax

Command	Possible response(s)
If PDU mode (+CMGF=0): +CMGS=<length><CR> PDU is given<ctrl-Z/ESC> If TEXT mode (+CMGF=1): +CMGS=<da>[,<toda>]<CR> text is entered<ctrl-Z/ESC>	If PDU mode (+CMGF=0): <CR><LF>+CMGS: <mr>[,<ackpdu>]<CR><LF><CR><LF>OK<CR><LF> If TEXT mode (+CMGF=1): <CR><LF>+CMGS: <mr><CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CMGS=?	<CR><LF>OK<CR><LF>

6.12.2 Description

Send a message to the network side. The process of sending a message includes two steps:

- PDU mode:**
 First, deliver "AT+CMGS=<length>" ended with (CR).
 After MS returns <CR><LF><greater_than><space> (IRA 13, 10, 62, 32), the TE delivers the PDU packet, which is ended with <ctrl-Z> (IRA 26).
- TEXT mode:**
 First, deliver "AT+CMGS=<da>[,<toda>]" ended with (CR).
 After MS returns <CR><LF><greater_than><space> (IRA 13, 10, 62, 32), the TE delivers the text, which is ended with <ctrl-Z> (IRA 26).

In TEXT mode, it only supports 0–0x00FF with UCS2. When choose GSM 7 bit coding mode, only support GSM 7 bit basic characters, not support GSM 7 bit extended characters.

The maximum length of message is 160 characters with 7bit codec, and 70 characters with UCS2.

6.12.3 Defined Values

<length>: the number of actually sent TPDU characters/2. The digits are decimal numbers that range from 0 to 9. The maximum value is 178.

<da>: destination address.

<mr>: message ID. The digits are decimal numbers that range from 0 to 9. The value ranges from 0 to 255.

<ackpdu>: when the value of <service> in "+CSMS" is 1, which is supported by the network, this field will be returned. Unless no SCA exists, the format is the same as the format of PDU. This field is not supported currently.

<ctrl-Z>: identifies the end of a PDU data. The characters are: '0x1A'

<ESC>: cancel the sending of this message. The characters are: '0x1B'

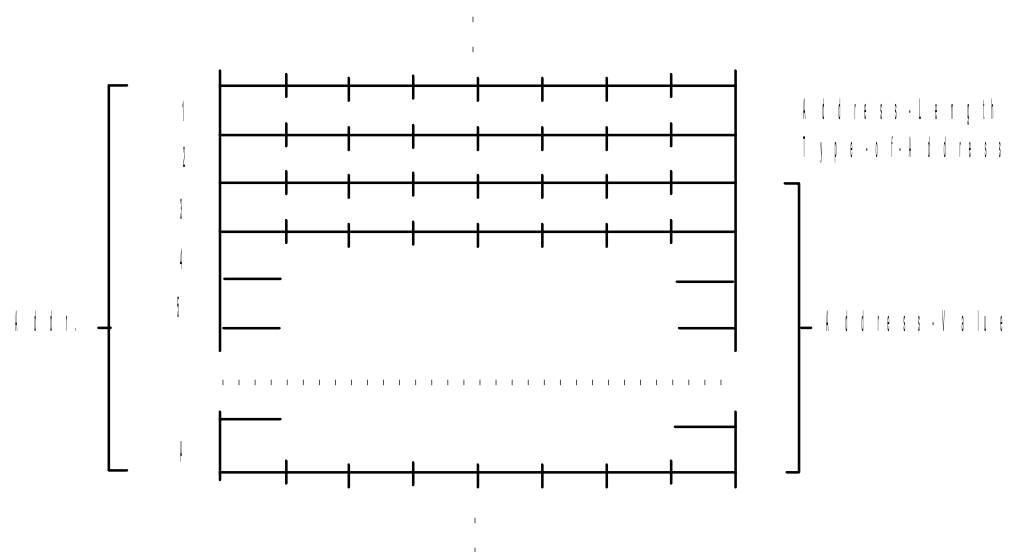
The structure of the PDU packet is as follows: (The values of the characters described in the packet are: 0–9, A–F, a–f. Two characters make up one Octet value. For example: '23'=0x23, '2a'=0x2a, all are hexadecimal).

Table 6-8 The structure of the PDU packet

[<SCA>]			
<sc_len>	<type_addr>	<numbers>	TPDU

<SCA>: SMSC address. Its structure is as follows:

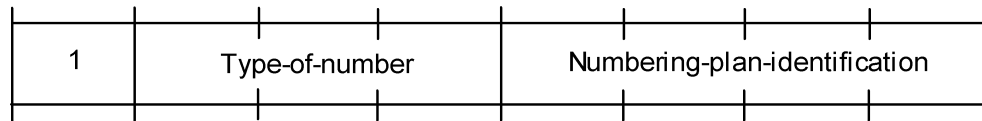
Figure 6-4 The structure of SMSC address



<sc_len>: length of the SCA (short message service centre number). It is composed of two characters. It indicates the number of characters occupied by <type_addr> and <numbers>/2.

<type_addr>: number address type. It is composed of two characters. Its structure is as follows:

Figure 6-5 The structure of type_addr



Type-of-Number (bit6...bit4). The values are as follows:

0 0 0 This value is written when the user does not know the authentication information of the target address number. In this case, the address number is organized at the network side.

0 0 1 This value is selected if the user knows that it is an international number, or believes that it falls in the domestic range.

0 1 0 Domestic number. No prefix or suffix is allowed. This value is selected when the user sends a message to a domestic telephone set.

0 1 1 A specific number in this network. It is used for management or service and cannot be selected by the user.

1 0 1 The number type is the default 7bit code mode of GSM. It is not in use currently.

1 1 0 Short number. It is not in use currently.

1 1 1 Reserved for extension. It is not in use currently.

Numbering-plan-identification (bit3...bit0). The values are as follows:

Note:

It is valid only when the values of bit6...bit4 are 000, 001, 010. In other circumstances, bit3...bit0 are not valid

0 0 0 0 The number is determined by the numbering plan at the network side.

0 0 0 1 ISDN/telephone numbering plan.

0 0 1 1 Data numbering plan, not in use currently.

0 1 0 0 Telex numbering plan, not in use currently.

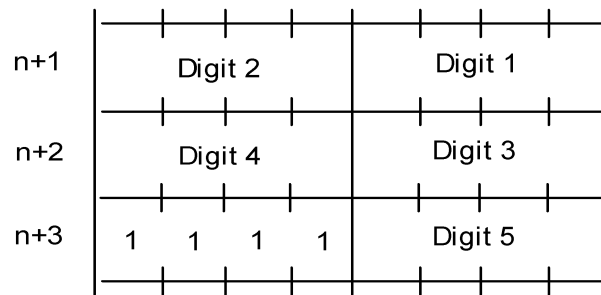
1 0 0 0 National numbering plan, not in use currently.

1 0 0 1 Private numbering plan, not in use currently.

1 0 1 0 ERMES numbering plan, not in use currently.

<numbers>: address number. One byte contains two digits. Bit3-bit0 contain the first digit, and bit7-bit4 contain the second digit. Coding sequence of half bytes, as shown in the following example:

Figure 6-6 Half byte coding with a total of 5 digits



Note:

If the number length is an odd number, the highest four digits of this octet should be filled with 1111.

'*': 1010 '#': 1011
'a': 1100 'b': 1101 'c': 1110

For example:

If the number of SCA is 13902900, then the <numbers> is: 31099200

If the number length of SCA is an odd number: 139029001, then <numbers> is: 31099200F1

If the number type is: 'A1', the corresponding <SCA> will be 05a131099200.

If the type is indicated as an international number 'A1', while the number 13902900 is a domestic number, it is necessary to additionally dial 86 before the number, hence the corresponding <SCA> in this case is 06a16831099200.

The data structure of TPDU is as follows:

Table 6-9 The data structure of TPDU

1Octet								1Oct	2Oct~12Oct	1Oct	1Oct	1Oct	1Oct	
RP	UDHI	SRR	VPF		RD	MTI		MR	DA	PID	DCS	VP	UDL	UD
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0							

<MTI>: message type. The values are as follows:

bit1	bit0	Message Type
0	0	SMS-DELIVER (in the direction SC to MS)
0	0	SMS-DELIVER REPORT (in the direction MS to SC)
1	0	SMS-STATUS-REPORT (in the direction SC to MS)
1	0	SMS-COMMAND (in the direction MS to SC)

- 0 1 SMS-SUBMIT (in the direction MS to SC)
- 0 1 SMS-SUBMIT-REPORT (in the direction SC to MS)
- 1 1 Reserved

<RD>: it indicates whether the SC needs to receive the short message that is still stored in the SC and has the MR and DA identical with those of the message sent previously from the same OA. The values are as follows:

0: To receive

1: Not to receive

<VPF>: it indicates the validity of the VP field and the format. The values are as follows:

bit4 bit3

0 0 The VP field is invalid

1 0 The VP field is valid and the format is "relative". Only this format is available currently.

0 1 The VP field is valid, and the format is "enhanced".

1 1 The VP field is valid, and the format is "absolute".

<RP>: indicates the setting of the path of the message reply. The values are as follows:

0: No setting.

1: Settings are available. It indicates that the reply has the SC number settings identical with those of the message, and the return path is the same.

<UDHI>: indicates the user data header. The values are as follows:

0: The user data segment contains only contents of the message.

1: In addition to the message, the user data segment contains a data header.

<SRR>: state report request indication

0: State report information about successful sending of a message is not required.

1: State report information about successful sending of a message is required.

<MR>: message ID. The value ranges from 0 to 255.

<DA>: DA (destination address), same as defined in SCA. There are a total of 2–12 octets. Therefore, the longest address in the DA segment contains 20 digits.

<PID>: protocol indication. The values are as follows:

Table 6-10 The structure of <PID>

PID							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0

Bit7 bit6 (here we assume bit 7=0 and bit 6=0)

0 0 Allocate bits 0..5. The values are defined below.

1 0 Allocate bits 0...5. The values are defined below.

0 1 Reserved.

1 1 Allocate bits 0...5, for special purpose of SC.

The values of Bit5 are as follows:

0: No interworking, but SME-to-SME protocol

1: Telematic interworking (in this case, the values of bits 4...0 are valid)

Bit4...bit0 telematic devices type indication:

If the values are 1 0 0 1 0, it indicates Email. Other values are not supported currently.

<DCS>: coding mode of user data. The values are as follows:

Table 6-11 The <DCS> parameter

Bit7...bit4			Bit3.....bit0
00xx	Bit5	0: Message is not compressed.	Bit1 bit0 indicate message type 0 0 : Class 0, providing display and reply to the SC that the message is received but not stored. 0 1 : Class 1, stored to the NV (or SIM card if the NV is full). 1 0 : Class 2, for use of SIM only. After the message is stored, the storage state will be replied to the SC. If the SIM card is full, the SC failure and the reasons will be reported. 1 1 : Class 3, stored to the TE. When the MS receives the message, but has not transmitted it to the TE, it will give a response to the SC. Bit3 bit2 message type indication 0 0 : GSM 7 bit default code 0 1 : 8bit data 1 0 : UCS2 code mode. When the user inputs Chinese characters, this value will be selected. 1 1 : Reserved.
		1: Message is compressed. Not supported currently.	
	Bit4	0: Bit1 and bit0 are reserved.	
		1: Bit1 and bit0 indicate message type.	
0100	Reserved.		
...			
1011			

Bit7...bit4		Bit3.....bit0
1100	The message contents are discarded. The message waiting prompt is given, and the user data adopts GSM 7 bit coding.	The settings of Bit3...0 are identical with the settings made in case of bit7...4=1101.
1101	The message is stored. The message waiting prompt is given, and the user data adopts GSM 7 bit coding.	Bit3 Prompt indication. The values are as follows: 0: The message waiting prompt function is invalid. 1: Activate the message waiting prompt function. Bit2 Reserved. The value is 0. Bit1 bit0 message type indication 0 0 : With voice message waiting. 0 1 : With fax message waiting. 1 0 : With E-mail message waiting. 1 1 : Message waiting of other unknown types
1110	The message is stored. The message waiting prompt is given, and the user data adopts uncompressed UCS2 coding.	The settings of Bit3...0 are identical with the settings made in case of bit7...4=1101.
1111	Data coding/message class	Bit2 Reserved. The value is 0. Bit2 Coding mode of message. The values are as follows: 0: GSM 7 bit default code 1: 8bit data Bit1 bit0 message type indication 0 0 : Class 0, providing display and reply to the SC that the message is received but not stored. 0 1 : Class 1, stored to the NV (or SIM card if the NV is full). 1 0 : Class 2, for use of SIM only. After the message is stored, the storage state will be replied to the SC. If the SIM card is full, the SC failure and the reasons will be reported. 1 1 : Class 3, stored to the TE. When the MS receives the message, but has not transmitted it to the TE, it will give a response to the SC.

<VP>: indicates the validity period, which starts from the message being received by the SC. If VPF=00, this field is lacking. The duration is expressed as follows:

Table 6-12 The description of <VP>

VP value	Description
0 to 143	(VP + 1) x 5 minutes
144 to 167	12 hours + ((VP-143) x 30 minutes)
168 to 196	(VP-166) x 1 day
197 to 255	(VP-192) x 1 week

<UDL>: length of user data. The value of UDL depends on the specific coding mode.

- In case of default 7-bit coding, it indicates there are a total of how many septets.
- In case of 8bit coding, it indicates there are a total of how many Octets.
- In case of UCS2 coding, UDL indicates there are a total of how many Octets.
- In case of compressed 7-bit or 8bit or UCS2 coding, UDL indicates there are a total of how many Octets after compression.

For the compressed message codes, the data length of <UD> should not be more than 160septets; for the message of uncompressed codes, the <UD> length should not be more than 140 Octets.

<UD>: user data. The data validity depends on the parameter UDL.

6.12.4 Examples

The SMSC number is: 13902900, and the message is sent to the number: 13901000453, and the contents are: 0x53 0x4E 0x4E 0x3A ("华为" for UCS2 encode), then:

If "+CSCA" has set SCA, then

a) When sending the message, the <SCA> field can be left uncompleted. The <SCA> value is obtained through the value set via "+CSCA" command.

AT+CMGS=17(CR)

>81000B813109010054F3001804534E4E3A\x1A

Note:

Data interpretation, 81(<RP-MTI>)00(<MR>)0B(<DA-len>)81(<DA-type>)
3109010054F3(<DA-numbers>)00(<PID>)18(<DCS>)04(<UDL>)534E4E3A
(<UD>)\x1A(<ctrl-Z>)

b) When sending the message, the <SCA> field can also be completed, and the <SCA> value can be obtained directly from the PDU packet.

AT+CMGS=17

```
>05a13109920081000B813109010054F3001804534E4E3A\x1A
```

or

```
AT+CMGS=17
```

```
>0081000B813109010054F3001804534E4E3A\x1A
```

(In this case, since <sc_len>=0, when sending the message, the <SCA> can be obtained through the value set via the "+CSCA" command)

PDU Format:

```
DATA:81000B813109010054F3001804534E4E3A
```

Field	Information	Comment
81	RP-MTI	RP-Message Type Indicator(send SMS)
00	TP-MR	0
0B	DA Address length	Total 11 code
81	DA-type	Unknown type
3109010054F3	TP-DA	13901000453, last extra F is filled for full information string.
00	TP-PID	GSM, point to point
18	TP-DCS	UCS2
04	TP-UDL	Send data length is 4
534E4E3A	TP-UD	send data
\x1A	ctrl-Z	

If "+CSCA" has not set SCA, then

When sending the message, the <SCA> field must be completed, and the <SCA> value can be obtained directly from the PDU packet.

```
AT+CMGS=17
```

```
>05a13109920081000B913109010054F3001804534E4E3A\x1A
```

PDU Format:

```
DATA:05a13109920081000B913109010054F3001804534E4E3A
```

Field	Information	Comment
05	SMSC address length	05
a1	TON	Domestic number
31099200	SMSC address	13902900

Field	Information	Comment
81	RP-MTI	RP-Message Type Indicator(send SMS)
00	TP-MR	0
0B	DA Address length	Total 11 codes
91	DA-type	International code
3109010054F3	TP-DA	13901000453, last extra F is filled for full information string.
00	TP-PID	GSM, point to point
18	TP-DCS	UCS2
04	TP-UDL	Send data length is 4
534E4E3A	TP-UD	send data
\x1A	ctrl-Z	

6.13 +CMGW-Store Message to Memory

6.13.1 Command Syntax

Command	Possible response(s)
If PDU mode (+CMGF=0): +CMGW=<length>[,<stat>]<CR>PDU is given<ctrl-Z/ESC> If TEXT mode (+CMGF=1): +CMGW[=<oa/da>[,<tooa/toda>[,<stat>]]]<CR> text is entered<ctrl-Z/ESC>	<CR><LF>+CMGW: <index><CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CMGW=?	<CR><LF>OK<CR><LF>

6.13.2 Description

Store a message to the <mem2> storage set via the "+CPMS" command.

6.13.3 Defined Values

PDU mode:

<length>: number of actually sent TPDU characters/2.

<mr>: message ID. The digits are decimal numbers that range from 0 to 9. The value range is: 0–255.

<ctrl-Z>: identifies the end of a PDU data. The characters are: '0x1A'

<ESC>: cancels the sending of this message. The characters are: '0x1B'

<stat>: storage state of the message. The values are as follows: (In the PDU mode, the default value is 2).

0 "REC UNREAD" received unread message

1 "REC READ" received read message

2 "STO UNSENT" stored unsent message

3 "STO SENT" stored sent message

4 "ALL" all messages (This value is only applicable to the "+CMGL" command)

<index>: position number in the storage. The digits are decimal numbers that range from 0 to 9. The value range is 0~maximum capacity of storage-1.

The PDU packet structure is consistent with the description of the "+CMGS" command.

TEXT mode:

<oa/da>: originating address/Destination address. Same as defined in SCA. Total 2–12 Octets. Therefore, the longest address in the OA segment contains 20 digits.

<tooa>: Type-of-Originating-Address.

<toda>: Type-of-Destination-Address.

<stat>, <ctrl-Z>, <ESC>: please refer to the defined values of PDU mode.

6.14 +CMGL-List Message List

6.14.1 Command Syntax

Command	Possible response(s)
+CMGL[=<stat>]	<p>In case of PDU mode and successful execution of command:</p> <pre>[<CR><LF>+CMGL: <index>,<stat>,<reserved>,<length><CR><LF><pdu>[<CR> <LF>+CMGL: <index>,<stat>,<reserved>,<length><CR><LF><pdu>...]]<C R><LF>]<CR><LF>OK<CR><LF></pre> <p>If text mode, command successful and SMS-SUBMITs and/or SMS-DELIVERs:</p> <pre>[<CR><LF>+CMGL: <index>,<stat>,<oa/da>,<reserved>,<scts>]<CR><LF><data >][<CR><LF>+CMGL: <index>,<stat>,<oa/da>,<reserved>,<scts>]<CR><LF><data >][...]<CR><LF>]<CR><LF>OK<CR><LF></pre> <p>If text mode, command successful and SMS-STATUS-REPORTs:</p> <pre>[<CR><LF>+CMGL: <index>,<stat>,<fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st>[<C R><LF>+CMGL: <index>,<stat>,<fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st>[...]<CR><LF>]<CR><LF>]]<CR><LF>OK<CR><LF></pre> <p>Otherwise:</p> <pre><CR><LF>+CMS ERROR: <err><CR><LF></pre>
+CMGL=?	<pre><CR><LF>+CMGL: (list of supported <stat>s)<CR><LF><CR><LF>OK<CR><LF></pre>

6.14.2 Description

The SET command returns all messages from <mem1>, which are in the state specified by the parameter <stat>. If the message state is "Unread message that has been received", the state of the message in the storage will be converted to "Read message that has been received" after the command is executed successfully.

When the <stat> takes on the default value, the SET command is equivalent to the SET command:

PDU: AT+CMGL=0

TEXT: AT+CMGL="REC UNREAD"

The TEST command returns all the supported stat values.

6.14.3 Defined Values

PDU mode:

<stat>: message type. The default value is 0:

0: Unread messages that has been received

1: Read message that has been received

2: Unsent message that has been stored

3: Sent message that has been stored

4: Any message

<index>: integer value, which indicates the position in the storage.

<reserved>: reserved.

<length>: integer value, which indicates the number of bytes of TPDU data.

<pdu>: protocol data unit. The data structure is as follows:

Table 6-13 The data structure of PDU

[<SCA>]			
<sc_len>	<type_addr>	<numbers>	TPDU

Where, the <SCA>, <sc_len>, <type_addr>, and <numbers> fields are defined in the same way as in the section "Message sending command".

For sent message, the data structure of TPDU is the same as defined in "Message sending command". For the received message, the data structure of TPDU is as follows:

Table 6-14 The data structure of TPDU

1 Oct								2 Oct~12 Oct	1 Oct	1 Oct	7 Oct	1Oct	
TP-MTI	MMS	0	0	SRI	UDHI	RP	OA	PID	DCS	SCTS	UDL	UD	
Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7						

<MTI>: the same as defined in the section "Message sending command".

<MMS>: indicates whether there are more messages to be sent.

0: Nonexistent

1: Existent

<SRI>: indicates whether the SME (short message entity) has requested a state report.

0: Nonexistent

1: Existent

<UDHI>: same as defined in the section "Message sending command".

<RP>: same as defined in the section "Message sending command".

<OA>: source address. Same as defined in SCA. Total 2–12 octets. Therefore, the longest address in the OA segment contains 20 digits.

<PID>: protocol indication. Same as defined in the section "Message sending command".

<DCS>: coding mode of user data. Same as defined in the section "Message sending command".

<SCTS>: time chop of SMC, including year, month, day, hour, minute, second and time difference. Time difference refers to the difference of time between the local time and the Greenwich standard time.

<UDL>: user data length. Same as defined in the section "Message sending command".

<UD>: the length of a specific user data depends on the UDL.

TEXT mode:

<stat>: message type. The default value is "REC UNREAD":

"REC UNREAD": unread SMS

"REC READ": read SMS

"STO UNSENT": stored and unsent SMS

"STO SENT": stored and sent SMS

"ALL": all SMS

<fo>: depending on the command or result code: first octet of 3GPP TS 23.040 SMS-DELIVER, SMS-SUBMIT (default value is 17), SMS-STATUS-REPORT, or SMS-COMMAND (default 2) in integer format.

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

<ra>: 3GPP TS 23.040 TP-Recipient-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <tora>.

<tora>: TP-Recipient-Address Type-of-Address octet in integer format (when first character of <ra> is + (IRA 43) the default value is 145, otherwise default is 129) <dt> 3GPP TS 23.040 TP-Discharge-Time in time-string format:

"yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone. E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals to "94/05/06,22:10:00+08".

<OA/DA>: source address. Same as defined in SCA. Total 2–12 octets. Therefore, the longest address in the OA segment contains 20 digits.

<SCTS>: time chop of SMC, including year, month, day, hour, minute, second and time difference. Time difference refers to the difference of time between the local time and the Greenwich standard time.

<dt>: 3GPP TS 23.040 TP-Di-charge-Time in time-string format:
"yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day,
hour, minutes, seconds and time zone. E.g. 6th of May 1994, 22:10:00 GMT+2 hours
equals to "94/05/06,22:10:00+08".

<st>: 3GPP TS 23.040 TP-Status in integer format

<data>: data unit to send.

Note:

If the <stat> message doesn't exist, the READ command will return OK.

6.15 +CMGR-Read A Message

6.15.1 Command Syntax

Command	Possible response(s)
+CMGR=<index>	<p>In case of PDU mode and successful execution of command: <CR><LF>+CMGR: <stat>,<reserved>,<length><CR><LF><pdu><CR><LF><C R><LF>OK<CR><LF></p> <p>In case of TEXT mode and successful execution of command: If text mode (+CMGF=1), command successful and SMS-DELIVER: <CR><LF>+CMGR:<stat>,<oa>,<alpha>,<scts>,<toda>,<fo >,<pid>,<dc>,<sca>,<tosca>,<length>]<CR><LF><data><C R><LF><CR><LF>OK<CR><LF></p> <p>If text mode (+CMGF=1), command successful and SMS-SUBMIT: <CR><LF>+CMGR:<stat>,<da>,<alpha>,<toda>,<fo>,<pid >,<dc>,<vp>,<sca>,<tosca>,<length>]<CR><LF><data>< CR><LF><CR><LF>OK<CR><LF></p> <p>If text mode (+CMGF=1), command successful and SMS-STATUS-REPORT: <CR><LF>+CMGR:<stat>,<fo>,<mr>,<ra>,<toda>,<scts>, <dt>,<st><CR><LF><CR><LF>OK<CR><LF></p> <p>If text mode (+CMGF=1), command successful and SMS-COMMAND: <CR><LF>+CMGR:<stat>,<fo>,<ct>,<pid>,<mn>,<da>,<t oda>,<length>]<CR><LF><data>]<CR><LF><CR><LF>OK< CR><LF></p> <p>Otherwise: <CR><LF>+CMS ERROR: <err><CR><LF></p>
+CMGR=?	<CR><LF>OK<CR><LF>

6.15.2 Description

The SET command returns the messages whose storage position is "index" from <mem1>. If the message state is "Unread message that has been received", the state of the message in the storage will be converted to "Read message that has been received" after the command is executed successfully.

The TEST command returns OK.

6.15.3 Defined Values

<index>: integer value, which indicates the position in the storage.

<stat>: message type:

0: "REC UNREAD" received unread message (i.e. new message)

1: "REC READ" received read message

2: "STO UNSENT" stored unsent message (only applicable to SMS)

3: "STO SENT" stored sent message (only applicable to SMS)

4: "ALL" all messages (only applicable to +CMGL command)

<fo>: depending on the command or result code: first octet of 3GPP TS 23.040 SMS-DELIVER, SMS-SUBMIT (the default value is 17), SMS-STATUS-REPORT, or SMS-COMMAND (the default value is 2) in integer format.

<mr>: message-reference.

<toda>: Type-of-Destination-Address.

<length>: integer value, which indicates the number of bytes of PDU data.

<pdu>: protocol data unit. Its format is the same as defined in section "Message list command".

<oa./da>: originating address/Destination address. Same as defined in SCA. Total 2–12Octets. Therefore, the longest address in the OA segment contains 20 digits.

<scts>: Service-Centre-Time-Stamp.

<data>: data unit to send.

The other parameters can be found in GSM 07.05.

Note:

If the message does not exist, the READ command will return OK.

6.16 +CGSMS-Set Message Bearer Domain

6.16.1 Command Syntax

Command	Possible response(s)
+CGSMS=<service>	<CR><LF>OK<CR><LF>
+CGSMS?	<CR><LF>+CGSMS: <service><CR><LF><CR><LF>OK<CR><LF>
+CGSMS=?	<CR><LF>+CGSMS: (list of supported <service>s)<CR><LF><CR><LF>OK<CR><LF>

6.16.2 Description

The SET command is used to set the message bearer domain, namely, selection of CS/PS domain.

The READ command returns the current message bearer domain.

The TEST command returns the supported parameter values.

<service> is stored in NV when the command executed, and is restored from NV when power on.

6.16.3 Defined Values

<service>:

0: PS domain only

1: CS domain only (default value)

2: Prefer the PS domain

3: Prefer the CS domain

6.17 +CMMS-Send More Messages

6.17.1 Command Syntax

Command	Possible response(s)
+CMMS[=<n>]	<CR><LF>OK<CR><LF>
+CMMS?	<CR><LF>+CMMS: <n><CR><LF><CR><LF>OK<CR><LF>
+CMMS=?	<CR><LF>+CMMS: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

6.17.2 Description

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

The TEST command returns supported values as a compound value.

6.17.3 Defined Values

<n>:

0: Disable (default value)

1: Keep enabled until the time between the response of the latest message send command (+CMGS, +CMSS, etc.) and the next send command exceeds 1–5 seconds (the exact value is up to ME implementation), then ME shall close the link and TA switches <n> automatically back to 0.

2: Enable (if the time between the response of the latest message send command and the next send command exceeds 1–5 seconds (the exact value is up to ME implementation), ME shall close the link but TA shall not switch automatically back to <n>=0).

6.18 +CSMP-Set SMS TEXT Mode Parameters

6.18.1 Command Syntax

Command	Possible response(s)
+CSMP=[<fo>],[[<vp>],[[<pid>],[<dc>]]]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CSMP?	<CR><LF>+CSMP: [<fo>],[<vp>],<pid>,<dc><CR><LF><CR><LF>OK<CR><LF>
+CSMP=?	<CR><LF>OK<CR><LF>

6.18.2 Description

The SET command is used to set external parameters when sending or storing SMS, such as period of validity, etc. (It is effective only when the current mode is TEXT mode.)

The READ command returns the supported parameters.

The TEST command returns OK.

6.18.3 Defined Values

<fo>: first Octet

<vp>: integer value, range from 0 to 255.

<pid>: integer value, protocol indication, 0 is default.

<dc>: integer value, data coding scheme, 0 is default.

Note:

In TEXT mode, when choose GSM 7 bit coding mode, only support GSM 7 bit basic characters, not support GSM 7 bit extended characters.

6.19 +CSDH-Show SMS TEXT Mode Parameters

6.19.1 Command Syntax

Command	Possible response(s)
+CSDH[=<show>]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CSDH?	<CR><LF>+CSDH: <show><CR><LF><CR><LF>OK<CR><LF>
+CSDH=?	<CR><LF>+CSDH: (list of supported <show>s)<CR><LF><CR><LF>OK<CR><LF>

6.19.2 Description

The SET command is used to control whether the header details are shown in the TEXT mode return code. (It is only effective when the current mode is TEXT mode.)

The READ command is used to return the current status.

The TEST command is used to list the supported values.

6.19.3 Defined Values

<show>:

0: Not show the header details in the return code (default value).

1: Show the header details in the return code.

6.20 +CMSS-Send Message from Storage

6.20.1 Command Syntax

Command	Possible response(s)
+CMSS=<index>[,<da>[,<toda>]]	<p>If TEXT mode (+CMGF=1) and sending successful: <CR><LF>+CMSS: <mr>[,<scts>]<CR><LF><CR><LF>OK<CR><LF></p> <p>If pdu mode (+CMGF=0) and sending successful: <CR><LF>+CMSS: <mr>[,<ackpdu>]<CR><LF><CR><LF>OK<CR><LF></p> <p>If sending fails: <CR><LF>+CMS ERROR: <err><CR><LF></p>
+CMSS=?	<CR><LF>OK<CR><LF>

6.20.2 Description

The SET command sends message with location value <index> from preferred message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). If new recipient address <da> is given for SMS-SUBMIT, it shall be used instead of the one stored with the message. Reference value <mr> is returned to the TE on successful message delivery. Optionally (when +CSMS <service> value is 1 and network supports) <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. See chapter Message Service Failure Result Code for a list of <err> values. This command should be aborted.

6.21 ^SMMEMFULL-Report Message Storage Media Being Full

6.21.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^SMMEMFULL:<mem_type><CR><LF>

6.21.2 Description

When the message storage media overflow, the event will be reported automatically.

6.21.3 Defined Values

<mem_type>: string value. It indicates the type of the overflowing media.

"SM": Which means the (U)SIM card.

"ME": Which means NV.

6.22 ^MWIMSG-Query And Report Voice Mail Message

6.22.1 Command Syntax

Command	Possible response(s)
^MWIMSG?	<CR><LF>^MWIMSG: <indicator>,<count>,<length>,<msg><CR><LF><CR><LF>OK<CR><LF>

6.22.2 Description

This command is used to query or report the indicator of the latest received voice mail message, count of the latest received voice mail message, and the latest received voice mail message content.

When the voice mail need to be stored, MS notify TE by +CMT.(MS does not report +CMTI only when <mt> of +CNMI is 0). Storage of the message is depend on +CPMS setting.

For CPHS method, <count> will be 0 if <indicator> is 0 or <count> will be 255 if <indicator> is 1.

For UDHI method, <count> is depend on TP-UDH.

If EF_{MWIS} is support by current USIM/SIM, EF_{MWIS} will be updated.

6.22.3 Defined Values

<indicator>: integer value. It indicates the indicator of the voice mail message.

0: Clear indicator

1: Set indicator

<count>: integer value. It indicates the message count of the voice mail. Legal characters only include 1–255. 255 is to be interpreted as "there are an unknown number of messages present."

<length>: integer value, which indicates the number of bytes of TPDU data of voice mail.

<msg>: protocol data unit of the voice mail msg. Its format is the same as defined in section "Message list command".

6.23 ^MWINUM-Query And Set Voice Mail Number

6.23.1 Command Syntax

Command	Possible response(s)
^MWINUM=<num>	<CR><LF>OK<CR><LF>
^MWINUM?	<CR><LF>^MWINUM: <num><CR><LF><CR><LF>OK<CR><LF>

6.23.2 Description

This command is used to set or read the voice mail number.

If USIM is used the SET command also will update EF_{MBDN} and EF_{MBI} (also EF_{EXT6} for extension number).

If SIM is used the SET command also will update EF_{MN} (also EF_{EXT1} for extension number).

6.23.3 Defined Values

<num>: string value. Legal characters only include '0'-'9'. '+' is only allowed in the first character of the <num>. The max string length is 40.

If <num> is set to "", the voice mail number will be cleared.

6.24 +CSVM-Set Voice Mail Number

6.24.1 Command Syntax

Command	Possible response(s)
+CSVM=<mode>[,<number>[,<type>]]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CMS ERROR: <err><CR><LF>
+CSVM?	<CR><LF>+CSVM: <mode>,<number>,<type><CR><LF><CR><LF> OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

Command	Possible response(s)
+CSVM=?	<CR><LF>+CSVM: (list of supported <mode>s),(list of supported <type>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

6.24.2 Description

The number to the voice mail server is set with this command. The parameters <number> and <type> can be left out if the parameter <mode> is set to 0. If setting fails, an MT error, +CME ERROR: <err> is returned. Refer subclause 18.2 for <err> values.

The READ command returns the currently selected voice mail number and the status (i.e. enabled/disabled).

The TEST command returns supported <mode>s and <type>s.

6.24.3 Defined Values

<mode>: integer type

0: Disable the voice mail number (default value).

1: Enable the voice mail number.

<number>: string type; character string <0–9,+>

<type>: integer type; type of address octet (refer 3GPP TS 24.008 subclause 10.5.4.7)

129: ISDN/telephony numbering plan, national/international unknown

145: ISDN/telephony numbering plan, international number

161: ISDN/telephony numbering plan, national number

128–255: Other values refer 3GPP TS 24.008 subclause 10.5.4.7

<type>: type of address octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.7); default value is 145 when dialling string includes international access code character "+", otherwise 129.

Note:

If <mode> is 0, the voice mail number will be deleted, and the type is changed to 255.

6.25 ^BCSSWITCH-Switch Cell Broadcast Status

6.25.1 Command Syntax

Command	Possible response(s)
^BCSSWITCH=<vol>	<CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF> <CR><LF>ERROR<CR><LF>
^BCSSWITCH?	<CR><LF>^BCSSWITCH: <vol><CR><LF><CR><LF>OK<CR><LF>
^BCSSWITCH=?	<CR><LF>^BCSSWITCH: (list of supported <vol>s)<CR><LF><CR><LF>OK<CR><LF>

6.25.2 Description

This command is used to enable and disable the cell broadcast.

The TEST command returns supported values as compound value.

The READ command returns the current BCSSWITCH mode <vol>.

6.25.3 Defined Values

<vol>:

0: Cell broadcast off (default value)

1: Cell broadcast on

Resetting the module will not affect the value. Module updating will reset the value to default value.

6.26 +CSCB-Select Cell Broadcast Message Types

6.26.1 Command Syntax

Command	Possible response(s)
+CSCB=<mode>[,<mids>[,<dcss>]]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CSCB?	<CR><LF>+CSCB: <mode>,<mids>,<dcss><CR><LF><CR><LF>OK<CR><LF>
+CSCB=?	<CR><LF>+CSCB: (list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

6.26.2 Description

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

The TEST command returns supported modes as a compound value.

6.26.3 Defined Values

<mode>:

0: Message types specified in <mids> and <dcss> are accepted (default value).

1: Message types specified in <mids> and <dcss> are not accepted.

<mids>: string type; all different possible combinations of CBM message identifiers (refer <mid>); e.g. "0,1,5,320-478,922".

<dcss>: string type; all different possible combinations of CBM data coding schemes (refer <dc>) (default is empty string); e.g. "0-3,5".

Note:

The settings of <mode> and <dcss> are not saved when the MT is powered off.

Send AT+CSCB, and MT will return ERROR directly.

6.26.4 Implementation

Follow the 3GPP TS 27.005 320

Mandatory if text mode is implemented.

6.27 +CBM-Cell Broadcast Message Directly Displayed

6.27.1 Command Syntax

Command	Possible response(s)
	<CR><LF>+CBM: <length><CR><LF><pdu><CR><LF> (PDU mode enabled) or <CR><LF>+CBM: <sn>,<mid>,<dc>,<page>,<pages><CR><LF><data> (text mode enabled)

6.27.2 Description

This command presents cell messages to the TE upon reception without saving.

6.27.3 Defined Values

<length>: integer type; length of PDU data.

<pdu>: protocol data unit of format specified in 3GPP TS 23.041.

<sn>: TP-Status in integer format.

<mid>: CBM Message Identifier in integer format.

<dcsc>: Cell Broadcast Data Coding Scheme in integer format.

<page>: CBM Page Parameter bits 4-7 in integer format

<pages>: CBM Page Parameter bits 0-3 in integer format.

For parameter description in Text mode, refer to 3GPP TS 23.041.

6.27.4 Implementation

Follow the 3GPP TS 27.005 320.

Mandatory when SMS service should be implemented.

7

Security Commands

7.1 +CPWD-Modify PIN Password

7.1.1 Command Syntax

Command	Possible response(s)
+CPWD=<fac>,<oldpwd>,<newpwd>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPWD=?	<CR><LF>+CPWD: (list of supported <fac>s),(list of supported <pwdlength>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

7.1.2 Description

The SET command is used to modify the equipment lock function (e.g. PIN).

The TEST command returns the supported device, and the maximum length of the password corresponding to this equipment.

If the pin verification was enabled, you must input the valid pin before using this command.

Note:

If you want to change password, the mode of CLCK must be 1.

7.1.3 Defined Values

<fac>: specify the object of operation of this command (only supporting SIM card, the value is "SC").

"SC": SIM card PIN

"P2": SIM card PIN2

"AB": Reserved, not supported currently

"AC": Reserved, not supported currently

"AG": Reserved, not supported currently

"AI": Reserved, not supported currently

"AO": Reserved, not supported currently

"IR": Reserved, not supported currently

"OI": Reserved, not supported currently

"OX": Reserved, not supported currently

<oldpwd>,<newpwd>: old password, new password, string type, and maximum length are specified by the parameter <pwdlength>. Legal characters only include '0'-'9'.

<pwdlength>: maximum length of the equipment lock password.

7.2 +CLCK-Enable and Query PIN

7.2.1 Command Syntax

Command	Possible response(s)
+CLCK=<fac>,<mode> [,<passwd>[,<class>]]	<p>In case of <mode>=2 and successful execution of command:</p> <p><CR><LF>+CLCK: <status><CR><LF><CR><LF>OK<CR><LF></p> <p>In case of <mode>≠2 and successful execution of command:</p> <p><CR><LF>OK<CR><LF></p> <p>In case of an MT-related error:</p> <p><CR><LF>+CME ERROR: <err><CR><LF></p>
+CLCK=?	<p><CR><LF>+CLCK: (list of supported <fac>s)<CR><LF><CR><LF>OK<CR><LF></p>

7.2.2 Description

The SET command is used to lock, unlock or interrogate a MT or a network facility <fac>. Password is normally needed to do such actions. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. This command should be aborted when network facilities are set or interrogated.

Call barring facilities are based on GSM/UMTS supplementary services (refer 3GPP TS 22.088). The interaction of these with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standard.

The TEST command returns facility values supported as a compound value.

Note:

When <fac> has been locked, it will return "operation not supported" if lock <fac>. And when <fac> has been unlocked, it also will return "operation not supported" if unlock <fac>.

7.2.3 Defined Values

<fac>: specify the object of operation of this command (only supporting SIM card, the value is "SC").

"AB": All Barring services (reserved, not supported currently)

"AC": All in Coming barring services (reserved, not supported currently)

"AG": All out Going barring services (reserved, not supported currently)

"AI": BAIC (barr all incoming calls) (reserved, not supported currently)

"AO": BAOB (barr all outgoing calls) (reserved, not supported currently)

"IR": BIC-Roam (barr incoming calls when roaming outside the home country)
(Reserved, not supported currently)

"OI": BOIC (barr outgoing international calls) (reserved, not supported currently)

"OX": BOIC-exHC (barr outgoing international calls except to home country) (reserved, not supported currently)

"SC": SIM card (if this command is configured, the password must be input when powering on the MS)

"FD": SIM card or active application in the UICC (GSM or USIM) fixed dialing memory feature (Reserved, not supported currently)

"PN": Network personalization (reserved, not supported currently)

"PU": Network sUbsset personalization (reserved, not supported currently)

"PP": Service provider personalization (reserved, not supported currently)

"PC": Corporate personalization (reserved, not supported currently)

"PF": Lock phone to the very first inserted SIM/UICC card (reserved, not supported currently)

<mode>:

0: Unblock

1: Lock

2: Query state

<status>:

0: Inactivated

1: Activated

<passwd>: string type; same as the password set via "modify password +CPWD".

<classx>: reserved, not supported currently.

7.2.4 Examples

```
AT+CPIN=1111
```

```
OK
```

```
AT+CLCK="SC", 0,"1111"
```

```
OK
```

```
AT+CLCK="SC", 1,"1111",2
```

```
OK
```

7.3 +CPIN-Manage PIN

7.3.1 Command Syntax

Command	Possible response(s)
+CPIN=<pin>[,<newpin>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPIN?	<CR><LF>+CPIN: <code><CR><LF><CR><LF>OK<CR><LF>
+CPIN=?	<CR><LF>OK<CR><LF>

7.3.2 Description

The READ command is used to indicate whether password input request exists.

The SET command is used to check and unlock the PIN and PIN2.

If the current password input request is PIN or PIN2, input "+CPIN=<pin>" to check.

If the current password input request is PUK or PUK2, input "+CPIN=<pin>,<newpin>" to unlock. The first parameter is SIM PUK or SIM PUK2, and the second parameter is <newpin>, which is a new PIN or PIN2.

When using the SET command, if the no PIN input request exists currently, an error message "+CME ERROR" will be returned.

Note:

Verifying PIN or PUK during an emergency call may make the call disconnected.

7.3.3 Defined Values

<pin>, <newpin>: string. Legal characters only include '0'–'9'.

<code>: string (without quotation marks)

READY: MT without password input request

SIM PIN: UICC/SIM PIN password request

SIM PUK: UICC/SIM PUK password request, to unblock the SIM PIN which was blocked for 3 verification failure.

SIM PIN2: PIN2 password request

SIM PUK2: PUK2 password request, to unblock the SIM PIN2 which was blocked for 3 verification failure.

7.4 ^CPIN-Manage PIN (Indicate Remaining Password Input Times)

7.4.1 Command Syntax

Command	Possible response(s)
^CPIN=<pin>[,<newpin>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^CPIN?	<CR><LF>^CPIN: <code>[,<times>],<puk_times>,<pin_times>,<puk2_times>,<pin2_times><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^CPIN=?	<CR><LF>OK<CR><LF>

7.4.2 Description

The READ command is used to indicate whether password input request exists. The remaining password input times will be given.

The SET command is used to verify and unlock the PIN.

If the current password input request is PIN, input "+CPIN=<pin>" to verify.

If the current password input request is PUK, input "+CPIN=<pin>,<newpin>" to unlock. The first parameter is SIM PUK, and the second parameter is <newpin>, which is a new PIN.

When using the SET command, if the no PIN input request exists currently, an error message "+CME ERROR: <err>" will be returned.

Note:

Verifying PIN or PUK during an emergency call may make the call disconnected.

7.4.3 Defined Values

<pin>, <newpin>: string. Legal characters only include '0'–'9'.

<code>: string (without quotation marks)

READY: MT without password input request.

SIM PIN: UICC/SIM PIN password request

SIM PUK: UICC/SIM PUK password request to unblock the SIM PIN which was blocked for 3 verification failure.

SIM PIN2: PIN2 password request

SIM PUK2: PUK2 password request to unblock the SIM PIN2 which was blocked for 3 verification failure.

<times>: in terms of the remaining input times, for PIN and PIN2, the maximum input times is 3 times; for PUK and PUK2, the maximum input times are 10 times.

Note:

If there is password verify request, <times> will be the remaining retry times. Otherwise, <times> will be empty.

<puk_times>: remaining PUK verify times, the maximum verify times is 10 times.

<pin_times>: remaining PIN verify times, the maximum verify times is 3 times.

<puk2_times>: remaining PUK2 verify times, the maximum verify times is 10 times.

<pin2_times>: remaining PIN2 verify times, the maximum verify times is 3 times.

7.5 ^STRIPUSB-Shield USB Communication

7.5.1 Command Syntax

Command	Possible response(s)
^STRIPUSB[=<stripusb_status>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^STRIPUSB?	<CR><LF>^STRIPUSB:<stripusb_status><CR><LF><CR><LF>OK<CR><LF>
^STRIPUSB=?	<CR><LF>^STRIPUSB:(list of supported <stripusb_status>s)<CR><LF><CR><LF>OK<CR><LF>

7.5.2 Description

The SET command is used to shield the USB communication. The command is supported only in UART port. If the parameter is omitted, the default value is 1. If the value is 0, restore the USB communication (reserved, not supported currently). Only support restoring the USB communication through resetting module.

The READ command returns the parameters value.

The TEST command returns the value range it supports.

Note:

If this command is sent before the asynchronous command processing is complete, the command could not be sent.

7.5.3 Defined Values

<stripusb_status>:

0: Restore USB communication (reserved, not supported currently).

1: Shield USB communication.

8 GPRS Service Commands

8.1 +CGDCONT-Set PDP Environment

8.1.1 Command Syntax

Command	Possible response(s)
+CGDCONT[=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>]]]]]]	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
+CGDCONT?	<CR><LF>+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp> <CR><LF>+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[...] <CR><LF><CR><LF>OK<CR><LF>
+CGDCONT=?	<CR><LF>+CGDCONT: (list of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s) <CR><LF>+CGDCONT: (list of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s)[...] <CR><LF><CR><LF>OK<CR><LF>

8.1.2 Description

The SET command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the test command.

A special SET command "+CGDCONT=<cid>" will clear all parameters in the setting environment indicated by <cid>.

The READ command returns all the parameter values of the defined setting environments. The setting environments are displayed by means of linefeed.

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

8.1.3 Defined Values

<cid>:

1–16: Index value of PDP setting environment. Other PDP-related commands can be used for invoking the storage position through this index value.

<PDP_type>: string value. It indicates the type of the packet switching protocol.

"IP": IP protocol

"PPP": Point-to-Point protocol

<APN>: string value. It indicates the access point domain name of the connected GGSN or external network. The max len is 100.

<PDP_addr>: string value. It indicates the address of MSI.

<d_comp>: a numerical value, controlling the compression of PDP data.

0: No compression

1: Compression

2: V.42bi (reserved, not supported currently)

If no <d_comp> is included, it is equivalent to the effect that the <d_comp> is 0.

<h_comp>: a numerical value, controlling the compression of PDP header.

0: No compression

1: Compression

2: RFC1144 (applicable for SNDP only) (not supported currently)

3: RFC2507 (reserved, not supported currently)

Other values are reserved.

If no <h_comp> is included, it is equivalent to the effect that the <h_comp> is 0.

8.1.4 Examples

After executing the following commands consecutively, the results are as follows:

1. AT+CGDCONT=?
+CGDCONT: (1-16),"IP",,,(0-2),(0-3)
+CGDCONT: (1-16),"PPP",,,(0-2),(0-3)

OK

Note:

This command supports two kinds of packet switching protocols: "IP" and "PPP". The TEST command lists the values of other parameters supportable by each protocol.

2. AT+CGDCONT=16,"PPP","abc.com","10.111.145.233",1,1
OK

Note:

This command stores 1 new BDP setting environment in the MS. The <cid> is 16.

3. AT+CGDCONT?
+CGDCONT: 1,"IP","mhahuawei1.com","",0,0
+CGDCONT: 2,"IP","", "",0,0
+CGDCONT: 3,"IP","", "",0,0
+CGDCONT: 4,"IP","", "",0,0
+CGDCONT: 5,"IP","", "",0,0
+CGDCONT: 6,"IP","", "",0,0
+CGDCONT: 7,"IP","", "",0,0
+CGDCONT: 8,"IP","", "",0,0
+CGDCONT: 9,"IP","", "",0,0
+CGDCONT: 10,"IP","", "",0,0
+CGDCONT: 11,"IP","", "",0,0
+CGDCONT: 12,"IP","", "",0,0
+CGDCONT: 13,"IP","", "",0,0
+CGDCONT: 14,"IP","", "",0,0
+CGDCONT: 15,"IP","", "",0,0
+CGDCONT: 16,"IP","", "",0,0

OK

Note:

Now the MS has an additional PDP setting environment whose <cid> is 16.

4. AT+CGDCONT=16
OK

Note:

Clear the PDP setting environment whose <cid>=16.

8.2 +CGQREQ–Quality of Service Profile (Requested)

8.2.1 Command Syntax

Command	Possible response(s)
+CGQREQ[=<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]]]	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
+CGQREQ?	<CR><LF>+CGQREQ: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>[<CR><LF>+CGQREQ: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean>[...]]<CR><LF><CR><LF>OK<CR><LF>
+CGQREQ=?	<CR><LF>+CGQREQ: <PDP_type>,(list of supported <precedence>s),(list of supported <delay>s),(list of supported <reliability>s),(list of supported <peak>s),(list of supported <mean>s)[<CR><LF>+CGQREQ: <PDP_type>,(list of supported <precedence>s),(list of supported <delay>s),(list of supported <reliability>s),(list of supported <peak>s),(list of supported <mean>s)[...]]<CR><LF><CR><LF>OK<CR><LF>

8.2.2 Description

This command allows the TE to specify a Quality of Service Profile that is used when the MT sends an Activate PDP Context Request message to the network.

The SET command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT command, the +CGQREQ command is effectively an extension to this command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGQREQ=<cid> causes the requested profile for context number <cid> to become undefined.

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

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

Note:

It suggests to set the QoS profile as default values.

8.2.3 Defined Values

<cid>:

1–16: Index value of PDP setting environment. Other PDP-related commands can be used for invoking the storage position through this index value.

<PDP_type>: packet Data Protocol, string type.

"IP": IP protocol

"PPP": Point-to-Point protocol (currently not supported)

The following parameters are defined in GSM 03.60:

<precedence>: a numeric parameter which specifies the precedence class.

0: Subscribed value (default value)

1: High priority

2: Normal priority

3: Low priority

<delay>: a numeric parameter which specifies the delay class.

0: Subscribed delay class (default value)

1: Delay class 1

2: Delay class 2

3: Delay class 3

4: Delay class 4 (best effort)

If the size of SDU is 128 octets:

Delay class	Average transmit delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	

If the size of SDU is 1024 octets;

Delay class	Average transmit delay	95 percentile
1 (Predictive)	<0.5	<1.5
2 (Predictive)	<5	<25
3 (Predictive)	<50	<250
4 (Best Effort)	Unspecified	

<reliability>: a numeric parameter which specifies the reliability class.

0: Subscribed reliability class (default value)

1: Unused. If received, it shall be interpreted as '010'

2: Unacknowledged GTP; Acknowledged LLC and RLC, Protected data

3: Unacknowledged GTP and LLC; Acknowledged RLC, Protected data

4: Unacknowledged GTP, LLC, and RLC, Protected data

5: Unacknowledged GTP, LLC, and RLC, Unprotected data

<peak>: a numeric parameter which specifies the peak throughput class.

0: Subscribed peak throughput (default value)

1: Up to 1 000 octet/s (8 kbit/s)

2: Up to 2000 octet/s (16 kbit/s)

3: Up to 4000 octet/s (32 kbit/s)

4: Up to 8000 octet/s (64 kbit/s)

5: Up to 16000 octet/s (128 kbit/s)

6: Up to 32000 octet/s (256 kbit/s)

7: Up to 64000 octet/s (512 kbit/s)

8: Up to 128000 octet/s (1024 kbit/s)

9: Up to 256000 octet/s (2048 kbit/s)

<mean>: a numeric parameter which specifies the mean throughput class.

0: Subscribed mean throughput (default value)

1: 100 octet/h (–0.22 bit/s)

2: 200 octet/h (–0.44 bit/s)

3: 500 octet/h (–1.11 bit/s)

4: 1000 octet/h (–2.2 bit/s)

5: 2000 octet/h (–4.4 bit/s)

6: 5000 octet/h (–11.1 bit/s)

7: 10000 octet/h (–22 bit/s)

8: 20000 octet/h (–44 bit/s)
9: 50000 octet/h (–111 bit/s)
10: 100000 octet/h (–0.22 kbit/s)
11: 200000 octet/h (–0.44 kbit/s)
12: 500000 octet/h (–1.11 kbit/s)
13: 1000000 octet/h (–2.2 kbit/s)
14: 2000000 octet/h (–4.4 kbit/s)
15: 5000000 octet/h (–11.1 kbit/s)
16: 10000000 octet/h (–22 kbit/s)
17: 20000000 octet/h (–44 kbit/s)
18: 50000000 octet/h (–111 kbit/s)
31: best effort

8.2.4 Examples

```
AT+CGQREQ=?  
+CGQREQ: "IP",(0-3),(0-4),(0-5),(0-9),(0-18,31)  
+CGQREQ: "PPP",(0-3),(0-4),(0-5),(0-9),(0-18,31)
```

OK

```
AT+CGQREQ?  
+CGQREQ:
```

OK

```
AT+CGQREQ=1,0,0,0,0,0
```

OK

```
AT+CGQREQ?  
+CGQREQ: 1,0,0,0,0,0
```

OK

8.3 +CGEQREQ-3G Quality of Service Profile (Requested)

8.3.1 Command Syntax

Command	Possible response(s)
+CGEQREQ=[<cid>[,<Traffic class>[,<Maximum bitrate UL>[,<Maximum bitrate DL>[,<Guaranteed bitrate UL>[,<Guaranteed bitrate DL>[,<Delivery order>[,<Maximum SDU size>[,<SDU error ratio>[,<Residual bit error ratio>[,<Delivery of erroneous SDUs>[,<Transfer delay>[,<Traffic handling priority>]]]]]]]]]]]	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
+CGEQREQ?	<CR><LF>+CGEQREQ: <cid>,<Traffic class>,<Maximum bitrate UL>,<Maximum bitrate DL>,<Guaranteed bitrate UL>,<Guaranteed bitrate DL>,<Delivery order>,<Maximum SDU size>,<SDU error ratio>,<Residual bit error ratio>,<Delivery of erroneous SDUs>,<Transfer delay>,<Traffic handling priority><CR><LF>+CGEQREQ: <cid>,<Traffic class>,<Maximum bitrate UL>,<Maximum bitrate DL>,<Guaranteed bitrate UL>,<Guaranteed bitrate DL>,<Delivery order>,<Maximum SDU size>,<SDU error ratio>,<Residual bit error ratio>,<Delivery of erroneous SDUs>,<Transfer delay>,<Traffic handling priority>...<CR><LF><CR><LF>OK<CR><LF>
+CGEQREQ=?	<CR><LF>+CGEQREQ: <PDP_type>,(list of supported <Traffic class>s),(list of supported <Maximum bitrate UL>s),(list of supported <Maximum bitrate DL>s),(list of supported <Guaranteed bitrate UL>s),(list of supported <Guaranteed bitrate DL>s),(list of supported <Delivery order>s),(list of supported <Maximum SDU size>s),(list of supported <SDU error ratio>s),(list of supported <Residual bit error ratio>s),(list of supported <Delivery of erroneous SDUs>s),(list of supported <Transfer delay>s),(list of supported <Traffic handling priority>s)<CR><LF>+CGEQREQ: <PDP_type>,(list of supported <Traffic class>s),(list of supported <Maximum bitrate UL>s),(list of supported <Maximum bitrate DL>s),(list of supported <Guaranteed bitrate UL>s),(list of supported <Guaranteed bitrate DL>s),(list of supported <Delivery order>s),(list of

Command	Possible response(s)
	supported <Maximum SDU size>s),(list of supported <SDU error ratio>s),(list of supported <Residual bit error ratio>s),(list of supported <Delivery of erroneous SDUs>s),(list of supported <Transfer delay>s),(list of supported <Traffic handling priority>s)[...]]<CR><LF><CR><LF>OK<CR><LF>

8.3.2 Description

This command allows the TE to specify a UMTS Quality of Service Profile that is used when the MT sends an Activate PDP Context Request message to the network.

The SET command specifies a profile for the context identified by the (local) context identification parameter, <cid>. The specified profile will be stored in the MT and sent to the network only at activation. Since this is the same parameter that is used in the +CGDCONT, the +CGEQREQ command is effectively an extension to this command. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGEQREQ=<cid> causes the requested profile for context number <cid> to become undefined.

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

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

8.3.3 Defined Values

<cid>:

1–16: Index value of PDP setting environment. Other PDP-related commands can be used for invoking the storage position through this index value.

<PDP_type>: string value. It indicates the type of the packet switching protocol.

"IP": IP protocol

"PPP": Point-to-Point protocol

<Traffic class>: a numeric parameter that indicates the type of application for which the UMTS bearer service is optimised.

0: Conversational

1: Streaming

2: Interactive (default value)

3: Background

4: Subscribed value

If the Traffic class is specified as conversational or streaming, then the Guaranteed and Maximum bitrate parameters should also be provided. Other values are reserved.

<Maximum bitrate UL>: a numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). This parameter should be provided if the Traffic class is specified as conversational or streaming. The default value is 0.

<Maximum bitrate DL>: a numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming. The default value is 0.

<Guaranteed bitrate UL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming. The default value is 0.

<Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32' (e.g. AT+CGEQREQ=...,32, ...). If the parameter is set to '0' the subscribed value will be requested. This parameter should be provided if the Traffic class is specified as conversational or streaming. The default value is 0.

<Delivery order>: a numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0: No

1: Yes

2: Subscribed value. (default value)

<Maximum SDU size>: a numeric parameter (1,2,3,...) that indicates the maximum allowed SDU size in octets. If the parameter is set to '0' the subscribed value will be requested. The default value is 0.

<SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQREQ=..., "5E3", ...). '0E0' (default value) means subscribed value.

<Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQREQ=..., "5E3", ...). '0E0' (default value) means subscribed value.

<Delivery of erroneous SDUs>: a numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.

0: No

1: Yes

2: No detect

3: Subscribed value (default value)

<Transfer delay>: a numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds. If the parameter is set to '0' (default value) the subscribed value will be requested.

<Traffic handling priority>: a numeric parameter (1,2,3,...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers. If the parameter is set to '0' (default value) the subscribed value will be requested.

0: Subscribed traffic handling priority (default value)

1: Priority level 1

2: Priority level 2

3: Priority level 3

8.3.4 Examples

AT+CGEQREQ=?

+CGEQREQ:

"IP",(0-4),(0-384),(0-7168),(0-384),(0-7168),(0-2),(0-1520),("0E0","1E1","1E2","7E3","1E3","1E4","1E5","1E6"),("0E0","5E2","1E2","5E3","4E3","1E3","1E4","1E5","1E6","6E8"),(0-3),(0,100-4000),(0-3)

+CGEQREQ:

"PPP",(0-4),(0-384),(0-7168),(0-384),(0-7168),(0-2),(0-1520),("0E0","1E1","1E2","7E3","1E3","1E4","1E5","1E6"),("0E0","5E2","1E2","5E3","4E3","1E3","1E4","1E5","1E6","6E8"),(0-3),(0,100-4000),(0-3)

OK

AT+CGEQREQ?

+CGEQREQ: 1,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 2,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 3,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 4,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 5,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 6,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 7,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 8,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 9,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 10,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

+CGEQREQ: 11,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 12,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 13,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 14,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 15,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 16,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

OK

AT+CGEQREQ=1,4,0,0,0,0,2,0,"0E0","0E0",3,0,0

OK

AT+CGEQREQ?

+CGEQREQ: 1,4,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 2,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 3,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 4,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 5,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 6,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 7,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 8,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 9,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 10,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 11,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 12,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 13,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 14,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 15,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 16,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

OK

8.4 +CGEQNEG-Request 3G Quality of Service Profile (Negotiated)

8.4.1 Command Syntax

Command	Possible response(s)
+CGEQNEG=<cid>[,<cid>[,...]]	<CR><LF>+CGEQNEG: <cid>,<Traffic class>,<Maximum bitrate UL>,<Maximum bitrate DL>,<Guaranteed bitrate UL>,<Guaranteed bitrate DL>,<Delivery order>,<Maximum SDU size>,<SDU error ratio>,<Residual bit error ratio>,<Delivery of erroneous SDUs>,<Transfer delay>,<Traffic handling priority><CR><LF>[<CR><LF>+CGEQNEG: <cid>,<Traffic class>,<Maximum bitrate UL>,<Maximum bitrate DL>,<Guaranteed bitrate UL>,<Guaranteed bitrate DL>,<Delivery order>,<Maximum SDU size>,<SDU error ratio>,<Residual bit error ratio>,<Delivery of erroneous SDUs>,<Transfer delay>,<Traffic handling priority><CR><LF>[...]]<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR:<err><CR><LF>
+CGEQNEG=?	If the connection has not been set up: <CR><LF>OK<CR><LF> If the connection has been set up; <CR><LF>+CGEQNEG: (list of supported <cid>s associated with active contexts)<CR><LF><CR><LF>OK<CR><LF>

8.4.2 Description

This command allows the TE to retrieve the negotiated QoS profiles returned in the Activate PDP Context Accept message.

The SET command returns the negotiated QoS profile for the specified context identifiers, <cid>s. The QoS profile consists of a number of parameters, each of which may have a separate value.

The TEST command returns a list of <cid>s associated with active contexts.

Note:

The SET command can only be used when the connection has been set up.

8.4.3 Defined Values

<cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT commands), the value range is 1 to 16.

<Traffic class>: a numeric parameter that indicates the type of application for which the UMTS bearer service is optimized.

0: Conversational

1: Streaming

2: Interactive

3: Background

Other values are reserved.

<Maximum bitrate UL>: a numeric parameter that indicates the maximum number of Kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...).

<Maximum bitrate DL>: a numeric parameter that indicates the maximum number of Kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:...,32, ...).

<Guaranteed bitrate UL>: a numeric parameter that indicates the guaranteed number of Kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:..., 32, ...).

<Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32kbit/s would be specified as "32" (e.g. +CGEQNEG:...,32, ...).

<Delivery order>: a numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0: No

1: Yes

Other values are reserved.

<Maximum SDU size>: a numeric parameter that (1, 2, 3,...) indicates the maximum allowed SDU size in octets

<SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:..., "5E3",...).

<Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a target residual bit error ratio of $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:..., "5E3",...).

<Delivery of erroneous SDUs>: a numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.

0: No

1: Yes

2: No detect

Other values are reserved.

<Transfer delay>: a numeric parameter (0, 1, 2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds

<Traffic handling priority>: a numeric parameter (1, 2, 3 ...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers.

If a value is omitted for a particular class then the value is considered to be unspecified.

8.5 +CGACT-Activate or Deactivate PDP Context

8.5.1 Command Syntax

Command	Possible response(s)
+CGACT=<state>[,<cid>[,<cid>[,...]]]	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
+CGACT?	<CR><LF>+CGACT: <cid>,<state>[<CR><LF>+CGACT: <cid>,<state>[...]]<CR><LF><CR><LF>OK<CR><LF>
+CGACT=?	<CR><LF>+CGACT: (list of supported <state>s)<CR><LF><CR><LF>OK<CR><LF>

8.5.2 Description

This command is used to activate or deactivate the PDP contexts indicated by <cid>s. If no <cid>s are specified the activation/deactivation form of the command, activate or deactivate all defined PDP contexts.

8.5.3 Defined Values

<state>: integer value, indicates the active state of the PDP context.

0: Deactivated

1: Activated

<cid>: the identifier of PDP context (referred to +CGDCONT)

8.5.4 Examples

Example 1: Activate/deactivate PDP context:

AT+CGACT=1,1

OK

AT+CGACT=0,1

OK

Example 2: Read command:

AT+CGACT?

+CGACT: 1,0

+CGACT: 2,0

+CGACT: 3,0

+CGACT: 4,0

+CGACT: 5,0

+CGACT: 6,0

+CGACT: 7,0

+CGACT: 8,0

+CGACT: 9,0

+CGACT: 10,0

+CGACT: 11,0

+CGACT: 12,0

+CGACT: 13,0

+CGACT: 14,0

+CGACT: 15,0

+CGACT: 16,0

OK

8.6 +CGATT-Attach or Detach PS Domain

8.6.1 Command Syntax

Command	Possible response(s)
+CGATT=<state>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
+CGATT?	<CR><LF>+CGATT: <state><CR><LF><CR><LF>OK<CR><LF>
+CGATT=?	<CR><LF>+CGATT: (list of supported <state>s)<CR><LF><CR><LF>OK<CR><LF>

8.6.2 Description

The SET command is used to attach the MT to, or detach the MT from the GPRS service. After the command has completed, the MT remains in V.250 command state. If the MT is already in the requested state, the command is ignored and the OK response is returned. If the request is not completed, the command returns ERROR or +CME ERROR. The external error response is enabled via +CME command.

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

The READ command returns the current GPRS service state.

The TEST command is used to request the information related to supporting GPRS service state.

8.6.3 Defined Values

<state>: integer value, indicates the GPRS service state.

0: Detached

1: Attached

Other values are reserved, which will get error response.

8.7 +CGDATA-Enter Data State

8.7.1 Command Syntax

Command	Possible response(s)
+CGDATA=[<L2P>,[<cid>,[<cid>[, ...]]]]	<CR><LF>CONNECT<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
+CGDATA=?	<CR><LF>+CGDATA: (list of supported <L2P>s)<CR><LF><CR><LF>OK<CR><LF>

8.7.2 Description

The EXECUTION command causes the MT to perform whatever actions are necessary to establish communication between the TE and the network using one or more Packet Domain PDP types. This may include performing a PS attach and one or more PDP context activations. If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.250 online data state.

Commands following +CGDATA command in the AT command line shall not be processed by the MT.

The detailed behaviour after the online data state has been entered is dependent on the PDP type. PS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the +CGATT and +CGACT commands.

If context activation takes place during the PDP startup, one or more <cid>s may be specified in order to provide the information needed for the context activation request(s).

During each PDP startup procedure the MT may have access to some or all of the following information:

The MT may have a priori knowledge, for example, it may implement only one PDP type.

The command may have provided an <L2P> parameter value.

The TE may provide a PDP type and/or PDP address to the MT during in the PDP startup procedure.

If any of this information is in conflict, the command will fail.

Any PDP type and/or PDP address present in the above information shall be compared with the PDP type and/or PDP address in any context definitions specified in the command in the order in which their <cid>s appear for a context definition to match.

The PDP type must match exactly.

The PDP addresses are considered to match if they are identical or if either or both addresses are unspecified. For example, a PPP NCP request specifying PDP type = IP and no PDP address would cause the MT to search through the specified context definitions for one with PDP type = IP and any PDP address.

The context shall be activated using the matched value for PDP type and a static PDP address if available, together with the other information found in the PDP context definition. If a static PDP address is not available then a dynamic address is requested.

If no <cid> is given or if there is no matching context definition, the MT shall attempt to activate the context with whatever information is available to the MT. The other context parameters shall be set to their default values.

If the activation is successful, data transfer may proceed.

After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the V.250 command state is re-entered and the MT returns the final result code OK.

In the event of an erroneous termination or a failure to start up, the V.250 command state is re-entered and the MT returns the final result code NO CARRIER or, if enabled, +CME ERROR. Attach, activate and other errors may be reported.

The TEST command is used for requesting information on the supported layer 2 protocols.

This command may be used in both normal and modem compatibility modes.

8.7.3 Defined Values

<L2P>: a string parameter that indicates the layer 2 protocol to be used between the TE and MT.

PPP: Point-to-point protocol for a PDP such as IP.

<cid>: a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT commands).

8.7.4 Implementation

Optional if the D (dial) command can be used to specify Packet Domain operation.

8.8 +CGAUTH–Set PDP Authentication

8.8.1 Command Syntax

Command	Possible response(s)
+CGAUTH=<cid>[,<auth_prot>[,<userid>[,<password>]]]	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>

Command	Possible response(s)
+CGAUTH?	<CR><LF>[+CGAUTH: <cid>,<auth_prot>,<userid>,<password>][<C R><LF>+CGAUTH: <cid>,<auth_prot>,<userid>,<password>[...]]< CR><LF><CR><LF>OK<CR><LF>
+CGAUTH=?	<CR><LF>+CGAUTH: (list of supported <cid>s),(list of supported <auth_prot>s),(list of supported <userid>s),(list of supported <password>s)<CR><LF><CR><LF>OK<CR> <LF>

8.8.2 Description

The SET command allows TE to specify authentication parameters for a PDP context identified by the (local) context identification parameter <cid> used during the PDP context activation and the PDP context modification procedures. Since the <cid> is the same parameter that is used in the +CGDCONT and +CGDSCONT commands (please refer to 3GPP TS 27.007 for +CGDSCONT command), +CGAUTH is effectively as an extension to these commands. Refer subclause 9.2 for possible <err> values.

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

The TEST command returns values supported as compound values.

8.8.3 Defined Values

<cid>: integer type that specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands; please refer to 3GPP TS 27.007 for +CGDSCONT command).

<auth_prot>: integer type that specifies authentication protocol used for this PDP context.

0: None. Indicate that no authentication protocol is used for this PDP context. Username and password are removed if previously specified.

1: PAP

2: CHAP

3: CHAP+PAP (default value)

<userid>: user name for access to the IP network. A string with double quotation marks, consisting of a maximum of 32 characters. It can be omitted. (Not used)

<password>: password for access to the IP network. A string with double quotation marks, consisting of a maximum of 32 characters. It can be omitted. (Not used)

9 Call Control Commands

9.1 D-Originate Call

9.1.1 Command Syntax

Command	Possible response(s)
Voice call: D<digits>; Data call: D<digits>	Voice call: <CR><LF>OK<CR><LF> Data call: <CR><LF>NO CARRIER<CR><LF> <CR><LF>CONNECT <text><CR><LF> <CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>

9.1.2 Description

This command is used to originate a call which may be a voice call or a data call.

Note:

Voice call command needs the semicolon, but data call command couldn't have the semicolon.

9.1.3 Defined Values

<digits>: a string of 0 or more of the characters:

"0 1 2 3 4 5 6 7 8 9 * # +"

The length of the dial string cannot bigger than 24 (not including '+').

Notes:

- The modifiers "D T P W @ ! \$ A B C" are not supported and will be ignored when appearing in the dial string.
- '+' indicates a international call only when it is the first character of the dial string. Otherwise it will be ignored.
- Any other characters appearing in the dial string that can't be recognized as a valid part of the call addressing information or as a valid modifier will be ignored.

<text>: indicator of interface speed.

UART: 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400

USB: 384000

9.2 A-Answer Call

9.2.1 Command Syntax

Command	Possible response(s)
A	Data call: <CR><LF>CONNECT [<text>]<CR><LF> Voice call: <CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>

9.2.2 Description

The EXECUTION command is used to answer a new incoming call. When there is an incoming voice call, only PS incoming call can be answered by this command. When in PS call, only voice incoming call can be answered. When voice call and PS call incoming at the same time, voice call can be answered first, and then the PS call will be answered.

Note:

Any additional commands on the same command line are ignored.

9.2.3 Defined Values

<text>: indicator of interface speed.

UART: 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400

USB: 384000

9.3 O-Return to Data State

9.3.1 Command Syntax

Command	Possible response(s)
O<value>	<CR><LF>CONNECT [<text>]<CR><LF> <CR><LF>NO CARRIER<CR><LF> <CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>

9.3.2 Description

This command causes the DCE to return to online data /PPP state and issue a CONNECT or CONNECT<text> result code.

9.3.3 Defined Values

<value>

0: Switch command mode to data state.

<text>: indicator of interface speed.

UART: 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400

USB: 384000

Note:

"ATO" is the same as "ATO0" and not Support PCUI port.

When one port is in data /PPP state, other port is forbidden to send "ATO" or "ATO0".

9.4 +++-Switch Data Mode to Command Mode

9.4.1 Command Syntax

Command	Possible response(s)
+++	<CR><LF>OK<CR><LF> If <value> is not recognized or supported: <CR><LF>+CME ERROR: <err><CR><LF>

9.4.2 Description

While the DCE is in data mode, this command enable DCE switch to command mode.

Or while the DCE is in transparent mode of Embedded TCP/IP function, +++ will make the DCE return to command mode. For Embedded TCP/IP function, +++ can be used in serial and USB ports, for the other case, +++ can only be used in serial port.

When executing this command, any character is forbidden in 900 ms before and after inputting "+++", and it must be less than 900ms between two '+' input.

Note:

Not Support PCUI port.

9.5 +CRC-Set Cellular Result Codes

9.5.1 Command Syntax

Command	Possible response(s)
+CRC[=<mode>]	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CRC?	<CR><LF>+CRC: <mode><CR><LF><CR><LF>OK<CR><LF>
+CRC=?	<CR><LF>+CRC: (list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

9.5.2 Description

The SET command controls whether or not the extended format of incoming call indication GPRS network request for PDP context activation is used. When enabled, an incoming call is indicated to the TE with unsolicited result code +CRING: <type> instead of the normal RING.

The READ command returns the current mode value.

The TEST command returns values supported as a compound value.

9.5.3 Defined Values

<mode>:

0: Disables extended format (default value)

1: Enables extended format

<type>:

ASYNCR [,<priority>[,<subaddr>,<satype>]]	asynchronous transparent
SYNCR [,<priority>[,<subaddr>,<satype>]]	synchronous transparent
REL ASYNCR [,<priority>[,<subaddr>,<satype>]]	asynchronous non-transparent
REL SYNCR [,<priority>[,<subaddr>,<satype>]]	synchronous non-transparent
VOICE [,<priority>[,<subaddr>,<satype>]]	normal voice

GPRS <PDP_type>, <PDP_addr> [, [<L2P>][,<APN>]] GPRS network request for PDP context activation

The optional <priority> indicates the eMLPP priority level of the incoming call by paging, notification or setup message. The priority level values are as defined in eMLPP specification 3GPP TS 22.067.

<subaddr>: string type sub address of format specified by <satype>

<satype>: type of sub address octet in integer format (refer 3GPP TS 24.008 sub clause 10.5.4.8)

<PDP_type>,<PDP_addr> and <APN> are as defined in the Define PDP Context (+CGDCONT) command. The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command. If the MT is unable to announce to the TE the network's request (for example it is in V.25ter online data state) the MT shall reject the request. No corresponding unsolicited result code shall be issued when the MT returns to a command state.

The "AT+CRC" will be set <mode> to 0.

9.6 +CHUP-Hangup Call

9.6.1 Command Syntax

Command	Possible response(s)
+CHUP	<CR><LF>OK<CR><LF>
+CHUP=?	<CR><LF>OK<CR><LF>

9.6.2 Description

The EXECUTION command causes the TE to hang up the voice call of the MS, including ACTIVE and HELD calls.

Notes:

- This execution of the command will not affect data calls.
- For hanging up in the multi-party call , AT+CHLD is suggested.

9.7 +CSTA-Select Type of Address

9.7.1 Command Syntax

Command	Possible response(s)
+CSTA[=<type>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>or <CR><LF>+CME ERROR: <err><CR><LF>
+CSTA?	<CR><LF>+CSTA: <type><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>or <CR><LF>+CME ERROR: <err><CR><LF>
+CSTA=?	<CR><LF>+CSTA: (list of supported <type>s)<CR><LF><CR><LF>OK<CR><LF>

9.7.2 Description

The SET command selects the type of number for further dialing commands (D) according to GSM/UMTS specifications. Test command returns values supported a compound value.

9.7.3 Defined Values

<type>: type of address octet in integer format (3GPP TS 24.008)

145: When dialing string includes international access code character "+".

129: Otherwise (default value).

Note:

AT+CSTA is the same as AT+CSTA=129.

9.8 +CBST-Select Bearer Service Type

9.8.1 Command Syntax

Command	Possible response(s)
+CBST[=<speed>[,<name>[,<ce>]]]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
+CBST?	<CR><LF>+CBST: <speed>,<name>,<ce><CR><LF><CR><LF>OK<CR><LF>
+CBST=?	<CR><LF>+CBST: (list of supported <speed>s),(list of supported <name>s),(list of supported <ce>s)<CR><LF><CR><LF>OK<CR><LF>

9.8.2 Description

The SET command selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated (refer 3GPP TS 22.002). Values may also be used during mobile terminated data call setup, especially in case of single numbering scheme calls (refer +CSNS).

The TEST command returns values supported as compound values.

9.8.3 Defined Values

<speed>:

0: Autobauding (automatic selection of the speed; this setting is possible in case of 3.1 kHz modem and non-transparent service) (default value)

7: 9600 bps (V.32)

12: 9600 bps (V.34)

14: 14400 bps (V.34)

16: 28800 bps (V.34)

17: 33600 bps (V.34)

39: 9600 bps (V.120)

43: 14400 bps (V.120)

48: 28800 bps (V.120)

51: 56000 bps (V.120)

71: 9600 bps (V.110 or X.31 flag stuffing)

75: 14400 bps (V.110 or X.31 flag stuffing)

80: 28800 bps (V.110 or X.31 flag stuffing)

81: 38400 bps (V.110 or X.31 flag stuffing)

83: 56000 bps (V.110 or X.31 flag stuffing)

84: 64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM)

116: 64000 bps (bit transparent)

134: 64000 bps (multimedia)

<name>:

0: Data circuit asynchronous (UDI or 3.1 kHz modem) (default value)

1: Data circuit synchronous (UDI or 3.1 kHz modem) (reserved, not supported)

4: Data circuit asynchronous (RDI) (reserved, not supported)

<ce>:

0: Transparent

1: Non-transparent (default value)

Note:

AT+CBST is the same as AT+CBST=0,0,1.

9.9 +CLCC-List Current Calls

9.9.1 Command Syntax

Command	Possible response(s)
+CLCC	[<CR><LF>+CLCC: <id1>,<dir>,<stat>,<mode>,<mpty>,<number>,<type><CR><LF>[<CR><LF>+CLCC: <id2>,<dir>,<stat>,<mode>,<mpty>,<number>,<type><CR><LF>[...]]<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CLCC=?	<CR><LF>OK<CR><LF>

9.9.2 Description

The EXECUTION command is used to return the list of current calls of MS.

9.9.3 Defined Values

<idx>: integer type; call identification number

<dir>:

0: Mobile originated (MO) call

1: Mobile terminated (MT) call

<stat> (state of the call):

0: Active

1: Held

2: Dialing (MO call)

3: Alerting (MO call)

4: Incoming (MT call)

5: Waiting (MT call)

<mode> (bearer/teleservice):

0: Voice

1: Data (not supported)

<mpty>:

0: Call is not one of multiparty (conference) call parties.

1: Call is one of multiparty (conference) call parties.

<number>: string type phone number in format specified by <type>. If receive a voice call with number withhold, only quotation will be displayed.

<type>: type of address octet in integer format

9.9.4 Examples

AT+CLCC

+CLCC: 1,0,3,0,0,"13801000841",129

OK

9.10 H-Hook Control

9.10.1 Command Syntax

Command	Possible response(s)
H	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>

9.10.2 Description

The EXECUTION command is used to terminate data call in progress by default.

9.11 S0-Ring Before Automatic Answer

9.11.1 Command Syntax

Command	Possible response(s)
S0=<value>	<CR><LF>OK<CR><LF>
S0?	<CR><LF><value><CR><LF><CR><LF>OK<CR><LF>

9.11.2 Description

The SET command is used to disable or enable the DCE automatic to answer the incoming call. If <value> was set to non-zero value, DCE will answer the incoming call after <value> rings.

The READ command is used to return the current value.

The return value comprises three octets, for example:

0-000

1-001

For CS incoming call:

Both S0 and ^AUTOANSWER equal 0, the incoming call will not be auto-answered.

Either S0 or ^AUTOANSWER not equal 0, the incoming call will be auto-answered after S0 or ^AUTOANSWER rings which not equal 0.

Both S0 or and ^AUTOANSWER not equal 0, the incoming call will be auto-answered after the smaller one of S0 and ^AUTOANSWER rings.

9.11.3 Defined Values

<value>:

0: Disable automatic answering (default value).

1–255: Enable automatic answering after the specified number of rings.

Note:

Value of S0 will restore to default when module was reset.

9.12 ^AUTOANSWER–Auto Answer

9.12.1 Command Syntax

Command	Possible response(s)
^AUTOANSWER=<n>	<CR><LF>OK<CR><LF>
^AUTOANSWER?	<CR><LF>^AUTOANSWER:<n><CR><LF><CR><LF>OK<CR><LF>

9.12.2 Description

Autoanswer only corresponds to CS call.

This command is used to

- MS can answer a call automatically.
- The function of auto-answer will be reserved after module reset.

The SET command is used to set whether MS can answer a call automatically or the number of rings before the incoming call is auto-answered.

The READ returns the current value of parameter <n>.

For CS incoming call:

- Both S0 and ^AUTOANSWER equal 0, the incoming call will not be auto-answered.
- Either S0 or ^AUTOANSWER not equal 0, the incoming call will be auto-answered after S0 or ^AUTOANSWER rings which not equal 0.
- Both S0 and ^AUTOANSWER not equal 0, the incoming call will be auto-answered after the smaller one of S0 and ^AUTOANSWER rings.

<n> is stored in NV when the command executed, and is restored from NV when booted up.

9.12.3 Defined Values

<n>: The value ranges from 0 to 255.

0: Disable the function of AUTOANSWER (default value).

1–255: MS will answer the call automatically after Ring n times.

9.13 ^DTMF-Send DTMF Key Value

9.13.1 Command Syntax

Command	Possible response(s)
^DTMF=<call_id>,<dtmf_digit>	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>

9.13.2 Description

The EXECUTION command is used to send DTMF key value to network during voice call.

9.13.3 Defined Values

<call_id>: the ID of the current call. The value ranges from 1 to 9.

<dtmf_digit>: DTMF key value. It just only includes 0–9 and *, #, every time only one character is supported.

Note:

The interval of two AT^DTMF commands must be more than 3.33 ms.

9.14 ^ORIG-Indicate Call Origination

9.14.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^ORIG:<call_id>,<call_type><CR><LF>

9.14.2 Description

This command indicates that MS is originating a voice call or an emergency call.

9.14.3 Defined Values

<call_id>: the ID of the current call. The value ranges from 1 to 9.

<call_type>: the type of the current call.

0: Voice call

9: Emergency call

9.15 ^CONF-Indicate Call Origination Accepted

9.15.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^CONF:<call_id><CR><LF>

9.15.2 Description

MS originate a call, and if the call is accepted by network, MS will report ^CONF to TE.

9.15.3 Defined Values

<call_id>: the ID of the current call. The value ranges from 1 to 9.

9.16 ^CONN-Indicate Call Connection

9.16.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^CONN:<call_id>,<call_type><CR><LF>

9.16.2 Description

This command indicates that the call is accepted by the target UE.

9.16.3 Defined Values

<call_id>: the ID of the current call. The value ranges from 1 to 9.

<call_type>: the type of the current call.

0: Voice call

9.17 ^CEND-Indicate Call End

9.17.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^CEND:<call_id>,<duration>,<end_status>[,<cc_cause>]<CR><LF>

9.17.2 Description

This command indicates that the call is hung up.

9.17.3 Defined Values

<call_id>: the ID of the current call. The value ranges from 1 to 9.

<duration>: call duration in seconds

<end_status>: call end cause

CM_CALL_END_OFFLINE=0,	The board is in offline mode.
CM_CALL_END_NO_SRV=21,	The board is out of service.
CM_CALL_END_FADE=22,	The call is ended normally.
CM_CALL_END_INTERCEPT=23,	The call is interrupted by the BS.
CM_CALL_END_REORDER=24, call.	A BS record is received during the
CM_CALL_END_REL_NORMAL=25,	The BS releases the call.
CM_CALL_END_REL_SO_REJ=26, service.	The BS rejects the current SO
CM_CALL_END_INCOM_CALL=27,	A call from the BS is received.
CM_CALL_END_ALERT_STOP=28, during the call.	A ringing stop signaling is received
CM_CALL_END_CLIENT_END=29, client.	The call is ended normally at the
CM_CALL_END_ACTIVATION=30, OTASP call.	The activation is ended during the
CM_CALL_END_MC_ABORT=31, stops the call.	The MC stops initiating the call or
CM_CALL_END_RUIM_NOT_PRESENT=34,	The RUIM does not exist.

CM_CALL_END_LL_CAUSE=100, layer, and cc_cause must be queried.	The call is released from the bottom
CM_CALL_END_CONF_FAILED=101,	The network fails to respond.
CM_CALL_END_INCOM_REJ=102,	The MT rejects an incoming call.
CM_CALL_END_SETUP_REJ=103,	The call is rejected during setup.
CM_CALL_END_NETWORK_END=104, network, and cc_cause must be queried.	The call is released from the
CM_CALL_END_NO_FUNDS=105,	The fund runs out.
CM_CALL_END_NO_GW_SRV=106,	The MT is out of service.
<cc_cause>: call control information	
UNASSIGNED_CAUSE	1
NO_ROUTE_TO_DEST	3
CHANNEL_UNACCEPTABLE	6
OPERATOR_DETERMINED_BARRING	8
NORMAL_CALL_CLEARING	16
USER_BUSY	17
NO_USER_RESPONDING	18
USER_ALERTING_NO_ANSWER	19
CALL_REJECTED	21
NUMBER_CHANGED	22
NON_SELECTED_USER_CLEARING	26
DESTINATION_OUT_OF_ORDER	27
INVALID_NUMBER_FORMAT	28
FACILITY_REJECTED	29
RESPONSE_TO_STATUS_ENQUIRY	30
NORMAL_UNSPECIFIED	31
NO_CIRCUIT_CHANNEL_AVAILABLE	34
NETWORK_OUT_OF_ORDER	38
TEMPORARY_FAILURE	41
SWITCHING_EQUIPMENT_CONGESTION	42
ACCESS_INFORMATION_DISCARDED	43
REQUESTED_CIRCUIT_CHANNEL_NOT_AVAILABLE	44
RESOURCES_UNAVAILABLE_UNSPECIFIED	47
QUALITY_OF_SERVICE_UNAVAILABLE	49

REQUESTED_FACILITY_NOT_SUBSCRIBED	50
INCOMING_CALL_BARRED_WITHIN_CUG	55
BEARER_CAPABILITY_NOT_AUTHORISED	57
BEARER_CAPABILITY_NOT_PRESENTLY_AVAILABLE	58
SERVICE_OR_OPTION_NOT_AVAILABLE	63
BEARER_SERVICE_NOT_IMPLEMENTED	65
ACM_GEQ_ACMMAX	68
REQUESTED_FACILITY_NOT_IMPLEMENTED	69
ONLY_RESTRICTED_DIGITAL_INFO_BC_AVAILABLE	70
SERVICE_OR_OPTION_NOT_IMPLEMENTED	79
INVALID_TRANSACTION_ID_VALUE	81
USER_NOT_MEMBER_OF_CUG	87
INCOMPATIBLE_DESTINATION	88
INVALID_TRANSIT_NETWORK_SELECTION	91
SEMANTICALLY_INCORRECT_MESSAGE	95
INVALID_MANDATORY_INFORMATION	96
MESSAGE_TYPE_NON_EXISTENT	97
MESSAGE_TYPE_NOT_COMPATIBLE_WITH_PROT_STATE	98
IE_NON_EXISTENT_OR_NOT_IMPLEMENTED	99
CONDITIONAL_IE_ERROR	100
MESSAGE_NOT_COMPATIBLE_WITH_PROTOCOL_STATE	101
RECOVERY_ON_TIMER_EXPIRY	102
PROTOCOL_ERROR_UNSPECIFIED	111
INTERWORKING_UNSPECIFIED	127
REJ_UNSPECIFIED	160
AS_REJ_RR_REL_IND	161
AS_REJ_RR_RANDOM_ACCESS_FAILURE	162
AS_REJ_RRC_REL_IND	163
AS_REJ_RRC_CLOSE_SESSION_IND	164
AS_REJ_RRC_OPEN_SESSION_FAILURE	165
AS_REJ_LOW_LEVEL_FAIL	166
AS_REJ_LOW_LEVEL_FAIL_REDIAL_NOT_ALLOWED	167
MM_REJ_INVALID_SIM	168

MM_REJ_NO_SERVICE	169
MM_REJ_TIMER_T3230_EXP	170
MM_REJ_NO_CELL_AVAILABLE	171
MM_REJ_WRONG_STATE	172
MM_REJ_ACCESS_CLASS_BLOCKED	173
ABORT_MSG_RECEIVED	174
OTHER_CAUSE	175
CNM_REJ_TIMER_T303_EXP	176
CNM_REJ_NO_RESOURCES	177
CNM_MM_REL_PENDING	178
CNM_INVALID_USER_DATA	179

Note:

If a call is terminated due to network problems, <cc_cause> is presented. If a call is terminated before response from the network side is received, <cc_cause> is not presented.

9.18 RING–Indicate Incoming Call

9.18.1 Command Syntax

Command	Possible response(s)
	<CR><LF>RING<CR><LF>

9.18.2 Description

An unsolicited report will be sent to TE periodically (PS incoming call: cycle=3s; Voice incoming call: cycle=5s). It will be reported when +CRC=0.

When there is a PS incoming call, the maximum number of rings is 13.

9.19 +CRING–Indicate Incoming Call

9.19.1 Command Syntax

Command	Possible response(s)
	<CR><LF>+CRING: <type><CR><LF>

9.19.2 Description

An unsolicited report will be sent to TE periodically (PS incoming call: cycle=3s; Voice incoming call: cycle=5s). It will be reported when +CRC=1.

When there is a PS incoming call, the maximum number of rings is 13.

<type>: the details refer to +CRC.

9.20 ^DDTMFCFG-DTMF Decoder Configuration Command

9.20.1 Command Syntax

Command	Possible response(s)
^DDTMFCFG=<para>,<value>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^DDTMFCFG?	<CR><LF>^DDTMFCFG: <para>,<value><CR><LF><CR><LF>OK<CR><LF>
^DDTMFCFG=?	<CR><LF>^DDTMFCFG: (list of supported <para>s)<CR><LF><CR><LF>OK<CR><LF>

9.20.2 Description

This command is used to set parameters related to DTMF Decoder. <para> specifies the parameter to be set, and <value> specifies the actual value assigned to the parameter. This command is used to enable and disable DTMF Decoder only in the RX direction, that is, this command controls whether DTMF signals sent from the network side should be decoded and reported with an ASCII code from the collection [0–9, A–D, *, #] to the TE.

The SET command is used to set parameters related to DTMF Decoder.

The READ command is used to query the current values of parameters related to DTMF Decoder.

The TEST command is used to display all controllable parameters.

9.20.3 Defined Values

<para>: integer, parameter related to DTMF Decoder.

0: Indicates switch of DTMF Decoder in the RX direction.

<value>: integer, parameter value; saved upon power-offs and restored to default value upon upgrades.

If <para> is set to 0, the available values for <value> are:

<value>

0: Disables DTMF Decoder in the RX direction (default value).

<value>

1: Enables DTMF Decoder in the RX direction.

9.20.4 Examples

```
AT^DDTMFCFG=0,1
```

```
OK
```

```
AT^DDTMFCFG?
```

```
^DDTMFCFG: 0,1
```

```
OK
```

```
AT^DDTMFCFG=?
```

```
^DDTMFCFG: (0)
```

```
OK
```

9.21 ^DDTMF–Unsolicited Report of DTMF Characters Sent by the Remote Subscriber

9.21.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^DDTMF: <key><CR><LF>

9.21.2 Description

When the function to decode DTMF signals in the RX direction is enabled, during communication, the DTMF signals sent from the remote subscriber will be decoded into corresponding characters and reported together with an ASCII code from [0–9, A–D, *, #], in an unsolicited manner, to the TE through this command.

9.21.3 Defined Values

<key>: value type: character; value range: [0–9, A–D, *, #].



9.21.4 Examples

^DDTMF: 1

10 Supplementary Service Commands

10.1 +CHLD-Set Call Related Supplementary Services

10.1.1 Command Syntax

Command	Possible response(s)
+CHLD[=<n>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CHLD=?	<CR><LF>+CHLD: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

10.1.2 Description

The SET command supplies operation for call related supplementary services.

The TEST command returns a list of operations which are supported. The call number required by some operations shall be denoted by 'x'. The range of x is 1–9.

10.1.3 Defined Values

<n>

0: Releases all held calls or sets User Determined User Busy (UDUB) for a waiting call.

1: Releases all active calls (if any exist) and accepts the other (being held or waiting) call.

1X: Releases a specific active call X in originate connecting status, hold or active status. For example, when <n> is 12, it means release call 2.

2: Places all active calls (if any exist) on hold and accepts the other (being held or waiting) call (default value).

2X: Places all active calls on hold except call X, with which communication shall be supported. For example, when <n> is 22, it means place all active calls on hold except call 2.

3: Adds a held call to the conversation.

4: Connects the two calls and disconnects the subscriber from both calls (ECT).

Notes:

- X is the id of current active call, we can get it via AT+CLCC.
- The "AT+CHLD" is the same as "AT+CHLD=2".

10.2 +CCFC-Set Call Forwarding Number and Conditions

10.2.1 Command Syntax

Command	Possible response(s)
+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<subaddr>[,<satype>[,<time>]]]]]]	<p>when <mode>=2 and command successful:</p> <p><CR><LF>+CCFC: <status>,<class1>,<number>,<type>[,<subaddr>,<satype>[,<time>]]][<CR><LF>+CCFC: <status>,<class2>,<number>,<type>[,<subaddr>,<satype>[,<time>]]][...]<CR><LF><CR><LF>OK<CR><LF></p> <p>In case of an MT-related error:</p> <p><CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF></p>
+CCFC=?	<CR><LF>+CCFC: (list of supported <reason>s)<CR><LF><CR><LF>OK<CR><LF>

10.2.2 Description

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. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>.

The TEST command returns reason values supported as a compound value.

10.2.3 Defined Values

<reason>:

0: Unconditional

1: Mobile busy

2: No reply

3: Not reachable

4: All call forwarding (refer 3GPP TS 22.030)

5: All conditional call forwarding (refer 3GPP TS 22.030)

<mode>:

0: Disable call forwarding

1: Enable call forwarding

2: Query status of call forwarding

3: Register and activate call forwarding

4: Erase and deactivate call forwarding

<number>: string type phone number of forwarding address in format specified by <type>.

<type>: type of address octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.7); the default value is 145 when dialing string includes international access code character "+", otherwise 129.

<subaddr>: string type subaddress of format specified by <satype>.

<satype>: type of subaddress octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.8); the default value is 128.

<class> is a sum of integers each representing a class of information (the default value is 7):

1: Voice (telephony)

2: Data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128).

4: Fax (facsimile services)

8: Short message service

16: Data circuit sync

32: Data circuit async

64: Dedicated packet access

128: Dedicated PAD access

1–255: Combination of some of the above classes. For example, the default setting 7 represents the sum of the integers 1, 2 and 4 (CF for voice, data and fax). The value 255 covers all classes. If the <class> parameter is omitted, the default value 7 is used.

<classx>: same as parameter <class>.

<time>:

1–30: When "no reply" is enabled or queried, this gives the time in seconds to wait before call is forwarded, the default value is 20.

<status>:

0: Not active

1: Active

10.3 +CLIP-Set Calling Line Identification Status

10.3.1 Command Syntax

Command	Possible response(s)
+CLIP[=<n>]	<CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CLIP?	<CR><LF>+CLIP: <n>,<m><CR><LF><CR><LF>OK<CR><LF>
+CLIP=?	<CR><LF>+CLIP: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

10.3.2 Description

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

The SET command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

The READ command is used to return the current value of parameter <n> and parameter <m>.

The TEST command is used to return the supported values as compound value.

10.3.3 Defined Values

<n> (parameter sets/shows presentation status to the TE):

0: Disable (default value)

1: Enable

<m> (parameter shows the subscriber CLIP service status in the network):

0: CLIP not provisioned

1: CLIP provisioned

2: Unknown (e.g. no network, etc.)

Note:

The "AT+CLIP" is the same as "AT+CLIP=0".

10.4 +CLIP-Report of Calling Line Identification

10.4.1 Command Syntax

Command	Possible response(s)
	<CR><LF>+CLIP: <number>,<type>,,,,<CLI validity><CR><LF>

10.4.2 Description

An unsolicited report will be sent to TE every 5 seconds if +CLIP is enabled by the set command of CLIP.

10.4.3 Defined Values

<number>: '0'-'9', '*', '#', '+' in the form of ASCII code value. If receive a voice call with number withhold, only quotation will be displayed.

<type>: type of address octet in integer format. 145 means international address. Refer to the detail instruction of <type_addr> at "+CMGS".

<CLI validity>:

0: CLI valid

1: CLI has been withheld by the originator.

2: CLI is not available due to inter-working problems or limitations of originating network.

10.4.4 Examples

- <CLI validity>=0 the unsolicited report will be
+CLIP: "82882690",129,,,0
- <CLI validity>=1 the unsolicited report will be
+CLIP: "",128,,,1
- <CLI validity>=2 the unsolicited report will be
+CLIP: "",128,,,2

10.5 +CLIR–Set Calling Line Identification Restriction Status

10.5.1 Command Syntax

Command	Possible response(s)
+CLIR=[<n>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CLIR?	<CR><LF>+CLIR: <n>,<m><CR><LF><CR><LF>OK<CR><LF>
+CLIR=?	<CR><LF>+CLIR: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

10.5.2 Description

This command refers to CLIR service (Calling Line Identification Restriction) according to 3GPP TS 22.081 that allows a calling subscriber to enable or disable the presentation of the CLI to the called party when originating a call.

The SET command enables or disables the Restriction of the CLI at the TE.

The READ command is used to return the current value of parameter <n> and parameter <m>.

The TEST command is used to return the supported values as compound value.

10.5.3 Defined Values

<n>: (parameter sets the adjustment for outgoing calls):

0: presentation indicator is used according to the subscription of the CLIR service.
(Default)

1: CLIR invocation

2: CLIR suppression

<m>: (parameter shows the subscriber CLIR service status in the network):

0: CLIR not provisioned

1: CLIR provisioned in permanent mode

2: Unknown (e.g. no network, etc.)

3: CLIR temporary mode presentation restricted

4: CLIR temporary mode presentation allowed

Note:

The "AT+CLIR" is the same as "AT+CLIR=0".

10.6 +CCWA-Set Call Waiting Status

10.6.1 Command Syntax

Command	Possible response(s)
+CCWA[=<n>[,<mode>[,<class>]]]	When <mode>=2: <CR><LF>+CCWA: <status>,<class1>[<CR><LF>+CCWA: <status>,<class2>[...]]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF> When <mode>≠2: <CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
+CCWA?	<CR><LF>+CCWA: <n><CR><LF><CR><LF>OK<CR><LF>
+CCWA=?	<CR><LF>+CCWA: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

10.6.2 Description

The SET command allows TE to control of the Call Waiting supplementary service. Activation, deactivation and status query are supported. <n> is used to disable/enable MS to show the result code presentation status to the TE.

The READ command returns the current value of <n>.

The TEST command returns the supported value of <n>.

10.6.3 Defined Values

<n>: sets/shows the result code presentation status to the TE.

0: Disable (default value)

1: Enable

<mode>: when <mode> parameter is not given, network is not interrogated.

0: Deactivation

1: Activation

2: Query status

<classx> is a sum of integers each representing a class of information:

1: Voice (telephony).

2: Data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if MS does not support values 16, 32, 64 and 128) (not supported).

4: Fax (facsimile services) (not supported).

8: Short message service (not supported).

16: Data circuit sync (not supported).

32: Data circuit async (not supported).

64: Dedicated packet access (not supported).

128: Dedicated PAD access (not supported).

1–255: combination of some of the above classes. For example, the default setting 1 represents that only voice is supported. The value 255 covers all classes, but it can't be used to set all classes active or inactive. If the <class> parameter is omitted, the default value 1 is used.

<status>:

0: Not active

1: Active

Note:

The "AT+CCWA" is the same as "AT+CCWA=0".

10.7 +CCWA-Report of Call Waiting

10.7.1 Command Syntax

Command	Possible response(s)
	<CR><LF>+CCWA: <number>,<type>,<class><CR><LF>

10.7.2 Description

An unsolicited report will be sent to TE every 5 seconds if +CCWA is enabled by the set command of CCWA.

10.7.3 Defined Values

<number>: string type phone number of forwarding address in format specified by <type>.

<type>: type of address octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.7).

<classx> is a sum of integers each representing a class of information (the default value is 7):

1: Voice (telephony)

2: Data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)

4: Fax (facsimile services)(not supported)

8: Short message service

16: Data circuit sync

32: Data circuit async

64: Dedicated packet access

128: Dedicated PAD access

1–255: Combination of some of the above classes. For example, the default setting 7 represents the sum of the integers 1, 2 and 4 (CF for voice, data and fax). The value 255 covers all classes. If the <class> parameter is omitted, the default value 7 is used.

10.8 +CUSD-USSD Command

10.8.1 Command Syntax

Command	Possible response(s)
+CUSD[=<n>[,<str>[,<dc>]]]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CUSD?	<CR><LF>+CUSD: <n><CR><LF><CR><LF>OK<CR><LF>
+CUSD=?	<CR><LF>+CUSD: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

10.8.2 Description

This command provides control on the supplementary service USSD. It supports the operation originated from the network side or the terminal side.

<n> is used to disable/enable proactive reporting of URC. This reporting may be response to the terminal-originated service at the network side, or service request originated at the network side.

+CUSD: <m>[,<str>,<dc>]

If the <str> field is provided in the delivered command, the message sent to the network side may be the USSD request originated at the terminal side, or the response to the network-side request from the terminal. The response (USSD string) from the network will be included in the subsequent +CUSD result code.

Besides, <n>=2 is used to exit the current USSD session.

When the <n> takes on the default value, the EXECUTION command is equivalent to the SET command +CUSD=0.

The TEST command returns all the supported <n> values.

10.8.3 Defined Values

<n>:

0: Disable result code reporting

1: Enable result code reporting

2: Exit the session

Note:

AT+CUSD equals to AT+CUSD=0.

<str>: USSD string

Note:

"" is not allowed in <str>.

If <str> is convert from IRA to GSM7. MS is only support basic GSM 7 bit and extended GSM 7 bit is not support. For example '[' is not valid in basic GSM 7 bit character. So it will convert to '('.

<dc>: USSD coding scheme. It indicates the string coding and specifies the language.

15: Default 7bit coding without specifying the language.

72: UCS2 coding (reserved, not supported currently).

<m>:

0: The network side does not require the terminal to return ussdata (no further information is required after the network side originates USSD-Notify or the terminal originates the initialization operation).

- 1: The network side requires the terminal to return ussdata (further information is required after the network side originates USSD-Notify or the terminal originates the initialization operation).
- 2: The USSD session is released by the network side.
- 3: Other local clients have made response. (The information returned by the board itself. "Client" means different clients, e.g. the DS module and the DIAG module are different clients).
- 4: Operation not supported (information returned from the network).
- 5: Network timeout.

10.9 ^USSDMODE-Set USSD Mode

10.9.1 Command Syntax

Command	Possible response(s)
^USSDMODE=<mode>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^USSDMODE?	<CR><LF>^USSDMODE:<mode><CR><LF><CR><LF> >OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^USSDMODE=?	<CR><LF>^USSDMODE:(list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

10.9.2 Description

The EXECUTE command is used to set the USSD mode. After the module resets, it will resume to default value.

The READ command is used to query current USSD mode.

The TEST command is used to query the list of all supported USSD mode.

10.9.3 Defined Values

<mode>:

0: USSD non-transparent transfer mode (default value)

1: USSD transparent transfer mode

10.10 ^CHIPTEMP-Query the Temperature of the PA/SIM/Battery/Crystal Oscillator

10.10.1 Command Syntax

Command	Possible response(s)
^CHIPTEMP?	<CR><LF>^CHIPTEMP: <G PAtemp>,<W PAtemp>,<L PAtemp>,<SIMtemp>,<BATTERYtemp>,<CRYSTALtemp><CR><LF><CR><LF>OK<CR><LF>
^CHIPTEMP=?	<CR><LF>^CHIPTEMP: <G PAtemp Range>,<W PAtemp Range>,<L PAtemp Range>,<SIMtemp Range>,<BATTERYtemp Range>,<CRYSTALtemp Range><CR><LF><CR><LF>OK<CR><LF>

10.10.2 Description

The read command is used to query the temperature of the PA, SIM card, battery, and crystal oscillator.

Notes:

- The command is a platform-based command. If the MU509 does not support the LTE mode. Therefore, the invalid value 65535 is returned for the <L PAtemp> parameter.
- No battery is configured on the AP-Modem. Therefore, 65535 is returned for the <BATTERYtemp> parameter.
- The hardware of the AP-Modem does not support temperature monitoring. Therefore, 65535 is returned for the SIM card temperature.

10.10.3 Defined Values

READ command:

Parameter	Description
<G PAtemp>	An integer indicates the GSM PA chip's current temperature.
<W PAtemp>	An integer indicates the WCDMA PA chip's current temperature.
<L PAtemp>	An integer indicates the LTE PA chip's current temperature.
<SIMtemp>	An integer indicates the SIM card's current temperature.
<BATTERYtemp>	An integer indicates the battery's current temperature.

Parameter	Description
<CRYSTALtemp>	An integer indicates the crystal's current temperature.

Notes:

- If the query of a component's temperature fails, 65535 is returned.
- The unit of read command and test command is 0.1°C. For example, if the response is –200, that is, the response is –20°C.

10.10.4 Examples

Query the temperature of the PA, SIM card, battery, and crystal oscillator:

AT^CHIPTEMP?

^CHIPTEMP: 65535,65535,65535,65535,65535,390

OK

Query the working range of the PA, SIM card, battery, and crystal oscillator:

AT^CHIPTEMP=?

^CHIPTEMP:

(65535-65535),(65535-65535),(65535-65535),(65535-65535),(65535-65535),(-350-1060)

OK

10.11 ^THERMFUN–Enable or Disable the Temperature Protection Function

10.11.1 Command Syntax

Command	Possible response(s)
^THERMFUN=<switch>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^THERMFUN?	<CR><LF>^THERMFUN: <switch><CR><LF><CR><LF>OK<CR><LF>
^THERMFUN=?	<CR><LF>^THERMFUN: (list of supported <switch>s)<CR><LF><CR><LF>OK<CR><LF>

10.11.2 Description

This command is used to enable or disable the temperature protection function. If the temperature protection function is enabled, the module performs corresponding protection operation, such as disable the PA or shut down the system when the temperature reaches the threshold. The protection operation and the temperature threshold vary with customer requirements. After protection operation is performed and the temperature protection function is disabled, the module recovers the normal state. All services are available. If the temperature protection function is disabled, the temperature does not affect the module functions.

10.11.3 Defined Values

<switch>: integer, indicating the switch for enabling or disabling the temperature protection function.

Available values include:

0: Disable the temperature protection function

1: Enable the temperature protection function

Note:

The default value is 1. The parameter value changes to 1 upon power-off.

10.11.4 Examples

- Check the parameter range supported by the command

```
AT^THERMFUN=?
```

```
^THERMFUN: (0-1)
```

```
OK
```

- Query whether the temperature protection function is enabled or disabled.

```
AT^THERMFUN?
```

```
^THERMFUN: 1
```

```
OK
```

- Enable the temperature protection function.

```
AT^THERMFUN=1
```

```
OK
```

A parameter value takes effect immediately after setting.

11 Audio Commands

11.1 ^SWSPATH-Switch Sound Path

11.1.1 Command Syntax

Command	Possible response(s)
^SWSPATH=<n>	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>
^SWSPATH?	<CR><LF>^SWSPATH: <n><CR><LF><CR><LF>OK<CR><LF>
^SWSPATH=?	<CR><LF>^SWSPATH: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

11.1.2 Description

This command is used to set sound path in voice call. Resetting the module will not affect the value. Module updating will reset the value to default value.

The READ command is used to query the current sound path.

The TEST command is used to query the supported sound paths.

11.1.3 Defined Values

<n>:

0: Handset (default value)

1: Speaker

2: PCM

3: Ear 1 and MIC 2 (that is, the combination of handset ear and speaker MIC)

11.2 ^AUDIO-Audio Loop Back Command

11.2.1 Command Syntax

Command	Possible response(s)
<code>^AUDIO=<channel>,<cmd></code>	<code><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>ERROR<CR><LF></code>
<code>^AUDIO=?</code>	<code><CR><LF>^AUDIO: (list of supported <channel>s), (list of supported <cmd>s)<CR><LF><CR><LF>OK<CR><LF></code>

11.2.2 Description

The SET command is used to select the audio channel, and disable or enable this audio channel's loop back function.

The TEST command can return the supported audio channel list and the function operation command list.

11.2.3 Defined Values

`<channel>`: an integer number, currently only supports two audio channels.

0: Handset channel

1: Headset channel

`<cmd>`: an integer number, used to enable or disable the audio loop back function.

0: Disable the audio loop back function.

1: Enable the audio loop back function.

11.2.4 Examples

Enable the handset channel's loop back function:

```
AT^AUDIO=0,1
```

```
OK
```

11.3 ^AUDSWITCH-Set Audio Command Set

11.3.1 Command Syntax

Command	Possible response(s)
^AUDSWITCH=<command_set>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^AUDSWITCH?	<CR><LF>^AUDSWITCH: <command_set><CR><LF><CR><LF>OK<CR><LF>
^AUDSWITCH=?	<CR><LF>^AUDSWITCH: (list of supported <command_set>s)<CR><LF><CR><LF>OK<CR><LF>

11.3.2 Description

This command is used to restrict the command set which are available. There are two sets of AT command related with voice volume, refer to below table. Command set 0 has only a few levels to adjust. Command set 1 has sufficient levels to adjust. Input AT which belongs to the unsupported command set will receive an ERROR.

The SET command is used to set the audio command set.

The READ command returns the currently command set in use.

The TEST command returns supported command sets.

Command set	AT commands
0	+CMIC, ^ECHOPARA, +CLVL, ^STN, ^RXGAIN, ^SETAUDIO
1	^AUDTXGAIN, ^AUDRXGAIN, ^SMUT

11.3.3 Defined Values

<command_set>: command set of audio.

0: Command set 0, which has only a few levels to adjust on voice volume.

1: Command set 1, including ^AUDTXGAIN, ^AUDRXGAIN and ^SMUT, which has sufficient levels to adjust on voice volume.

During a voice call, excluding ringing and originating a call, executing the SET command will return ERROR. Resetting the module will not affect the value. Module updating will reset the value to default value (default value is 0, which means command set 0).

11.3.4 Examples

Set 1 to use audio command set 1.

AT^AUDSWITCH=1

OK

11.4 ^AUDTXGAIN-Set Audio Input Gain

11.4.1 Command Syntax

Command	Possible response(s)
^AUDTXGAIN=[<micvol>],[<miccodec>],[<micamp>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^AUDTXGAIN?	<CR><LF>^AUDTXGAIN: <micvol>,<miccodec>,<micamp><CR><LF><CR><LF>OK<CR><LF>
^AUDTXGAIN=?	<CR><LF>^AUDTXGAIN: (list of supported <micvol>s),(list of supported <miccodec>s),(list of supported <micamp>s)<CR><LF><CR><LF>OK<CR><LF>

11.4.2 Description

The command is used to set the audio input gain.

The READ command returns the currently gain to the audio input path.

The TEST command returns supported values as compound value.

<miccodec> and <micamp> are not supported on PCM audio channel.

11.4.3 Defined Values

<micvol>: microphone volume.

1–65535: Integer type value. Take effect during voice call. Comply with the rule $A=20*\lg(Y/16384)$. Unit is dB. From –84 dB to 12 dB. Resetting the module will not affect the value. Module updating will reset the value to default value (default value is 16384, which means 0 dB).

<miccodec>: microphone Codec TX gain.

1–65535: Integer type value. Take effect at the next voice call. Comply with the rule $A=20*\lg(Y/16384)$. Unit is dB. From –84 dB to 12 dB. Resetting the module will not affect the value. Module updating will reset the value to default value (default value is 16384, which means 0 dB).

<micamp>: microphone analogue amplifier. Integer type value.

0: 0 dB

1: 24 dB

Take effect at the next voice call. Resetting the module will not affect the value. Module updating will reset the value to default value (default value is 1, which means 24 dB).

11.4.4 Examples

Set both of the module's microphone volume and codec gain to about +5 dB; set MIC analogue amplifier as 0 dB.

```
AT^AUDTXGAIN=29135,29135,0
```

```
OK
```

11.5 ^AUDRXGAIN-Set Audio Output Gain

11.5.1 Command Syntax

Command	Possible response(s)
<code>^AUDRXGAIN=[<spkvol>],[<spkcodec>],[<sidetone>]</code>	<code><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>ERROR<CR><LF></code>
<code>^AUDRXGAIN?</code>	<code><CR><LF>^AUDRXGAIN:</code> <code><spkvol>,<spkcodec>,<sidetone><CR><LF><CR><LF></code> <code>OK<CR><LF></code>
<code>^AUDRXGAIN=?</code>	<code><CR><LF>^AUDRXGAIN:</code> (list of supported <code><spkvol></code> s),(list of supported <code><spkcodec></code> s),(list of supported <code><sidetone></code> s) <code><CR><LF><CR><LF>OK<CR><LF></code>

11.5.2 Description

The command is used to set the audio output gain.

The READ command returns the currently gain to the audio output path.

The TEST command returns supported values as compound value.

`<spkcodec>` and `<sidetone>` are not supported on PCM audio channel.

11.5.3 Defined Values

`<spkvol>`: speaker volume.

1–65535: Integer type value. Take effect during voice call. Comply with the rule $A=20 \cdot \lg(Y/16384)$. Unit is dB. From –84 dB to 12 dB. Resetting the module will not affect the value. Module updating will reset the value to default value (default value is 16384, which means 0 dB).

`<spkcodec>`: speaker Codec RX gain.

1–65535: Integer type value. Take effect at the next voice call. Comply with the rule $A=20*\lg(Y/16384)$. Unit is dB. From –84 dB to 12 dB. Resetting the module will not affect the value. Module updating will reset the value to default value (default value is 16384, which means 0 dB).

<sidetone>: side tone gain.

0–65535: Integer type value. Take effect at the next voice call. Comply with the rule $A=20*\lg(Y/16384)-12\text{dB}$. Unit is dB. From –96 dB to 0 dB. Resetting the module will not affect the value. Module updating will reset the value to default value (default value is 0, which means side tone is mute).

11.5.4 Examples

Set both of the module's speaker volume and codec gain to about +5 dB; set side tone gain as mute.

```
AT^AUDRXGAIN=29135,29135,0
```

```
OK
```

11.6 ^SMUT–Set Speaker Mute Status

11.6.1 Command Syntax

Command	Possible response(s)
^SMUT=<n>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^SMUT?	<CR><LF>^SMUT: <n><CR><LF><CR><LF>OK<CR><LF>
^SMUT=?	<CR><LF>^SMUT: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

11.6.2 Description

The SET command is used to enable and disable the downlink voice muting during a voice call. The SET command which is not during a voice call will return ERROR. Resetting the module will not affect the value. Module updating will reset the value to default value. This value is restored to 0 when voice call is ended.

The READ command returns current mute status.

The TEST command returns supported values as compound value.

11.6.3 Defined Values

<n>:

0: Mute off (default value)

1: Mute on

11.6.4 Examples

Set mute during a voice call.

```
AT^SMUT=1
```

OK

11.7 ^CPCM-Configure PCM Audio

11.7.1 Command Syntax

Command	Possible response(s)
<code>^CPCM=<mode>,<format>,<clock>,<frame>,<offset></code>	<code><CR><LF>OK<CR><LF></code> <code><CR><LF>ERROR<CR><LF></code>
<code>^CPCM?</code>	<code><CR><LF>^CPCM:</code> <code><mode>,<format>,<clock>,<frame>,<offset><CR><LF><CR></code> <code><LF>OK<CR><LF></code>
<code>^CPCM=?</code>	<code><CR><LF>^CPCM: (list of supported <mode>s),(list of supported <format>s),(list of supported <clock>s),(list of supported <frame>s),(list of supported <offset>s)<CR><LF><CR><LF>OK<CR><LF></code>

11.7.2 Description

This command is used to configure the PCM audio before a voice call. Resetting the module will not affect the value. Module updating will reset the value to default value.

11.7.3 Defined Values

`<mode>`:

0: MASTER_PRIM (default value)

1: MASTER_AUX (reserved, not supported currently)

2: SLAVE (reserved, not supported currently)

`<format>`:

0: linear (default value)

1: u-law

2: a-law (reserved, not supported currently)

<clock>:

0: 2.048 MHz (default value)

1: 128 kHz (reserved, not supported currently)

<frame>:

0: Short frame (default value)

1: Long frame (reserved, not supported currently)

<offset>:

0: Offset cleared: the sync launched is aligned to the rising edge of the PCM CLK (default value).

1: Short sync offset set: the short sync sent to the external world in Primary PCM master mode is launched 1/4 cycle after the rising edge of the PCM CLK.

2: Long sync offset set: the long sync sent to the external world in Aux PCM master mode is launched 1/4 cycle ahead of the rising edge of PCM CLK (reserved, not supported currently).

11.8 +CMIC-Tune Microphone Gain Level

11.8.1 Command Syntax

Command	Possible response(s)
+CMIC=<level>	<CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CMIC?	<CR><LF>+CMIC: <level><CR><LF><CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CMIC=?	<CR><LF>+CMIC: (list of supported <level>s)<CR><LF><CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>

11.8.2 Description

This command is used to adjust the microphone gain of the MT.

The TEST command returns supported values as compound value.

The PCM audio channel is not supported.

11.8.3 Defined Values

<level>: 1–12, integer type value with manufacturer specific range (smallest value represents the lowest gain). Default value is 5. Resetting the module will not affect the value. Firmware updating will reset the value to default value.

11.9 +CLVL-Tune Loudspeaker Volume Level

11.9.1 Command Syntax

Command	Possible response(s)
+CLVL=<level>	<CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CLVL?	<CR><LF>+CLVL: <level><CR><LF><CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CLVL=?	<CR><LF>+CLVL: (list of supported <level>s)<CR><LF><CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>

11.9.2 Description

This command is used to select the volume of the internal loudspeaker of the MT.

The TEST command returns supported values as compound value.

The PCM audio channel is not supported.

11.9.3 Defined Values

<level>:

0–7: integer type value with manufacturer specific range (smallest value represents the lowest sound level). 0 means mute. Default value is 2. Resetting the module will not affect the value. Module updating will reset the value to default value.

11.10 +CMUT-Switch Mute Status

11.10.1 Command Syntax

Command	Possible response(s)
+CMUT=<n>	<CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF> <CR><LF>ERROR<CR><LF>
+CMUT?	<CR><LF>+CMUT: <n><CR><LF><CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CMUT=?	<CR><LF>+CMUT: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

11.10.2 Description

This command is used to enable and disable the uplink voice muting during a voice call.

The TEST command returns supported values as compound value.

11.10.3 Defined Values

<n>:

0: Mute off (default value)

1: Mute on

This value is restored to 0 when voice call is ended.

11.11 +VTS-Generate DTMF and Tone

11.11.1 Command Syntax

Command	Possible response(s)
+VTS=<DTMF_CHAR>[, <duration>]	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+VTS=?	<CR><LF>+VTS: (list of supported <dtmf>s)<CR><LF><CR><LF>OK<CR><LF>

11.11.2 Description

This command is intended to send ASCII character which causes the Mobile Switching Center (MSC) to transmit DTMF tone to a remote subscriber. The command can only be used during active voice calls and offers the following rules:

AT+VTS=<DTMF_CHAR> allows to send a single DTMF tone-with a default duration of 100 ms.

AT+VTS=<DTMF_CHAR>[,<duration>] allows to send a single DTMF tone. In this case, the duration can be individually determined during the call.

11.11.3 Defined Values

<DTMF_CHAR>: a single ASCII character in the set 0–9, #, *, A, B, C, D.

<duration>: tone duration in 1/10 seconds with tolerance. The minimum duration of DTMF signals is 100 ms. DTMF tone below 100ms cannot be generated.

1–255: The unit is 1/10 second.

11.12 ^STN-Switch Sidetone Status

11.12.1 Command Syntax

Command	Possible response(s)
^STN=<vol>	<CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF> <CR><LF>ERROR<CR><LF>
^STN?	<CR><LF>STN: <vol><CR><LF><CR><LF>OK<CR><LF>
^STN=?	<CR><LF>^STN: (list of supported <vol>s)<CR><LF><CR><LF>OK<CR><LF>

11.12.2 Description

This command is used to enable and disable the sidetone before a voice call. During a voice call, including ringing and originating a call, executing the SET command will return ERROR.

The TEST command returns supported values as compound value.

The PCM audio channel is not supported.

11.12.3 Defined Values

<vol>:

0: Sidetone off

1: Sidetone on

Resetting the module will not affect the value. Module updating will reset the value to default value.

11.13 ^ECHO-Switch Echo Canceller Mode

11.13.1 Command Syntax

Command	Possible response(s)
^ECHO=<n>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^ECHO?	<CR><LF>^ECHO: <n><CR><LF><CR><LF>OK<CR><LF>

^ECHO=?	<CR><LF>^ECHO: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>
----------------	---

11.13.2 Description

This command is used to switch the echo canceller mode before a voice call.

The TEST command returns supported values as compound value.

11.13.3 Defined Values

<n>:

0: Close the echo canceller

1: Handset mode, mild echo, short delay (less than 16ms dispersion)

2: Headset mode, moderate echo, short delay (less than 16ms dispersion)

3: Carkit mode, loud echo, long delay (up to 64 ms dispersion)

4: Speakerphone mode, loud echo, long delay (default value)

5: Bluetooth headset mode, there is a lot of delay in the Bluetooth air interface, definitely cannot be used for non-Bluetooth modes.

Resetting the module will not affect the value. Module updating will reset the value to default value.

11.14 ^KEYTONE-Play Local DTMF Key Tone

11.14.1 Command Syntax

Command	Possible response(s)
^KEYTONE=<key>[,<duration>]	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^KEYTONE=?	<CR><LF>^KEYTONE: (list of supported <key>s)<CR><LF><CR><LF>OK<CR><LF>

11.14.2 Description

This command is used to play the DTMF key tone local.

The TEST command returns supported values as compound value.

11.14.3 Defined Values

<key>: ASCII character in the set 0–9, #, *, A, B, C, D.

<duration>: 0 ms–1000 ms. Integer type value with manufacturer specific range. Time of the tone will play. 0 means no stop (input this command with none 0 duration can abort).

11.15 ^AUDIOCFG–Set Tone Volume Level

11.15.1 Command Syntax

Command	Possible response(s)
^AUDIOCFG=<tone_type>,<tone_volume>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^AUDIOCFG?	<CR><LF>^AUDIOCFG: <tone_type>,<tone_volume>[<CR><LF>^AUDIOCFG: <tone_type1>,<tone_volume1>[<CR><LF>^AUDIOCFG: <tone_type2>,<tone_volume2>...]]<CR><LF><CR><LF> OK<CR><LF>
^AUDIOCFG=?	<CR><LF>^AUDIOCFG: (list of supported <tone_type>s)<CR><LF><CR><LF>OK<CR><LF>

11.15.2 Description

This command is used to set the volume of specific type tone.

The TEST command returns supported values as compound value.

11.15.3 Defined Values

<tone_type>: 0–2. Integer type value with manufacturer specific range.

0: Incoming call ring

1: Local dtmf tone

2: Busy tone

<tone_volume>:

Incoming call ring:

0–3: Integer type value with manufacturer specific range (smallest value represents the lowest sound level). 0 means turning off the incoming call ring function. Default value is 0. Resetting the module will not affect the value. Module updating will reset the value to default value.

Local dtmf tone:

0–7: Integer type value with manufacturer specific range(smallest value represents the lowest sound level). 0 means mute. Default value is 2. Resetting the module will not affect the value. Module updating will reset the value to default value.

Busy tone:

0–1: Integer type value with manufacturer specific range. 0 means turning off the Busy tone function. Default value is 1, means turning on the function. Resetting the module will not affect the value. Module updating will reset the value to default value.

11.16 ^ECHOPARA–Set Echo Suppression Parameters

11.16.1 Command Syntax

Command	Possible response(s)
^ECHOPARA=<para>,<value>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^ECHOPARA?	<CR><LF>^ECHOPARA: <para>,<value>[<CR><LF>^ECHOPARA: <para1>,<value1>[<CR><LF>^ECHOPARA: <para2>,<value2>...]]<CR><LF><CR><LF>OK<CR><LF>
^ECHOPARA=?	<CR><LF>^ECHOPARA: (list of supported <para>s)<CR><LF><CR><LF>OK<CR><LF>

11.16.2 Description

This command adjusts echo suppression parameters.

The SET command is used to set the echo suppression parameters.

The READ command is used to query the settings of the echo suppression parameters.

The TEST command is used to return all configurable echo suppression parameters.

The PCM audio channel is not supported.

11.16.3 Defined Values

<para>: specifies the echo suppression parameter to set.

0: Gain of the first microphone amplifier

1: Gain of the codec during the sending process

<value>: specifies the value for the echo suppression parameter to set.

If <para> is set to 0, the available values for <value> are:

0: 0 dB

1: 24 dB (1 is the default value)

If <para> is set to 1, the available values for <value> are an integer ranging from 1 to 12. The gain increases with the value. The default value is 6.

This command can be executed only before calls. The parameters are restored to their default values after the module is upgraded, but not after the module is restarted.

11.16.4 Implementation

Huawei proprietary interface

Optional

11.16.5 Examples

Test command:

AT^ECHOPARA=?

^ECHOPARA: (0–1)

OK

Read command:

AT^ECHOPARA?

^ECHOPARA: 0,1

^ECHOPARA: 1,6

OK

Set command:

AT^ECHOPARA=0,0

OK

11.17 ^RXGAIN-Set Codec RX Gain

11.17.1 Command Syntax

Command	Possible response(s)
^RXGAIN=<codec_rx_gain>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>

<code>^RXGAIN?</code>	<code><CR><LF>^RXGAIN:</code> <code><codec_rx_gain><CR><LF><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>ERROR<CR><LF></code>
<code>^RXGAIN=?</code>	<code><CR><LF>^RXGAIN:</code> (list of supported <code><codec_rx_gain>s)<CR><LF><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>ERROR<CR><LF></code>

11.17.2 Description

This command is used to set the Codec RX gain. The PCM audio channel is not supported.

The SET command is used to set the Codec RX gain. The parameter settings take effect at the next voice call. Running the SET command during a voice call (including a call initialization) will return an ERROR.

The READ command is used to query the current Codec RX gain.

The TEST command is used to return the supported value range of Codec RX gain.

11.17.3 Defined Values

`<codec_rx_gain>`: Codec RX gain. Value range: 1–12. The gain increases with the value.

Do not run this command during a voice call.

Resetting the module will not affect the value. Module updating will keep the value to default value.

11.17.4 Example

Set command:

`AT^RXGAIN=6`

OK

Test command:

`AT^RXGAIN=?`

`^RXGAIN: (1-12)`

OK

Read command:

`AT^RXGAIN?`

`^RXGAIN: 6`

OK

11.18 ^PCMFIR-Set Audio FIR

11.18.1 Command Syntax

Command	Possible response(s)
^PCMFIR=<filter_type>,<pre_ec_tx_pcm_filter_flag>,<tap0>,<tap1>,<tap2>,<tap3>,<tap4>,<tap5>,<tap6>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^PCMFIR?	<CR><LF>^PCMFIR: <filter_type>,<pre_ec_tx_pcm_filter_flag>,<tap0>,<tap1>,<tap2>,<tap3>,<tap4>,<tap5>,<tap6><CR><LF>[^PCMFIR: <filter_type>,<pre_ec_tx_pcm_filter_flag>,<filter_type>,<tap0>,<tap1>,<tap2>,<tap3>,<tap4>,<tap5>,<tap6><CR><LF>][...]<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^PCMFIR=?	If the command is executed successfully: <CR><LF>^PCMFIR: (list of supported <filter_type>s),(list of supported <pre_ec_tx_pcm_filter_flag>s),(list of supported <tap0>s),(list of supported <tap1>s),(list of supported <tap2>s),(list of supported <tap3>s),(list of supported <tap4>s),(list of supported <tap5>s),(list of supported <tap6>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>

11.18.2 Description

This command is used to set the FIR filter parameters of the current audio channel. All types of audio channels are supported.

The SET command is used to set the audio FIR filter parameters of different types of PCM channels. The parameter settings take effect at the next voice call. Running the SET command during a voice call (including a call initialization) will return an ERROR. Resetting the module will not affect the value. Module updating will keep the value to default value.

The READ command is used to query the FIR filter parameters of all types in the current audio channel.

The TEST command is used to return the range of the supported FIR filter parameter values.

11.18.3 Defined Values

<filter_type>: type of the FIR filter.

0: RX filter

1: TX filter of the second microphone in dual-microphone mode (this value is reserved and not supported)

2: RX filter

<pre_ec_tx_pcm_filter_flag>: TX filter mode.

0: TX filter after echo suppression

65535: TX filter before echo suppression

When <filter_type> is set to 2, this parameter must be set to 0.

<tap0>—< tap6>: parameters of the 13-tap FIR filter. Value range: 0–65535.

<tap0>: Filter Tap, h[0] and h[12], Q14

<tap1>: Filter Tap, h[1] and h[11], Q14

<tap2>: Filter Tap, h[2] and h[10], Q14

<tap3>: Filter Tap, h[3] and h[9], Q14

<tap4>: Filter Tap, h[4] and h[8], Q14

<tap5>: Filter Tap, h[5] and h[7], Q14

<tap6>: Filter Tap, h[6], Q14

If this parameter is set to 0, this FIR filter is disabled.

11.18.4 Example

Set command:

```
AT^PCMFIR=0,0,65270,372,573,65428,63877,61885,11903
```

OK

Test command:

```
AT^PCMFIR=?
```

```
^PCMFIR:
```

```
(0-2),(0,65535),(0-65535),(0-65535),(0-65535),(0-65535),(0-65535),(0-65535),(0-65535)
```

OK

Read command:

```
AT^PCMFIR?
```

```
^PCMFIR: 0,0,65270,372,573,65428,63877,61885,11903
```

```
^PCMFIR: 1,0,0,0,0,0,0,0,0
```

^PCMFIR: 2,0,0,0,0,0,0,0,0

OK

11.19 ^SETAUDIO-Set Audio Parameter Sets

11.19.1 Command Syntax

Command	Possible response(s)
^SETAUDIO[=<audio_profile_index>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^SETAUDIO?	<CR><LF>^SETAUDIO: <audio_profile_index><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^SETAUDIO=?	<CR><LF>^SETAUDIO: (list of supported <audio_profile_index>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

11.19.2 Description

This command is a customized AT command used to set a series of audio parameter sets that are different from those of the general version. Customers can set their audio parameter set indexes based on their devices. This command changes the volume gain range of each level and is prior to +CMIC and +CLVL. +CMIC and +CLVL are used to select gain levels within the range set by this command. Execution of this command will also affect the echo suppression parameters.

The SET command is used to set the audio parameter set indexes. New settings take effect at the next voice playback.

Resetting the module will not affect the value. Module updating will keep the value to default value.

The EXECUTION command only returns OK and does not perform any other operations.

The TEST command is used to query the supported audio parameter sets.

The READ command is used to query the currently used audio parameter set index.

11.19.3 Defined Values

<audio_profile_index>: supported audio parameter set indexes.

0: General audio parameter sets

1: PATEO customized audio parameter sets

11.19.4 Example

Set command:

AT^SETAUDIO=1

OK

Test command:

AT^SETAUDIO=?

^SETAUDIO: (0-1)

OK

Read command:

AT^SETAUDIO?

^SETAUDIO: 1

OK

12 Phonebook Commands

12.1 +CPBS-Select Phonebook Memory

12.1.1 Command Syntax

Command	Possible response(s)
+CPBS=<storage>[,<reserved>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPBS?	<CR><LF>+CPBS: <storage>,<used>,<total><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPBS=?	<CR><LF>+CPBS: (list of supported <storage>s)<CR><LF><CR><LF>OK<CR><LF>

12.1.2 Description

The SET command is used to select a phonebook memory. The initial value after restarting the MS is "SM". Other phonebook-related commands will be operated by using the memory selected via this command.

The READ command returns the currently selected phonebook memory. Optionally, the number of entries in use and the maximum number of entries should also be returned.

The TEST command returns the supported phonebook memory types.

12.1.3 Defined Values

<storage>: phonebook memory type. Currently, only "SM" and "ON" are supported.

"SM": SIM/UICC phonebook

"DC": MT dialed calls list (reserved, not supported currently)

"FD": SIM/USIM fix-dialing phonebook (reserved, not supported currently)

"LD": SIM/UICC last-dialing-phonebook (reserved, not supported currently)

"MC": MT missed (unanswered received) calls list (reserved, not supported currently)

"ME": MT phonebook (reserved, not supported currently)

"RC": MT received calls list (reserved, not supported currently)

"ON": SIM/USIM own numbers (MSISDNs) list

"EN": SIM/USIM emergency number (reserved, not supported currently)

<reserved>: reserved.

<used>: integer value. It indicates the number of entries in use in the currently selected memory.

<total>: integer value. It indicates the maximum number of entries in the currently selected memory.

12.2 +CPBF-Query Phonebook Query

12.2.1 Command Syntax

Command	Possible response(s)
+CPBF=<findtext>	<CR><LF>[+CPBF: <index1>,<number>,<type>,<text>[[...]<CR><LF>+CPBF: <index2>,<number>,<type>,<text>]]<CR><LF><CR><LF> OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPBF=?	<CR><LF>+CPBF: <nlength>,<tlength><CR><LF><CR><LF>OK<CR><LF>

12.2.2 Description

The SET command is used to search and list all the records whose name begins with the specified characters. If there is no match record, returns as follows:

+CME ERROR: not found

12.2.3 Defined Values

<index1>, <index2>: integer values, the location within phonebook memory. There values are less than or equal to the total returned via +CPBS?.

<number>: string value, phone number

<type>: phone number type. It is 145 if the number begins with "+", otherwise it is 129.

<findtext>,<text>: string values, name

<nlength>: integer value, the maximum length of the phone number

<tlength>: integer value, the maximum length of the name

12.3 +CPBR–Read Phonebook Entries

12.3.1 Command Syntax

Command	Possible response(s)
+CPBR=<index1>[,<index2>]	[<CR><LF>+CPBR: <index1>,<number>,<type>,<text>[,<hidden>][[...]<CR><LF>+C PBR:<index2>,<number>,<type>,<text>[,<hidden>]]<CR><LF>] <CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPBR=?	<CR><LF>+CPBR: (list of supported <index>s),[<nlength>],[<tlength>]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

12.3.2 Description

The EXECUTION command returns phonebook entries in location number range <index1>... <index2> from the current phonebook memory storage selected with +CPBS. If <index2> is left out, only location <index1> is returned. Entry fields returned are location number <indexn>, phone number stored there <number> (of format <type>), text <text> associated with the number and, if the selected phonebook supports hidden entries, <hidden> indicating if the entry is hidden. If all queried locations are empty (but available), no information text lines may be returned. If listing fails in an MT error, +CME ERROR: <err> is returned (refer 3GPP TS 27.007 subclause 9.2 for <err> values).

The TEST command returns location range supported by the current storage as a compound value and the maximum lengths of <number> and <text> fields. In case of SIM storage, the lengths may not be available. If MT is not currently reachable, +CME ERROR: <err> is returned (refer 3GPP TS 27.007 subclause 9.2 for <err> values).

12.3.3 Defined Values

<index1>, <index2>, <index>: integer type values in the range of location numbers of phonebook memory.

<number>: string type phone number of format <type>.

<type>: type of address octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.7).

<text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS.

<nlength>: integer type value indicating the maximum length of field <number>.

<tlength>: integer type value indicating the maximum length of field <text>.

<hidden>: indicates if the entry is hidden or not.

0: Phonebook entry not hidden

1: Phonebook entry hidden

12.4 +CPBW-Write Phonebook Entry

12.4.1 command Syntax

Command	Possible response(s)
+CPBW=[<index>][,<number>[,<type>[,<text>[,<hidden>]]]]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPBW=?	<CR><LF>+CPBW: (list of supported <index>s)[,<nlength>](list of supported <type>s)[,<tlength><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

12.4.2 Description

The EXECUTION command writes phonebook entry in location number <index> in the current phonebook memory storage selected with +CPBS. The <number> field cannot be null and the <text> field can be null. Entry fields written are phone number <number> (in the format <type>), text <text> associated with the number and, if the selected phonebook supports hidden entries, <hidden> parameter, which indicates if the entry is hidden or not. If those fields are omitted, phonebook entry is deleted. If <index> is left out, but <number> is given, entry is written to the first free location in the phonebook (the implementation of this feature is manufacturer specific). If writing fails in an MT error, +CME ERROR: <err> is returned (refer 3GPP TS 27.007 subclause 9.2 for <err> values).

The TEST command returns location range supported by the current storage as a compound value, the maximum length of <number> field, supported number formats of the storage, and the maximum length of <text> field. In case of SIM storage, the lengths may not be available. If MT is not currently reachable, +CME ERROR: <err> is returned (refer 3GPP TS 27.007 subclause 9.2 for <err> values). If storage does not offer format information, the format list should be empty parenthesis.

12.4.3 Defined Values

<index>: integer type values in the range of location numbers of phonebook memory.

<number>: string type phone number of format <type>.

<type>: type of address octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.7) ; default 145 when dialling string includes international access code character "+", otherwise 129.

<text>: string type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS.

<nlength>: integer type value indicating the maximum length of field <number>.

<tlength>: integer type value indicating the maximum length of field <text>.

<hidden>: indicates if the entry is hidden or not.

0: Phonebook entry not hidden

1: Phonebook entry hidden

12.5 ^CPBR–Read Phonebook

12.5.1 Command Syntax

Command	Possible response(s)
^CPBR=<index1>[,<index2>]	[<CR><LF>^CPBR: <index1>,<number>,<type>,<text>,<coding>[[...]<CR><LF>^ CPBR:<index2>,<number>,<type>,<text>,<coding>]<CR><LF>]<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^CPBR=?	<CR><LF>^CPBR:(list of supported <index>s),<nlength>,<tlength><CR><LF><CR><LF>OK<CR> ><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

12.5.2 Description

This command returns the phonebook entries between positions index1 and index2 in the currently selected phonebook memory. If no entry exists between index1 and index2, the following will be returned:

+CME ERROR: not found

Alternatively, you can input index1 only, and only the phonebook entries in the position index1 will be returned.

The TEST command returns the position range of the currently selected phonebook memory, and the maximum length of <number>, <text> and <email>.

12.5.3 Defined Values

<index1>, <index2>, <index>: integer value. It indicates the position in the phonebook memory. The values of index1 and index2 are less than or equal to the "total" field returned by the "+CPBS?" command.

<number>: string type, telephone number.

<type>: number type: "145" means an international call. For the specific values, see also the definition of the "type_addr" parameter in the SC number, as described in the section "Short message sending +CMGS".

<text>: string type. It indicates a name. In case coding=1, it indicates that the <text> is a hexadecimal text value of the original data.

<coding>: coding scheme. It means the character code of the <text> field, and specifies the language.

0: GSM 7 bit Default Alphabet

1: UCS2 (namely, upload the <text> in the format of original data).

<nlength>: integer value. It indicates the maximum length of the telephone number.

<tlength>: integer value. It indicates the maximum length of the name.

12.6 ^CPBW-Write Phonebook

12.6.1 Command Syntax

Command	Possible response(s)
^CPBW=<index>[,<number>[,<type>[,<text>,<coding>]]]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^CPBW=?	<CR><LF>^CPBW:(list of supported <index>s),<nlength>,(list of supported <type>s),<tlength><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

12.6.2 Description

This command writes the phonebook entries into the position specified by "index" in the currently selected phonebook memory. If only "index" is included in the command parameter, the phonebook entry at the position corresponding to "index" will be deleted. If the "index" field is omitted, but the "number" field is included in the

parameter, this phonebook entry will be written to the first empty position. If no empty position is available in this case, the following will be reported:

+CME ERROR: memory full

The TEST command returns the position range of the currently selected phonebook memory, the maximum length of the "number" field, all values of the "type" field, maximum length of the "text" field, and maximum length of the "email" field. When storing the phonebook, all input lengths must fall within the maximum length range.

12.6.3 Defined Values

<index>: integer value. It indicates the position in the phonebook memory.

<number>: string type, telephone number. (legal characters only include: '0'-'9', '*', '#', '+', '(', ')', '-', '. But '(', ')', '-' will be ignored).

<type>: number type: "145" means international call. For the specific values, see also the definition of the "type_addr" parameter in the SC number, as described in the section "Short message sending +CMGS".

<text>: string type. It indicates a name (no support character 'enter', '').

<coding>: coding scheme. It means the character code of the <text> field, and specifies the language.

0: GSM 7 bit Default Alphabet

1: UCS2 (namely, upload the <text> in the format of original data).

<nlength>: integer value. It indicates the maximum length of the telephone number.

<tlength>: integer value. It indicates the maximum length of the name.

12.6.4 Examples

```
AT^CPBW=1,"28780808",129,"80534E4E3A",1
```

OK

Notes:

- data explain 1(the location of this record int the memory);
- "28780808"(telephone number);
- 129(number style);
- "80534E4E3A" (name Huawei);
- 1(encode format of UCS2)

12.7 ^ECCLIST-Read the Emergency Num

12.7.1 Command Syntax

Command	Possible response(s)
^ECCLIST?	<CR><LF>^ECCLIST: <list of supported eccs><CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
	<CR><LF>^ECCLIST: <list of supported eccs><CR><LF>

12.7.2 Description

The command is mainly used to obtain emergency numbers.

The module will report the current emergency numbers, and the emergency number will also be reported when it changed. The query command provides a real-time functions of querying the emergency number.

12.7.3 Defined Values

<list of supported eccs>: string type, telephone number (legal characters only include: '0'-'9', '*', '#'). It can support 18 emergency nums, and each num can have a maximum length of 6 digits.

12.7.4 Examples

Insert a valid SIM card.

```
^ECCLIST: "911","112","000","08","110","999","118","119" //Does not detect SIM card.//
```

```
^ECCLIST: "911","112" //Detect SIM card.//
```

```
AT^ECCLIST?
```

```
^ECCLIST: "911","112"
```

```
OK //Query after detected SIM card.//
```

```
^ECCLIST: "911","112","000","08","110","999","118","119" //Pull cards.//
```

```
AT^ECCLIST? //Query after pull cards.//
```

```
^ECCLIST: "911","112","000","08","110","999","118","119"
```

```
OK
```


13

Status Control Commands

13.1 +CEER-Report Extended Error

13.1.1 Command Syntax

Command	Possible response(s)
+CEER	<CR><LF>+CEER: <report><CR><LF><CR><LF>OK<CR><LF>
+CEER=?	<CR><LF>OK<CR><LF>

13.1.2 Description

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

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

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

13.1.3 Defined Values

<report>: the total number of characters, including line terminators, in the information text shall not exceed 2041 characters.

Note:

Text shall not contain the sequence 0<CR> or OK<CR>.

13.2 ^RSSI-Indicate RSSI Change

13.2.1 Command Syntax

Command	Possible response(s)
^RSSI	<CR><LF>^RSSI: <rssi><CR><LF><CR><LF>OK<CR><LF>
	<CR><LF>^RSSI:<rssi><CR><LF>

13.2.2 Description

This command returns received signal strength indication. The unit is dBm.

Unsolicited Result Code:

When the change of RSSI is more than 5dBm, the MS will report this indication to the TE.

13.2.3 Defined Values

<rssi>: strength of the receiving signal. The values are defined as follows:

0: Equals to or less than -113 dBm

1: -111 dBm

2-30: -109 to -53 dBm

31: Equals to or higher than -51 dBm

99: Unknown or immeasurable.

13.3 ^BAR-Query RSSI Level

13.3.1 Command Syntax

Command	Possible response(s)
^BAR	<CR><LF>^BAR: <uiPercent><CR><LF><CR><LF>OK<CR><LF>
^BAR=?	<CR><LF>^BAR: (list of supported <uiPercent>s)<CR><LF><CR><LF>OK<CR><LF>

13.3.2 Description

This command is used to query the signal intensity.

13.3.3 Defined Values

<uiPercent>: the grid of the signal.

0–5: Indicate the signal intensity, definition as below.

0: $\text{RSCP} \leq -109 \text{ dBm}$

1: $-109 \text{ dBm} < \text{RSCP} \leq -97 \text{ dBm}$

2: $-97 \text{ dBm} < \text{RSCP} \leq -85 \text{ dBm}$

3: $-85 \text{ dBm} < \text{RSCP} \leq -73 \text{ dBm}$

4: $-73 \text{ dBm} < \text{RSCP} \leq -61 \text{ dBm}$

5: $\text{RSCP} > -61 \text{ dBm}$

13.4 ^SRVST-Indicate Service State Change

13.4.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^SRVST:<srv_status><CR><LF>

13.4.2 Description

When the service state changes, the MS will report the new service state to the TE.

In sleep mode, unsolicited reports will be ignored, since the ports are closed.

13.4.3 Defined Values

<srv_status>: system service state. The values are as follows:

0: No service

1: Restricted service

2: Valid service

3: Restricted regional service

4: Power-saving and deep sleep state

13.5 ^MODE–Indicate System Mode Change Event

13.5.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^MODE:<sys_mode>,<sys_submode><CR><LF>

13.5.2 Description

When the system mode or sub-mode changes, the MS will report this indication to the TE.

In sleep mode, unsolicited reports will be ignored, since the ports are closed.

13.5.3 Defined Values

<sys_mode>: system mode. The values are as follows:

0: No service

3: GSM/GPRS mode

5: WCDMA mode

<sys_submode>: system sub mode. The values are as follows:

0: No service

1: GSM mode

2: GPRS mode

3: EDGE mode

4: WCDMA mode

5: HSDPA mode

13.6 ^SYSINFO–Query System Information

13.6.1 Command Syntax

Command	Possible response(s)
^SYSINFO	<CR><LF>^SYSINFO:<srv_status>,<srv_domain>,<roam_status>,<sys_mode>,<sim_state>[,<lock_state>,<sys_submode>]<CR><LF><CR><LF>OK<CR><LF>

13.6.2 Description

This command is used to query the current system information, e.g. system service state, domain, roaming or not.

13.6.3 Defined Values

<srv_status>: system service state. The values are as follows:

- 0: No service
- 1: Restricted service
- 2: Valid service
- 3: Restricted regional service
- 4: Power-saving and deep sleep state

<srv_domain>: system service domain. The values are as follows:

- 0: No service
- 1: Only CS service
- 2: Only PS service
- 3: PS+CS service
- 4: CS and PS not registered, searching

<roam_status>: roaming status. The values are as follows:

- 0: Non roaming state
- 1: Roaming state

<sys_mode>: system mode. The values are as follows:

- 0: No service
- 1: AMPS mode (not in use currently)
- 2: CDMA mode (not in use currently)
- 3: GSM/GPRS mode
- 5: WCDMA mode

<sim_state>: SIM card state. The values are as follows:

- 0: Invalid USIM card state or pin code locked
- 1: Valid USIM card state
- 2: USIM is invalid in case of CS
- 3: USIM is invalid in case of PS
- 4: USIM is invalid in case of either CS or PS
- 255: USIM card is not existent

<lock_state>: simlock state (reserved, not supported currently)

<sys_submode>: system sub mode, the values are as follows:

- 0: No service
- 1: GSM mode
- 2: GPRS mode
- 3: EDGE mode
- 4: WCDMA mode
- 5: HSDPA mode

Note:

In 2G network sys_submode indicates the capability of the current cell.

13.6.4 Examples

AT^SYSINFO

^SYSINFO:2,1,0,3,1,,2

OK

13.7 ^SYSCFG-Set System Configuration Reference

13.7.1 Command Syntax

Command	Possible response(s)
^SYSCFG=<mode>,<acqorder>,<band>,<roam>,<srvdomain>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^SYSCFG?	<CR><LF>^SYSCFG:<mode>,<acqorder>,<band>,<roam>,<srvdomain><CR><LF><CR><LF>OK<CR><LF>
^SYSCFG=?	<CR><LF>^SYSCFG:(list of supported <mode>s),(list of supported <acqorder>s),(list of supported(<band>,<band_name>)s),(list of supported <roam>s),(list of supported <srvdomain>s)<CR><LF><CR><LF>OK<CR><LF>

13.7.2 Description

This command is used to set the characteristics such as system mode, GW access sequence, band, roaming support and domain.

13.7.3 Defined Values

<mode>:system mode reference:

2: Automatic search (default value)

13: GSM ONLY

14: WCDMA ONLY

16: No change

<acqorder>: network access sequence reference:

0: Automatic search

1: GSM first, WCDMA later

2: WCDMA first, GSM later (default value)

3: No change

<band>: the band of frequency relate to selection of mode, which is actually up to the performance of MS. The parameter is HEX string, whose value is as follows or with the exception of 0x3FFFFFFF and 0x40000000 parameter as combination:

00080000 (CM_BAND_PREF_GSM_850)	GSM 850
00000080 (CM_BAND_PREF_GSM_DCS_1800)	GSM DCS systems
00000100 (CM_BAND_PREF_GSM_EGSM_900)	Extended GSM 900
00000200 (CM_BAND_PREF_GSM_PGSM_900)	Primary GSM 900
00200000 (CM_BAND_PREF_GSM_PCS_1900)	GSM PCS
00400000 (CM_BAND_PREF_WCDMA_I_IMT_2000)	WCDMA IMT 2000
04000000 (CM_BAND_PREF_WCDMA_V_850)	WCDMA_V_850
08000000 (CM_BAND_PREF_WCDMA_VI_800)	WCDMA 800
3FFFFFFF (All bands)	All Bands (default value)
40000000 (Not change bands)	Not change bands
0000000000800000	WCDMA US PCS 1900 band
0000000001000000	WCDMA EUROPE & CHINA DCS 1800 band
0000000002000000	WCDMA US 1700 band
0002000000000000	WCDMA EUROPE & JAPAN 900 band
0004000000000000	WCDMA_1X_1700

<roam>: roaming support: (This parameter is not supported, any value entered will be ignored, and roaming is supported by default).

- 0: Not supported
1: Roaming is supported (default value)
2: No change
<srvdomain>: domain setting
0: CS_ONLY
1: PS_ONLY
2: CS_PS (default value)
4: No change

Notes:

- Module cannot register NW if the <band> value not support.
- The <band>s that module supports please refer to module's Release Notes.

13.8 ^RESETCNT-Query Reset Counter

13.8.1 Command Syntax

Command	Possible response(s)
^RESETCNT	<CR><LF>^RESETCNT:<pwroff_rst>,<at_rst>,<dog_rst><CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^RESETCNT=<clear_flag>	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>

13.8.2 Description

This command used to query the times of resetting which caused by POWER_ON_OFF pin or at command etc.

13.8.3 Defined Values

- <pwroff_rst>: times of resetting which caused by POWER_ON_OFF pin.
<at_rst>: times of resetting which caused by at command, such as ^RESET.
<dog_rst>: times of resetting which caused by watchdog timer expired.
<clear_flag>: this value only can be 0. It is used to clear the record of resetting times.

13.9 ^ANTDTCT-Query the Status of ANTDET

13.9.1 Command Syntax

Command	Possible response(s)
^ANTDTCT?	<CR><LF>^ANTDTCT: <stat><CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>

13.9.2 Description

This command used to query the status of ANTDET which is connected to the antenna.

13.9.3 Defined Values

<stat>: the logic value of ANTDET.

0: The antenna is connected.

1: The antenna is disconnected.

13.10 ^ANTDTCT-Indicate the Status of ANTDET When It Changes

13.10.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^ANTDTCT:<stat><CR><LF>

13.10.2 Description

This command is used to report the status of ANTDET when the status changes.

13.10.3 Defined Values

<stat>: the logic value of ANTDET

0: The antenna is connected.

1: The antenna is disconnected.

14 Network Service Commands

14.1 +CREG-Register Network

14.1.1 Command Syntax

Command	Possible response(s)
+CREG[=<n>]	<CR><LF>OK<CR><LF>
+CREG?	<CR><LF>+CREG: <n>,<stat>[,<lac>,<ci>]<CR><LF><CR><LF>OK<CR><LF>
+CREG=?	<CR><LF>+CREG: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

14.1.2 Description

The SET command is used to control "+CREG" to report event proactively.

When <n>=1, and the state of network registration changes, the following will be reported: +CREG :<stat>.

When <n>=2, and the cell information changes, the following will be reported: +CREG: <stat>[,<lac>,<ci>].

When <n> is ignored, the command is treated as <n>=0, and return OK.

The READ command returns the current registration state <stat>. The position information <lac> and <ci> is reported only when <n>=2.

14.1.3 Defined Values

<n>:

0: Disable proactive reporting of "CREG" (default value)

1: Enable proactive reporting of "+CREG: <stat>"

2: Enable proactive reporting of "+CREG: <stat>[,<lac>,<ci>]"

<stat>:

0: Not registered. The MS is not searching the new operators to be registered.

1: Local network is registered.

2: Not registered. But the MS is searching the new operators to be registered.

3: Registration rejected.

4: Unknown reasons.

5: Roaming network is registered.

<lac>: position code information, composed of four characters and expressed in hexadecimal. (Example: "00C3"="195" in decimal).

<ci>: cell information, composed of four characters and expressed in hexadecimal.

(Extended Information: according to 3GPP Rel7, four characters are requested, but if before Rel7, for example the currently network is Rel6 mostly, only the last two characters is valid, the other characters is invalid and should be ignored. For example, if the <ci> return 3B3DE1C, only DE1C is valid and could be used as DE1C is the last two characters.)

14.2 +CGREG-Control GPRS Network Registration Status

14.2.1 Command Syntax

Command	Possible response(s)
+CGREG[=<n>]	<CR><LF>OK<CR><LF>
+CGREG?	<CR><LF>+CGREG: <n>,<stat>[,<lac>,<ci>]<CR><LF><CR><LF>OK<CR><LF>
+CGREG=?	<CR><LF>+CGREG: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

14.2.2 Description

The SET command is used to control "+CGREG" to report event proactively.

When <n>=1, and the state of network registration changes, the following will be reported: +CGREG: <stat>.

When <n>=2, and the cell information changes, the following will be reported: +CGREG: <stat>[,<lac>,<ci>].

The READ command returns the current registration state <stat>. The position information <lac> and <ci> is reported only when <n>=2.

14.2.3 Defined Values

<n>:

0: Disable proactive reporting of "CGREG" (default value)

1: Enable proactive reporting of "+CGREG: <stat>"

2: Enable proactive reporting of "+CGREG: <stat>[,<lac>,<ci>]"

<stat>:

0: Not registered. The MS is not searching the new operators to be registered.

1: Local network is registered (default value).

2: Not registered. But the MS is searching the new operators to be registered.

3: Registration rejected.

4: Unknown reasons.

5: Roaming network is registered.

<lac>: position code information, composed of four characters and expressed in hexadecimal. (Example: "00C3"="195" in decimal).

<ci>: cell information, composed of four characters and expressed in hexadecimal.

(Extended Information: according to 3GPP Rel7, four characters are requested, but if before Rel7, for example the currently network is Rel6 mostly, only the last two characters is valid, the other characters is invalid and should be ignored. For example, if the <ci> return 3B3DE1C, only DE1C is valid and could be used as DE1C is the last two characters.)

14.3 +COPS-Select Operator

14.3.1 Command Syntax

Command	Possible response(s)
+COPS[=<mode>[,<format>[,<oper>[,<rat>]]]]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+COPS?	<CR><LF>+COPS: <mode>[,<format>,<oper>[,<rat>]]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+COPS=?	<CR><LF>+COPS: [list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper>[,<rat>])s][,.(list of supported <mode>s),(list of supported <format>s)]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

14.3.2 Description

This interface enables to query the network state and network selection mode currently registered by the MS. The Execution command enables to select the GSM/UMTS network automatically or manually. The READ command returns the current network selection mode. If the registration is successful, the current operator information will be returned. The TEST command returns the list of (up to 20) operators existent in the current network.

Note:

When `<mode>=1`, the command is aborted, and it will return OK for aborting.

Only when SIM is unlocked, module can select network via this command.

14.3.3 Defined Values

`<mode>`:

0: Automatic (`<oper>` field is ignored) (default value).

1: Manual (`<oper>` field shall be present, and `<rat>` optionally).

2: Deregister from network (Reserved, not supported currently).

3: Set only `<format>` (for read command +COPS?), do not attempt registration/deregistration (`<oper>` and `<rat>` fields are ignored).

This value is not applicable in READ command response.

4: Manual/automatic (`<oper>` field shall be present); if manual selection fails, automatic mode (`<mode>=0`) is entered.

`<format>`: if `<format>` is omitted, the value of `<format>` is default value.

0: Long format alphanumeric `<oper>` (default value)

1: Short format alphanumeric `<oper>`

2: Numeric `<oper>`

`<oper>`:

string type; `<format>` indicates if the format is alphanumeric or numeric; long alphanumeric format can be up to 16 characters long and short format up to 8 characters (refer GSM MoU SE.13); numeric format is the GSM Location Area Identification number (refer 3GPP TS 24.008 sub clause 10.5.1.3) which consists of a three BCD digit country code coded as in ITU-T E.212 Annex A, plus a two BCD digit network code, which is administration specific; returned `<oper>` shall not be in BCD format, but in IRA characters converted from BCD; hence the number has structure: (country code digit 3) (country code digit 2) (country code digit 1) (network code digit 3) (network code digit 2) (network code digit 1).

`<stat>`:

0: Unknown

1: Available

2: Current

3: Forbidden

<rat>: access technology selected (Reserved, not supported currently).

0: GSM (default value)

2: WCDMA

14.3.4 Examples

(1) Query the present status of ME's network registration using the test command:

AT+COPS=?

+COPS: (2,"","","46008",2),(3,"China Unicom","UNICOM","46001",0),(3,"China Mobile Com","CMCC","46000",0),(0,1,3,4),(0,1,2)

OK

(2) Automatic search of network

AT+COPS=0

OK

Note:

In SET command, that mode equals to 0 makes other parameters invalid.

(3) Manual search of network

AT+COPS=1,2,46000 (+CREG=1, +CGREG=1, enable URC reporting)

OK

(If the selected operator was not allowed, the ME is now unregistered. The

READ command will return only the mode, but no operator:

AT+COPS?

+COPS: 1

OK

Please use the AT+CREG? command to verify the registration status.)

Notes:

- We cannot manually search the UTRAN network when current setting is GSM ONLY(mode=13) mode which set by ^SYSCFG.
- We cannot manually search the GSM network when current setting is WCDMA ONLY(mode=14) mode which set by ^SYSCFG.
- ERROR will be returned in this situation.

(4) Query the status of the ME's network registration using the read command:

AT+COPS? //query the information of the network currently logged in.//

+COPS: 1,2,46000 //command returns mode, format, registered operator.//

OK

14.4 +CSQ-Query RSSI

14.4.1 Command Syntax

Command	Possible response(s)
+CSQ	<CR><LF>+CSQ: <rss>,<ber><CR><LF><CR><LF>OK<CR><LF>
+CSQ=?	<CR><LF>+CSQ: (list of supported <rss>),(list of supported <ber>)<CR><LF><CR><LF>OK<CR><LF>

14.4.2 Description

The SET command returns the RSSI and BER of ME.

The TEST command returns the supported RSSI and BER values.

14.4.3 Defined Values

<rss>: Indication of the receiving signal strength

0: Equals to or less than -113 dBm

1: -111 dBm

2-30: -109 to -53 dBm

31: Equals to or higher than -51 dBm

99: Unknown or unmeasurable.

<ber> (bit error rate,in percent):

0-7: As RXQUAL values in the table in 3GPP TS 45.008 subclause 8.2.4

99: Not known or not detectable

14.5 +CCED-Query Cell Environment

14.5.1 Command Syntax

Command	Possible response(s)
+CCED=<mode>[,<requested dump>]	<CR><LF>+CCED:[<mcc>],[<mnc>],[<lac>],[<ci>], [<bsic>],[<bcch_freq>],[<rxlvel>]<[<rxlevel_full>], [<rxlevel_sub>],[<rxqual>],[<rxqual_full>],[<rxqual_sub>], [<idle_ts>]><CR><LF><CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
+CCED?	<CR><LF>OK<CR><LF>
+CCED=?	<CR><LF>OK<CR><LF>

14.5.2 Description

This command can be used by the application to retrieve the parameters of the main cell and of up to six neighbouring cells.

This command is able to query the main cell at GSM and WCDMA, but can only query the neighbouring cells at GSM. It will return OK for WCDMA.

14.5.3 Defined Values

<mode>: return mode

0: Only return once.

<requested dump>: which cell to show.

1: Main cell

2: neighbouring cell

<mcc>: mobile country code

<mnc>: mobile network code

<lac>: location area code

<ci>: cell id

<bsic>: base station Identify Code (In WCDMA mode, it will be 0)

<bcch_freq>: absolute bcch channel number.

<rxlevel>: rx signal level (0–63).refer to 3GPP TS 45.008

<rxlevel_full>,<rxlevel_full>,<rxlevel_sub>,<rxqual>,<rxqual_full>,<rxqual_sub>,<idle_ts>: to reserved. 0 or space.

Notes:

- The response from <requested dump>=1 should be:
<CR><LF>+CCED:[<mcc>],[<mnc>],[<lac>],[<ci>],[<bsic>],[<bcch_freq>],[<rxlvel>]<[<rxlev
el_full>],[<rxlevel_sub>],[<rxqual>],[<rxqual_full>],[<rxqual_sub>],[<idle_ts>]><CR><LF><C
R><LF>OK<CR><LF>
- If <requested dump> is omitted,it means <requested dump>=1

14.6 +CNUM-Query Subscriber Number

14.6.1 Command Syntax

Command	Possible response(s)
+CNUM	[<CR><LF>+CNUM: [<alpha1>,<number1>,<type1>,<speed>,<service>,<i tc>]]][<CR><LF>+CNUM: [<alpha2>,<number2>,<type2>,<speed>,<service>,<i tc>]][...]]<CR><LF><CR><LF>OK<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>
+CNUM=?	<CR><LF>OK<CR><LF>

14.6.2 Description

Action command returns the MSISDNs related to the subscriber (this information can be stored in the SIM/UICC or in the MT). When storing information in the SIM/UICC, if a SIM card is present or if a UICC with an active GSM application is present, the information is stored in the EFMSISDN under DFTelecom. If a UICC with an active USIM application is present, the information is stored in the EFMSISDN under ADFUSIM). If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line. Refer subclause14.2 for possible <err> values.

14.6.3 Defined Values

<alphax>: optional alphanumeric string associated with <numberx>; used character set should be the one selected with command Select TE Character Set +CSCS.

<numberx>: string type phone number of format specified by <typex>.

<typex>: type of address octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.7).

<speed>:

0: Autobauding (automatic selection of the speed; this setting is possible in case of 3.1 kHz modem and non-transparent service).

1: 300 bps (V.21)

2: 1200 bps (V.22)

- 3: 1200/75 bps (V.23)
- 4: 2400 bps (V.22bis)
- 5: 2400 bps (V.26ter)
- 6: 4800 bps (V.32)
- 7: 9600 bps (V.32)
- 12: 9600 bps (V.34)
- 14: 14400 bps (V.34)
- 15: 19200 bps (V.34)
- 16: 28800 bps (V.34)
- 17: 33600 bps (V.34)
- 34: 1200 bps (V.120)
- 36: 2400 bps (V.120)
- 38: 4800 bps (V.120)
- 39: 9600 bps (V.120)
- 43: 14400 bps (V.120)
- 47: 19200 bps (V.120)
- 48: 28800 bps (V.120)
- 49: 38400 bps (V.120)
- 50: 48000 bps (V.120)
- 51: 56000 bps (V.120)
- 65: 300 bps (V.110)
- 66: 1200 bps (V.110)
- 68: 2400 bps (V.110 or X.31 flag stuffing)
- 70: 4800 bps (V.110 or X.31 flag stuffing)
- 71: 9600 bps (V.110 or X.31 flag stuffing)
- 75: 14400 bps (V.110 or X.31 flag stuffing)
- 79: 19200 bps (V.110 or X.31 flag stuffing)
- 80: 28800 bps (V.110 or X.31 flag stuffing)
- 81: 38400 bps (V.110 or X.31 flag stuffing)
- 82: 48000 bps (V.110 or X.31 flag stuffing)
- 83: 56000 bps (V.110 or X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI or RDI service in order to get FTM)
- 84: 64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM)

115: 56000 bps (bit transparent)

116: 64000 bps (bit transparent)

120: 32000 bps (PIAFS32k)

121: 64000 bps (PIAFS64k)

130: 28800 bps (multimedia)

131: 32000 bps (multimedia)

132: 33600 bps (multimedia)

133: 56000 bps (multimedia)

134: 64000 bps (multimedia)

<service>: (service related to the phone number):

0: Asynchronous modem

1: Synchronous modem

2: PAD Access (asynchronous)

3: Packet Access (synchronous)

4: Voice (reserved, not supported currently)

5: Fax (reserved, not supported currently)

Also all other values below 128 are reserved by the present document.

<itc> (information transfer capability):

0: 3.1 kHz

1: UDI

14.7 ^NWINFO-Query Network Information

14.7.1 Command Syntax

Command	Possible response(s)
^NWINFO	<CR><LF>^NWINFO:<srv_band>,<srv_nodeB_PLMN>,<srv_nodeB_BS>,<srv_cell_stat>,<srv_psc>,<ecio>,<rscp>,<lac>,<cell_id>,<neighbor_cell_num>,<neig_psc1>,<neig_psc2>,<neig_psc3>,<neig_psc4>,<neig_psc5>,<neig_psc6><CR><LF><CR><LF>OK<CR><LF>

14.7.2 Description

This command is used to query the registered network information of the wireless module in the normal state, includes serving cell information, neighbour cells information of the active set, base station ID, frequency and so on.

14.7.3 Defined Values

<srv_band>: information of frequency the wireless module registered.

43 (SYS_BAND_GSM_850)	GSM 850
44 (SYS_BAND_GSM_EGSM_900)	Extended GSM 900
45 (SYS_BAND_GSM_PGSM_900)	Primary GSM 900
47 (SYS_BAND_GSM_DCS_1800)	GSM DCS systems
48 (SYS_BAND_GSM_PCS_1900)	GSM PCS
80 (SYS_BAND_WCDMA_I_IMT_2000)	WCDMA IMT 2000
87 (SYS_BAND_WCDMA_VIII_900)	WCDMA 900

<srv_nodeB_PLMN> and <srv_nodeB_BS>: information of base station the wireless module maintained.

0–255: Base station ID.

Note:

It only supports to query base station information at GSM mode now, and returns 0,0 at WCDMA mode.

<srv_cell_stat>: serving cell state.

0: Indicates not register on serving cell currently.

1: Indicates register on serving cell currently.

<srv_psc>: serving cell primary scrambling code.

0–65535: Serving cell primary scrambling code.

Note:

It returns primary scrambling code at WCDMA mode but cell id at GSM mode.

<ecio>: the value ranges from –15 to 0, returns the Ec/Io value. It is a negative.

Note:

It only supports to query base station information at WCDMA mode now, and returns 0 at GSM mode.

<rscp>: received Signal Code Power. Return the RSCP value. It is a negative. The unit is dBm.

Note:

It only supports to query base station information at WCDMA mode now, and returns 0 at GSM mode.

<lac>: location area code, the value displays hexadecimal.

<cell_id>: cell ID, the value displays hexadecimal.

<neighbour_cell_num>: number of neighbour cells. It equals 0 means cannot get any neighbour cell, maybe because of the network environment.

0–6: It supports to maintain six neighbour cells at most.

<neig_psc1>...<neig_psc6>: primary scrambling code of neighbour cells.

0–65535: Primary scrambling code of neighbour cells.

Note:

It returns primary scrambling code at WCDMA mode but cell id at GSM mode.

14.7.4 Examples

```
AT^NWINFO
```

```
^NWINFO:84,0,0,1,405,-7,-113,0x2513,0xe0195,0,0,0,0,0,0
```

```
OK
```

14.8 ^NTCT-Set Presentation of Network Time

14.8.1 Command Syntax

Command	Possible response(s)
^NTCT[=<n>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^NTCT?	<CR><LF>^NTCT: <n><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^NTCT=?	<CR><LF>^NTCT: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>

14.8.2 Description

This command controls the presentation of network time.

The SET command selects the control mode for the presentation of network time. When <n> is set to 1, ^NWTIME is presented. The READ command returns the current presentation status. The TEST command returns the value range of supported parameters.

14.8.3 Defined Values

<n>: enables or disables the presentation.

0: Disable

1: Enable (default value)

Note:

If <n> is not specified, the value of <n> is 1. The settings are not saved when the MT is powered off. The command is controlled by PIN.

14.8.4 Examples

Run the following command to disable the presentation of network time ^NWTIME:

```
AT^NTCT=0
```

OK

Run the following command to enable the presentation of network time ^NWTIME:

```
AT^NTCT=1
```

OK

14.9 ^NWTIME–Set Presentation of Network System Time

14.9.1 Command Syntax

Command	Possible response(s)
^NWTIME?	If the command is successfully executed: <CR><LF>^NWTIME: <time><tz>,<dt><CR><LF><CR><LF>OK<CR><LF> If the command is unsuccessfully executed: <CR><LF>ERROR<CR><LF>
	<CR><LF>^NWTIME: <time><tz>,<dt><CR><LF>

14.9.2 Description

This command controls the presentation of network system time, time zone, and daylight saving time.

14.9.3 Defined Values

<time>: specifies date and time in the format of yy/MM/dd, hh:mm:ss. The value of <time> consists of date and time, for example, 10/09/07,05:56:13.

<tz>: specifies the time zone. The unit of time zones is 15 minutes. The +32 value indicates 32 times of 15 minutes, that is, + 8 hours.

<dt>: specifies daylight saving time. When the parameter is not specified, the board presents 0. Otherwise, corresponding daylight saving time is presented. Detailed values and descriptions are as follows (refer to table 10.5.97a/3GPP TS 24.008):

Value	Description
0	No adjustment for Daylight Saving Time
1	+1 hours adjustment for Daylight Saving Time
2	+2 hours adjustment for Daylight Saving Time
3	Reserved

14.9.4 Implementation

10.5.97a/3GPP TS 24.008

15 Internet Service Commands

15.1 ^IPINIT-Initialize a TCP/UDP Connection

15.1.1 Command Syntax

Command	Possible response(s)
^IPINIT=<APN>[,<user_name>[,<password>[,<ip_addr>[,<auth_type>]]]]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^IPINIT?	If initialization is performed: <CR><LF>^IPINIT: <state>,<ip_address>,<APN>,<pri_dns_addresses>,<sec_dns_address><CR><LF><CR><LF>OK<CR><LF> If initialization is not performed: <CR><LF>^IPINIT: 0<CR><LF><CR><LF>OK<CR><LF>
^IPINIT=?	<CR><LF>^IPINIT: (list of supported <state>s)<CR><LF><CR><LF>OK<CR><LF>

15.1.2 Description

This command initializes a TCP/UDP connection. After initialization is complete, a local IP address is obtained, enabling the next step to be performed, for example, enabling a TCP connection and transmitting UDP data.

In case of using the command without <user_name> and/or <password>, the user name and password that have been set by running the PPPCFG command are used.

During the execution command running, the command can be interrupted.

15.1.3 Defined Values

<APN>: a string with double quotation marks, consisting of a maximum of 100 characters. Not used by the product. It does not need to be specified. For details, see "Example".

<user_name>: a string with double quotation marks, consisting of a maximum of 31 characters. It can be omitted.

<password>: a string with double quotation marks, consisting of a maximum of 31 characters. It can be omitted.

<ip_addr>: a string with double quotation marks, consisting of a maximum of 40 characters, specifying the local IP address in the read command. If this value is not be given, it will be set to "0.0.0.0".

<auth_type>: an integer, specifying the authentication mode. The 3GPP2 not support this parameter, determined by the module and network consultation.

0: Non authentication

1: PAP authentication

2: CHAP authentication (default value)

<state>: an integer, specifying the initialization completion flag.

0: Non-initialized

1: Initialized

<pri_dns_address>: a string with double quotation marks, specifying the IP address of the primary DNS server.

<sec_dns_address>: a string with double quotation marks, specifying the IP address of the secondary DNS server.

15.1.4 Examples

```
AT+IPINIT="1234","card","card"
```

```
OK
```

```
AT+IPINIT?
```

```
+IPINIT: 1,"192.168.70.94","1234","172.22.44.200","172.22.44.201"
```

```
OK
```

```
AT+IPINIT=?
```

```
+IPINIT: (0-1)
```

```
OK
```

15.2 ^IOPEN-Establish a TCP/UDP Connection

15.2.1 Command Syntax

Command	Possible response(s)
^IOPEN=<link_id>,<type>,<remote_addr>,<remote_port>[,<local_port>][,<username>,<password>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^IOPEN?	If connection is establishment: <CR><LF>^IOPEN: <link_id>,<type>,<local_port>,<remote_ip>,<remote_port>,<SIO_port>,<MSS>[<CR><LF>^IOPEN: <link_id>,<type>,<local_port>,<remote_ip>,<remote_port>,<SIO_port>,<remote_MSS>[...]]<CR><LF><CR><LF>OK<CR><LF> If the connection has not established: <CR><LF>OK<CR><LF>
^IOPEN=?	<CR><LF>^IOPEN: (list of supported <link_id>s),(list of supported <local_port>s),(list of supported <remote_port>s)<CR><LF><CR><LF>OK<CR><LF>

15.2.2 Description

This command establishes a wireless connection with one or more remote servers to complete data exchange.

TCP, UDP, HTTP, HTTPS, FTP, FTPS, SMTP and SMTPS are supported.

During the execution command running, the command can be interrupted.

Note:

At a time only one link, FTP[S]/HTTP[S]/SMTP[S] can be established.

15.2.3 Defined Values

<link_id>: an integer, specifying the ID of a connection. The value ranges from 1 to 5.

<type>: a string with double quotation marks, specifying the connection type.

"TCP": Establishes the TCP link.

"UDP": Establishes the UDP link.

"FTP": Establishes the FTP link.

"FTPS" Establishes the FTPS Link.

"HTTP" Establishes the HTTP link.

"HTTPS" Establishes the HTTPS Link.

"SMTP" Establishes the SMTP link.

"SMTPS" Establishes the SMTPS link.

<remote_addr>: a string enclosed in double quotation marks, specifying the target IP address to be connected to, or the domain name to be resolved. The maximum value length is 255 characters.

<remote_ip>: a string with double quotation marks, specifying the target IP address to be connected to.

<remote_port>: an integer, specifying the port of the peer server to be connected to. The value ranges from 1 to 65535.

<local_port>: an integer, specifying the local sending and receiving port. The value ranges from 1 to 65535. This parameter of the execution command parameter is optional. If the user does not enter the parameters, TE will be randomly assigned to the local port number.

<username>: indicates the user name used to log in to the FTP/SMTP server. String of character type and allowed maximum character is 64.

<password>: indicates the password used to log in to the FTP/SMTP server. String of character type and allowed maximum character is 64.

<SIO_port>: an integer, specifying the link binding the physical port number. The value ranges from 0 to 10.

0: Reserved

1: UART

2: MODEM

3: PCUI

4-10: Reserved

<remote_MSS>: an integer, specifying maximum segment size in TCP protocol.

15.2.4 Examples

```
AT+IPOPEN=1, "TCP", "129.11.18.8", 10000,9000
```

```
OK
```

```
AT+IPOPEN=2, "TCP", "129.11.18.8", 10000,8000
```

```
OK
```

```
AT+IPOPEN=3, "UDP", "129.11.18.8", 7000,6000
```

```
OK
```

```
AT+IPOPEN?
```

```
+IPOPEN: 1, "TCP", 9000, "129.11.18.8", 10000,1,1460
```

^IPOPEN: 2, "TCP", 8000, "129.11.18.8", 10000,1,1460

^IPOPEN: 3, "UDP", 6000, "129.11.18.8", 7000,1,0

OK

AT^IPOPEN=1, "TCP", "www.huawei.com", 80, 3081

OK

AT^IPOPEN?

^IPOPEN: 1, "TCP", 3081, "192.168.111.147", 80,1,1440

OK

AT^IPOPEN=1,"HTTP","192.166.63.35",9001

OK

AT^IPOPEN?

^IPOPEN: 1,"HTTP",48559,"192.166.63.35",9001,1,1460

OK

AT^SSLEN=1,1 [To enable SSL]

OK

AT^IPOPEN=1,"FTPS","192.166.63.35",990,,"m2m","m2m"

OK

AT^IPOPEN?

^IPOPEN: 1,"FTPS",39132,"192.166.63.35",990,1,1460

OK

15.3 ^IPLISTEN-Enable Server Listening

15.3.1 Command Syntax

Command	Possible response(s)
^IPLISTEN=<type>,<listen_port>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

^IPLISTEN?	<CR><LF>^IPLISTEN: <type>,<listen_port>,<idle_num><CR><LF><C R><LF>OK<CR><LF>
^IPLISTEN=?	<CR><LF>^IPLISTEN: (list of supported <type>s),(list of supported <listen_port>s),(list of supported <idle_num>s)<CR><LF><CR><LF>OK<CR>< LF>

15.3.2 Description

This command enables the server listening function. After a server is started, the server can be connected to a maximum of five clients.

15.3.3 Defined Values

<type>: a string with double quotation marks, specifying the connection type.

"TCP": A TCP connection is established.

"UDP": A UDP connection is established.

"": No connection is established. The value is returned only when the read command is executed. The value cannot be returned when the test command is executed. The value cannot be used in the execution command.

<listen_port>: an integer, specifying the local listening port. The value ranges from 1 to 65535.

Note:

If server listening is not enabled, 0 is returned when the query command is executed.

<idle_num>: an integer, specifying the number of currently idle connections. The value ranges from 0 to 5.

15.3.4 Examples

```
AT^IPLISTEN?
```

```
^IPLISTEN: "",0,2
```

```
OK
```

```
AT^IPLISTEN=?
```

```
^IPLISTEN: ("TCP","UDP"),(1-65535),(0-5)
```

```
OK
```

```
AT^IPLISTEN="TCP",12000
```

```
OK
```

```
AT^IPLISTEN?
```

```
^IPLISTEN: "TCP",12000,2
```

```
OK
```

15.4 ^IPSEND-Transmit TCP/UDP Data

15.4.1 Command Syntax

Command	Possible response(s)
<code>^IPSEND=<link_id>,<data></code>	<code><CR><LF>^IPSEND:</code> <code><link_id><CR><LF><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>+CME ERROR: <err><CR><LF></code>
<code>^IPSEND=?</code>	<code><CR><LF>OK<CR><LF></code>

15.4.2 Description

This command is used to transmit subscriber data through an established connection.

During the execution command running, the command can be interrupted.

15.4.3 Defined Values

`<link_id>`: an integer, specifying the ID of an established connection. The value ranges from 1 to 5.

`<data>`: specifies subscriber data, enclosed in double quotation marks, with a maximum length of 1500 bytes.

Note:

Only the subscriber data in the form of visible characters can be transmitted. To transmit invisible characters, they must first be converted into visible ones. In addition, subscriber data cannot contain quotation marks.

15.4.4 Examples

```
AT^IPSEND=3,"ASDF"
```

```
^IPSEND: 3
```

OK

15.5 ^IPSENDEX-Send TCP/UDP Data Extension Command

15.5.1 Command Syntax

Command	Possible response(s)
<code><mode>=0,1: ^IPSENDEX=<link_id>,<mode>,<data> <mode>=2: ^IPSENDEX=<link_id>,<mode>,<len>[,<eof>]<CR>entered data</code>	<code><CR><LF>^IPSENDEX: <link_id><CR><LF><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>+CME ERROR: <err><CR><LF></code>
<code>^IPSENDEX=?</code>	<code><CR><LF>^IPSENDEX: (list of supported <link_id>s),(list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF></code>

15.5.2 Description

This command is used to transmit user data through an established connection, supporting three data transmission modes.

- The first mode is the ^IPSEND compatible mode, in which ^IPSENDEX functions as the old command ^IPSEND.
- The second mode is the forced conversion mode. In this mode, a user must convert the original data from hexadecimal data to character strings before entering them to the MT. Then the MT converts the data back to hexadecimal data before sending the data to the receiving end. The receiving end can obtain the original data without additional processing. For example, if a user wants to send four bytes of data (0x00, 0x08, 0x1B, and 0x2C), the user enters the command ^IPSENDEX=1,1,"00081B2C".
Then the receiving end receives 0x00, 0x08, 0x1B, and 0x2C.
- The third mode is the length-limited transparent transmission mode. In this mode, a user runs the command to send the data length to the MT. After the MT returns OK, the user enters the data to be sent until it reaches the length limit. For example, if a user wants to send four bytes of data, 0x00, 0x08, 0x1B, and 0x2C, the user runs the command ^IPSENDEX=1,2,4. After OK is returned, the user enters 0x00, 0x08, 0x1B, and 0x2C.

Note:

If the length of the entered data is shorter than the requested length, the MT will wait until the remaining data is entered. If the length of the entered data is longer than the requested length, it will return CME ERROR.

During the execution command running, the command can be interrupted.

15.5.3 Defined Values

<link_id>: an integer, specifying the ID of an established connection. The value ranges from 1 to 5.

<mode>:

0: ^IPSEND compatible

1: Forced conversion mode

2: Length-limited transparent transmission mode

<data>: user data, only STRING type data supported. The maximum length of the user data is 1500 bytes.

<len>: data length user request to transfer, the maximum value is the 1500 bytes.

<eof> : this parameter is used during SMTP/S post and during EMTSEND to identify the end of user data.

0: Data is pending

1: End of file or data

Note:

It is suggested that the user data be sent over a TCP link with the MSS value being the maximum length. Otherwise extra packets are generated, affecting the transmission rate. For example, if the MSS value is 1460, 1460 characters are recommended for the maximum length of <len>.

15.5.4 Examples

```
AT^IPSENDEX=1,1,"393830"
```

```
^IPSENDEX: 1
```

```
OK
```

```
AT^IPSENDEX=1,2,3
```

```
OK
```

```
input user data
```

```
^IPSENDEX: 1
```


OK
AT^IPSENDEX=1,2,1500,0
OK
input user data
^IPSENDEX: 1

OK
AT^IPSENDEX=1,2,500,1
OK
input user data
^IPSENDEX: 1

OK

15.6 ^IPDATA–Indicate the Arrival of TCP/UDP Data

15.6.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^IPDATA: <link_id>,<data_len>,<data><CR><LF>

15.6.2 Description

This command automatically reports the received data.

15.6.3 Defined Values

<link_id>: an integer, specifying the ID of an established connection. The value ranges from 1 to 5.

<data_len>: an integer, specifying the data length. The value ranges from 1 to 1500.

<data>: a string without double quotation marks, specifying the newly received data.

15.6.4 Examples

^IPDATA: 3,4,asdf

15.7 ^IPCLOSE-Disable a TCP/UDP Connection

15.7.1 Command Syntax

Command	Possible response(s)
^IPCLOSE=<link_id>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^IPCLOSE?	<CR><LF>^IPCLOSE: <link1_state>,<link2_state>,<link3_state>,<link4_state>,<link5_state><CR><LF><CR><LF>OK<CR><LF>
^IPCLOSE=?	<CR><LF>^IPCLOSE: (list of supported <link_id>s)<CR><LF><CR><LF>OK<CR><LF>

15.7.2 Description

This command disables a TCP/UDP connection or disables the TCP/UDP function.

Note:

This command will close the TCP link as soon as the AT command returns OK. In some rare contention case, when the server does not receive FIN ACK from the client, the server will remain in CLOSE_WAIT state. In that rare case, the server cannot finish TCP release on time. But the server will close the link after some time. The waiting time depends on the server's implementation.

During the execution command running, the command can be interrupted.

15.7.3 Defined Values

<link_id>: specifies the ID of a connection. The value ranges from 1 to 7.

- If <link_id> is set to 1–5, it indicates that the corresponding established connection is disconnected. To disconnect a TCP connection, four handshaking operations are needed for both parties. UDP connection can be disconnected directly.
- If <link_id> is set to 6, it indicates that the server listening function is disabled for the module.
- If <link_id> is set to 7, it indicates that the module deregisters from the network, which is similar to dial-up disconnection.

1–5: Actual connection ID

6: Established connection and the local server

7: Disable all connections and PPP

<linkx_state>: specifies the state of connection x.

0: Connection x is disabled and can be used.

1: Connection x is enabled and is being used.

15.7.4 Examples

AT^IPCLOSE?

^IPCLOSE: 1,1,0,0,0

OK

AT^IPCLOSE=1

OK

AT^IPCLOSE?

^IPCLOSE: 0,1,0,0,0

OK

15.8 ^IPENTRANS–Enable the Transparent Transmission Mode

15.8.1 Command Syntax

Command	Possible response(s)
^IPENTRANS=<link_id>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^IPENTRANS?	<CR><LF>^IPENTRANS: <link_id><CR><LF><CR><LF>OK<CR><LF> If there is no link in the transparent transmission mode: <CR><LF>OK<CR><LF>

15.8.2 Description

This command enables the TCP/UDP transparent transmission mode.

After "OK" is returned, a subscriber can continuously enter data and transmit the data to the remote TE.

If a subscriber continuously enters +++, the transparent transmission mode is disabled.

Detection +++ rules:

- The interval between the user data and +++ must be greater than 900 ms.
- The interval between two '+' can not exceed 900ms. And there are no other data input between two '+'.

Before link enters transparent transmission mode, the other links on the same physical port should be closed. Otherwise the command ^IPENTRANS will return CME ERROR.

The twelfth parameter of ^IPCFL command can set the transparent transmission mode.

MODE 0: In this mode, user can send any data, and the data will be sent to the remote TE without any treatment. The mode can be used in TCP link and UDP link.

According to fifth parameter of ^IPCFL, the module determine the packet delay. According to tenth parameter of ^IPCFL, the module determine data packet length.

Mode 0 data is sent as follows:

- Step 1: When the data length is reached "data packet length", module will send such data to the remote TE. Then the module will continue to process remaining data.
- Step 2: When the length of the remaining data does not meet the "data packet length", the module will start or reset packet delay timer.
- Step 3: If the timer times out, the remaining data will be sent to the remote TE.
- Step 4: If the packet delay timer running process, the module receives new data, then repeat step 1 to 3.

MODE 1: In this mode, the user needs to add 0x7E in the end of each packet. The module detects "0x7E" as a packet end. Then the data packet will be sent to the remote TE. This mode just be used in UDP link.

The user sends data rules: if user data contains the 0x7E, 0x7E must convert to 0x7D 0x5E, and if user data contains the 0x7D, 0x7D must convert to 0x7D 0x5D.

The user receives data rules: the 0x7D 0x5E converted to 0x7E, the 0x7D 0x5D converted to 0x7D. 0x7E identifies a UDP message end, not the actual user data.

Notes:

- This command is only supported in UART port. If the user uses this command to enter into the transparence transmission mode in other ports, it may cause some uncertain issues.
- When the module in server listen state, this command only supports the link that created by the remote client to enter the transparence transmission mode. And the link which created by the module can't enter the transparence transmission mode.
- When the module is in transparence transmission mode, a TCP connection request is coming. The module will close the TCP link after accept it. And if there are some UDP data packets received and this UDP link is not the trans link, the module will discard those packets, and close the UDP link.

15.8.3 Defined Values

<link_id>: specifies the ID of an established connection. The value ranges from 1 to 5.

15.8.4 Examples

```
AT^IPENTRANS=1
```

```
OK
```

Now, the remote end will receive any characters (excluding consecutive three +) entered by a subscriber.

15.9 ^IPSTATE-Report TCP/UDP Connection State

15.9.1 Command Syntax

URC	Possible response(s)
	<CR><LF>^IPSTATE: <link_id>,<state>,<errcode><CR><LF>

15.9.2 Description

This command is used by the module to notify the host computer of the current link information and state when the TCP/UDP link state changes.

15.9.3 Defined Values

<link_id>: TCP/UDP link ID

0: An illegal ID

1–5: ID of established links

6: Local server

7: Network connection

<state>: link state

0: Indicates that the link is closed.

1: Indicates that the link is established

2–255: Reserved

<errcode>: error information

0: Indicates that the peer end closes the link.

1: Indicates that the server receives a new link.

2: Indicates that a network error occurs.

3: Indicates that the supported link reaches the threshold.

4: Indicates that the server rejects new connections in the transparent transmission mode.

5–254: Reserved

255: No error

15.9.4 Examples

There has been a link 1 for TCP connection as client. After the TCP server close the connection, the ME will report:

^IPSTATE: 1,0,0

15.10 ^IPCFL-Set IPSTACK Static Parameters

15.10.1 Command Syntax

Command	Possible response(s)
^IPCFL=<parameter_id> ,<value>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^IPCFL?	<CR><LF>^IPCFL: <parameter_id>,<value>[<CR><LF>^IPCFL: <parameter_id>,<value>[...]]<CR><LF><CR><LF>OK< CR><LF>
^IPCFL=?	<CR><LF>^IPCFL: <parameter_id>,(list of supported <value>s),[<CR><LF>^IPCFL: <parameter_id>,(list of supported <value>s),[...]]<CR><LF><CR><LF>OK<CR><LF>

15.10.2 Description

This command is used to set some parameters of the IPSTACK. Currently, the command supports only 5, 10, 12, 13 and 14 as <parameter_id>.

The command is used to set the processing mode for FTP file data (when the value of <parameter_id> is statically set to 13, the values of the other <parameter_id>s of ^IPCFL restore to the default values).

Note:

When the query command is run, the response will not contain the unsupported items.

15.10.3 Defined Values

<parameter_id>	Value Range	Description
5	1–100 (unit: 0.1s, default value: 10)	The value of the transparent transmission timer.

<parameter_id>	Value Range	Description
7 (not supported currently)	(0–120) (unit:1min)	Sets the TCP connection inactivity time.
10	1–1472 (unit: 1Byte, default value: 1024)	The transparent transmission length Trigger.
12	0–1 (default value is 0)	The transparent transmission mode, see the command ^IPENTRANS.
13	0–1 (default value is 0)	0: The FTP file data obtained from the server is transparently reported and forwarded to the user. 1: The FTP file data obtained from the server is saved to the OBD division. This feature applies only to the OBD of the MT.
14	0–2 (default value is 0)	Sets data transmission mode. 0: Transparent transmission mode 1: Command transmission mode 2: Buffer mode

15.10.4 Examples

The value of the transparent transmission timer is set to 0.2 seconds.

AT^IPCFL=5,2

OK

15.11 ^IPFLOWQ-TCP/UDP Flow Queries

15.11.1 Command Syntax

Command	Possible response(s)
^IPFLOWQ[=<link_id>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^IPFLOWQ?	<CR><LF>^IPFLOWQ: <link1>,<TX_FROM_USER>,<TX_TO_SOCKET>,<TX_ACK_SUM>,<RX_FROM_SOCKET>,<RX_TO_USER><CR><LF>^IPFLOWQ: <link2>,<TX_FROM_USER>,<TX_TO_SOCKET>,<TX_ACK_SUM>,<RX_FROM_SOCKET>,<RX_TO_USER><CR><LF>...<CR><LF>OK<CR><LF>

^IPFLOWQ=?	<CR><LF>^IPFLOWQ: (list of supported <link_id>s)<CR><LF><CR><LF>OK<CR><LF>
------------	---

15.11.2 Description

The EXECUTION command is used to clear the specified TCP / UDP link packet statistics.

The READ command is used to query the current TCP / UDP link packet statistics.

15.11.3 Defined Values

<link_id>: specifies the ID of the link. The value ranges from 0 to 5.

0: It is used to clear the statistics for all links in the execution command.

1–5: It specifies the link need to clear the statistical data.

<TX_FROM_USER>: an integer, specifying the amount of data received from user. The maximum value is the $(2^{32}-1)$ bytes.

<TX_TO_SOCKET>: an integer, specifying the amount of data sent to socket. The maximum value is the $(2^{32}-1)$ bytes.

<TX_ACK_SUM>: an integer, specifying the amount of ACK received. The maximum value is the $(2^{32}-1)$ bytes.

<RX_FROM_SOCKET>: an integer, specifying the amount of data received from socket. The maximum value is the $(2^{32}-1)$ bytes.

<RX_TO_USER>: an integer, specifying the amount of data sent to user. The maximum value is the $(2^{32}-1)$ bytes.

15.12 ^DVCFG–Set Priority of Voice Call and Data Service

15.12.1 Command Syntax

Command	Possible response(s)
^DVCFG=<mode>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
^DVCFG?	<CR><LF>^DVCFG: <mode><CR><LF><CR><LF>OK<CR><LF>
^DVCFG=?	<CR><LF>^DVCFG: (list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

15.12.2 Description

This command sets and queries the priority of voice call and data service.

15.12.3 Defined Values

<mode>:

0: voice call prefer (default value)

In this state, an incoming voice call will suspend the data transmission. If data service is not in transparent transmission mode, all ports (PCUI port, MODEM port, and UART port) will report RING message. If data service is in transparent transmission mode, all ports will report RING message except the port which is processing data service, and the RING pin is dredged. The data transmission will keep on going after stopping the voice call. But there is one risk that the transmitted data maybe loss during the process of voice call, only the last packet(less than 1600 byte) can be sent successfully.

1: data service prefer

In this state, when the TE performs IP Stack asynchronous command or is in the transparent transmission mode, an incoming voice call will be hung up by the module automatically.

In this state, the TE can originate a voice call. And a new incoming voice call during the call will not be hung up automatically.

To change the priority of voice call and data service by using AT^DVCFG=0 command, or using command AT^IPCLOSE=7 to close IPSTACK, which can return back to answer the voice call when it coming.

15.13 AT^IPRCV-Read Network Service Data

15.13.1 Command Syntax

Command	Possible Response
^IPRCV=<link_id>,<reqReceiveLength>	<p>When the buffer contains data:</p> <p><CR><LF>^IPRCV: <link_id>,<reqReceiveLength><CR><LF>.....(returns reads data) <CR><LF><CR><LF>OK<CR><LF></p> <p>When the buffer contains no data or the length of the read data is 0:</p> <p><CR><LF>^IPRCV: <link_id>,<reqReceiveLength><CR><LF><CR><LF>OK<CR><LF></p> <p>In case of an error during command execution:</p> <p><CR><LF>ERROR<CR><LF></p> <p>In case of an error related to the MT:</p> <p><CR><LF>+CME ERROR: <err><CR><LF></p>

<code>^IPRCV=?</code>	In case of available command: <CR><LF>OK<CR><LF> In case of unavailable command: <CR><LF>ERROR<CR><LF> In case of an error related to the MT: <CR><LF>+CME ERROR: <err><CR><LF>
-----------------------	--

15.13.2 Description

This command reads data out from the service buffer.

15.13.3 Defined Values

<link_id>: link number.

1–5: The expression has established link number.

<reqReceiveLength>: integer; indicates the data length requested from the buffer.

0: Peek Operator, which queries the number of bytes received by the internal buffer.

1–1500: Number of data bytes read by the Internet service whose <link_id> is specified.

15.13.4 Examples

Read data from the service buffer.

Precondition: The data service connection has been established and successfully enabled; there is data in the buffer.

AT^IPRCV=1,25

^IPRCV: 1,25

Message of MU509 is here.

OK

15.14 ^IPRCV-Report Unsolicitedly Data Arrival in Data Receive Buffer

15.14.1 Command Syntax

URC	Possible responses
	<CR><LF>^IPRCV: <link_id>,<urcCauseid><CR><LF>

15.14.2 Description

The ^IPRCV command (URC command) notifies unsolicited reports to the user by indicating the data arrival in data receive buffer.

15.14.3 Defined Values

<link_id>: link number, the value ranges from 1 to 5.

<urcCauseid>: indicates whether there is data to be read.

1: indicates that data is available and can be read by sending the AT^IPRCV command.

15.14.4 Examples

^IPRCV: 1,1

Note:

If the buffer is not read or queried by the ^IPRCV command when data is available, no report will be submitted to the upper layer when new data arrives.

15.15 ^IPSRVST-Report the Socket Service State

15.15.1 Command Syntax

URC	Possible response
	<CR><LF>^IPSRVST: <link_id>,<state_type>,<state_code><CR><LF>

15.15.2 Description

This command is used to report the current service operating state of the socket when the socket service state changes. The service operating state can be the user operating state or data transmission state.

15.15.3 Defined Values

<link_id>: indicates the link ID of the socket service. The value ranges from 1 to 5.

<state_type>: specifies the type of the state to report.

0-9: reserved.

10: FTP service, indicates the user operating state.

11: FTP service, indicates the data transmission state.

12: HTTP service event.

13: SMTP service, indicates User operation state.

14: SMTP Service, indicates the data transmission state.

15-255: Reserved.

<state_code>: indicates the state information.

<state_type>	<state_code>	Meaning
15-255	Reserved	Reserved
10	100	The server does not respond.
	110	Restart the marker reply.
	120	Get prepared in n minutes.
	125	The connection is open. Prepare to transmit data.
	150	Open data connection.
	200	The command succeeds.
	202	The command fails.
	211	System status
	212	Directory status
	213	File status
	214	Help information
	215	Name system type
	220	The new user service is ready.
	221	Close the control connection of a specified service. The user can log out.
	225	The data connection is open, and no transmission is in process.
	226	Close the data connection. The requested file operation succeeds.
	227	Enter the passive mode.
	230	User login
	250	The requested file operation is completed.
	257	Create "PATHNAME".
	331	The user name is correct and a password is required.
	332	Require account information for login.
	350	Next step command

<state_type>	<state_code>	Meaning
	421	Services cannot be provided. Close the control connection.
	425	Failed to open the data connection.
	426	Close the connection and terminate the transmission.
	450	The requested file operation is not executed.
	451	Terminate the requested operation: a local error occurs.
	452	The requested operation is not executed: insufficient system storage space.
	500	The command is unable to identify because of incorrect format.
	501	Syntax error
	502	Command not executed
	503	Command sequence error
	504	The command specifying the parameter is not executed.
	530	Users do not log in.
	532	Account information is required for file storage.
	550	The requested operation is not executed.
	551	The requested operation is terminated: unknown page type.
	552	The requested file operation is terminated: storage space exceeded.
	553	The requested operation is not executed: invalid file name.
	600	Unknown error
11	0	Data transmission defeat
	1	The data transmission completes
12	200	Operation successful
	301	Moved permanently
	302	Moved temporarily
	400	Bad request
	401	Requested action requires authorisation
	403	Forbidden

<state_type>	<state_code>	Meaning
	404	Resource not found
	405	Method not allowed on resource
	406	Requested representation not accepted
	408	Request timedout
	410	Requested source is no longer available server.
	500	Internal server error
	501	Requested HTTP operation not supported.
	505	HTTP version not supported
	998	Bad response Headers
13	235	Authentication Successful
	334	Wait for user information
	421	Service not available
	450	Requested mail command failed
	451	Command has been aborted due to server error.
	500	The server could not recognize the command due to syntax error.
	502	Command is not implemented
	535	Authentication Fail
	551	Recepent is not local to server.
	552	Exceeded storage allocation
	553	Mailbox name is invalid.
14	250	Server has transmitted message.
	354	State Mail input end <CR><LF>.<CR><LF>
	500	Unrecognized command
	550	Mail box unavailable
	554	SMTP Transaction failed
	503	Bad sequence of commands

15.15.4 Examples

- FTP user registers successfully:
AT^IPOPEN=1,"FTP","172.22.44.4",21,"loader","loader"

OK

^IPSRVST: 1,10,230

- FTP data transmission is successful:

AT^FTPCMD=1,GET,"test.txt"

CONNECT

<file content>

OK

^IPSRVST: 1,11,1

- HTTP download is successful:

AT^HTTPCMD=1,GET,"http://www.baidu.com:80/index.html"

CONNECT

<Server response>

OK

^IPSRVST: 1,12,200

- SMTP Login is successful:

AT^IPOPEN=4,"SMTPS","192.166.63.35",567,,"m2mtest@m2m.huawei.com","M2mhuawei"

OK

^IPSRVST: 4,13,235

16 FTP(S) Commands

16.1 ^FTPCMD–Create File Transfer Service Command

16.1.1 Command Syntax

Command	Possible Response
^FTPCMD=<link_id>,<ftp_cmd>[,<filename>[,<data_offset>]]	<p>In the case of successful execution of "PASV","PORT": <CR><LF>OK<CR><LF></p> <p>In the case of successful execution of "FILESIZE": <CR><LF>^FTPCMD: "FILESIZE",<File_length><CR><LF><CR><LF>OK<CR><LF></p> <p>In the case of successful execution of "GET","PUT": Transparent mode of transmission, returns <CR><LF>CONNECT<CR><LF><file content><CR><LF><CR><LF>OK<CR><LF> Command mode of transmission, returns <CR><LF>OK<CR><LF></p> <p>In case of any error: <CR><LF>ERROR<CR><LF> Or <CR><LF>CONNECT<CR><LF><file content><CR><LF><CR><LF>ERROR<CR><LF></p>
^FTPCMD=?	<CR><LF>^FTPCMD: (list of supported <link_id>s),(list of supported <ftp_cmd>s)<CR><LF><CR><LF>OK<CR><LF>

16.1.2 Description

Once the FTP/FTPS connection is successfully established, this command is used to download/upload data from and to the specified FTP server. During transparent data

transmission, the ME enters the transparent transmission mode and does not respond to any AT command. Once the data is downloaded, the ME quits the transparent transmission mode; once data is uploaded, the user must manually enter +++ to enable the ME to quit the transparent transmission mode.

16.1.3 Defined Values

<link_id>: indicates the link ID of the socket service. The value ranges from 1 to 5.

<data_offset>: offset of a data file (this parameter must be smaller than the file length; unit: byte). For a 1000 byte file, if downloaded 600 bytes, offset should be 600.

<File_length>: length of the file you need to query; the maximum length is $2^{32}-1$ (unit: byte).

<ftp_cmd>: indicates the type of the FTP service. The value is a character string without quotation marks ("").

GET: Downloads data using FTP.

PUT: Uploads data using FTP.

PASV: Establishes data connection in PASV mode (default value).

PORT: Establishes data connection in PORT mode.

FILESIZE: Gets the filesize of the file to be downloaded.

<filename>: indicates the name of the file downloaded/uploaded using FTP. The value is a string with a maximum of 256 characters and cannot contain any of the following characters:

"|", "*", "<", ">", "\"", "?"

Notes:

- AT^FTPCMD needs to be executed only after IOPEN, using the <link_id> that was opened.
- When setting data connection establishment pattern, i.e. when <ftp_cmd> is PORT or PASV, the <filename> parameter is not required.

16.1.4 Examples

- Configure the connection mode for downloading data.
AT^FTPCMD=1,PORT
OK
- Download the file test.txt. The content of the file is "ftp test!".
AT^FTPCMD=1,GET,"test.txt"
CONNECT
ftp test!

OK
- Query the range of the parameters supported by AT^FTPCMD.

AT^FTPCMD=?
^FTPCMD: (1-5),("GET","PUT","PORT","PASV","FILESIZE")

OK

- FTP Pause and Resume:
AT^FTPCMD=0,FILESIZE,"ftp_download.txt"
^FTPCMD: "FILESIZE",16

OK

AT^FTPCMD=0,GET,"ftp_download.txt",0,6
CONNECT
I like

OK

- In the FTP COMMAND MODE Transmission:
AT^IPCFL=14,1
OK
AT^FTPCMD=1,GET,"ftp_download.txt"
OK

^IPDATA: 1,1500,ABC...

^IPDATA: 1,1500,ABC..

^IPSRVST: 1,11,1

- FTP Command Mode-GET buffer:
AT^IPCFL=14,2
OK
AT^FTPCMD=1,GET,"ftp_download.txt"
OK //Data received will be stored in buffer. It can be read using
AT^IPRCV//

^IPRCV: 1,1

AT^IPRCV=1,1500

^IPRCV: 1,1500

<Content of file -1500 characters>

OK

^IPSRVST: 1,11,1



Note :

To use FTPS, please find the configuration in AT+IPOPEN.

17 HTTP(S) Commands

17.1 ^HTTPCMD-Data Services Command

17.1.1 Command Syntax

Command	Possible responses
<code>^HTTPCMD=<http_linkID>,<operation>,<http_data_path>[,<http_data_length>[,http_data_type]]</code>	<p>In case of successful execution:</p> <p>Transparent mode of transmission, returns <CR><LF>CONNECT<CR><LF><http data content><CR><LF><CR><LF>OK<CR><LF></p> <p>Command mode of transmission, returns <CR><LF>OK<CR><LF></p> <p>In case of error: <CR><LF>ERROR<CR><LF></p> <p>Or <CR><LF>CONNECT<CR><LF><http data content><CR><LF><CR><LF>ERROR<CR><LF></p>
<code>AT^HTTPCMD=?</code>	<p>In the case of successful execution: <CR><LF>^HTTPCMD: (list of supported <http_linkID>s),(list of supported <operation>s)<CR><LF><CR><LF>OK<CR><LF></p> <p>In the case of an error during command execution: <CR><LF>ERROR<CR><LF></p>

17.1.2 Description

After the HTTP service connection establishes successfully, this AT command uses the HTTP agreement to carry on the data transfer, download (GET) and upload (POST).

17.1.3 Defined Values

<http_linkID>: HTTP link number, the value ranges from 1 to 5.

<operation>: the string of character type, indicates the HTTP service type.

GET: HTTP GET request

POST: HTTP POST request

<http_data_path>: the string of character type, (Uniform Resource Locator) unifies the resources identifier by URL to be composed. The form is as follows. <way> has a limitation of 255 bytes.

<agreement>://<main engine>:<port >/<way>

<http_data_length>: total data length to be uploaded, used during HTTP POST.

<http_data_type>: POST data the type, if user has not input this parameter, and then the default is "text/plain" the type. Maximum length is 256 bytes.

Note:

When AT^HTTPCMD is used to download/GET file, users need not enter the parameters <http_data_length> and <http_data_type>.

17.1.4 Examples

- AT^HTTPCMD=?
^HTTPCMD: (1–5),("GET","POST")

OK
- AT^IPOPEN=1,"HTTP","news.yahoo.com",80
OK
AT^HTTPCMD=1,GET,"http://news.yahoo.com:80/bombings-rock-egyptian-capital-killing-5-people-094759738.html"
CONNECT
<file Content>

OK

^IPSRVST: 1,12,200
- AT^IPOPEN=1,"HTTP","www.baidu.com",80
OK
AT^HTTPCMD =1,POST,"http://www.baidu.com:80/index.html",3500,"text/plain"
CONNECT
<User enter 3500 characters>
<Server Response>

OK

^IPSRVST: 1, 12,200

Command Mode

- AT^IPCFL=14,1

OK

AT^HTTPCMD=1,GET,"http://news.yahoo.com:80/bombings-rock-egyptian-capital-killing-5-people-094759738.html"

OK

^IPDATA: 1,1500,ABC...

^IPDATA: 1,1500,ABC..

^IPSRVST: 1,12,200

- AT^IPCFL=14,1

OK

AT^HTTPCMD=1,POST,"http://www.baidu.com:80/index.html",1000,"text/plain"

OK

AT^IPSENDEX=1,2,1000

OK

<User enter 1000 characters>

^IPSENDEX: 1

OK

^IPDATA: 1,100,ABC...

^IPSRVST: 1,12,200

Command Mode- Get Buffer

- AT^IPCFL=14,2

OK

AT^IPOPEN=1,"HTTPS","news.google.com",443

OK

AT^HTTPCMD=1,GET,"https://news.google.com:443/nwshp?hl=en&tab=wn"

OK

^IPSRVST: 1,12,200

^IPRCV: 1,1 //Stored data received in data buffer, it can be read using AT^IPRCV.
//

AT^IPRCV=1,1500

^IPRCV: 1,1500

<Content of file -1500 characters>

OK

AT^HTTPCMD=1,POST,"http://www.baidu.com:80/index.html",3500,"text/plain"

OK

AT^IPSENDEX=1,2,1500

OK

<User enter 1500 characters>

^IPSENDEX: 1

OK

AT^IPSENDEX=1,2,1500

OK

<User enter 1500 characters>

^IPSENDEX: 1

OK

AT^IPSEND EX=1,2,500

OK

<User enter 500 characters>

^IPSENDEX: 1

OK

^IPSRVST: 1,12,200

^IPRCV: 1,1 //Stored data received in data buffer, it can be read using AT^IPRCV.
//

AT^IPRCV=1,1500

^IPRCV: 1,1500

<Content of file -1500 characters>

OK

Note:

Users can also use AT^IPSEND in command mode to send data.

AT^IPSEND=1,"agddhmwdgwcfcjgjdgcjsjsjsdfg"

OK



Note:

To use HTTPS, please find the configuration in AT+IPOPEN.

18 SMTP(S) Commands

18.1 ^EMSEND-Send Emails

18.1.1 Command Syntax

Command	Possible Responses
<code>^EMSEND=<link_id>,<ds_addr>[,<subj>][,<charset>][,<attachment>[,<file_name>]]<CR></code> email text is entered<CTRL-Z/Esc>	In case of success: <CR><LF>OK<CR><LF> If case of error: <CR><LF>ERROR<CR><LF>

18.1.2 Description

This command is used to set the target email address, email subject, content encoding method, whether to attach files to the email, and the attachment format and name.

Sending email through secure or non-secure environment is dependent on the protocol type selection during AT+IPOPEN command.

Body of mail is sent in DATA mode terminated by <CTRL-Z>.

18.1.3 Defined Values

<link_id>: the link number, the value ranges from 1 to 5.

<ds_addr>: this is destination email address and it must have the domain name also along with username. The maximum length is 255 bytes.

<subj>: a string that specifies the email subject. The maximum length is 128 bytes

<charset>: a string that specifies the content encoding method (default: UTF-8). The maximum length is 16 bytes.

<attachment>: a number that specifies whether to attach a file to the email.

0: Without attachment (default value)

1: With attachment, encoding method: 7Bit

2: With attachment, encoding method: Base 64

<file_name>: a string that specifies the file name. The maximum length is 64 bytes.

Note:

If the email has attachment, use AT^IPSENDEX to send the attachment after the email content is sent and OK is returned.

Use <eodFlag> of IPSENDEX to mark the last data packet of the attachment.

If the email does not have any attachment, the attachment name should not be entered. If the email has an attachment, the attachment name cannot be left blank.

The email subject and attachment only supports ASCII characters.

18.1.4 Examples

Example1: without attachment

```
AT^EMSEND=1,"m2mtest@m2m.huawei.com","this is a test mail","utf-8",0
```

```
>Test mail without attachment<Ctrl-Z>
```

OK

Example 2: with attachment

```
AT^EMSEND=1,"m2mtest@m2m.huawei.com","testwithattachment","utf-8",2,"test.txt"
```

```
>Test mail with attachment <Ctrl-Z>
```

OK

```
AT^IPSENDEX=1,2,16,1
```

OK

<The user enters 16 characters here.>

```
^IPSENDEX: 1
```

OK

Note:

To use SMTPS, please find the configuration in AT^IPOPEN.

19

SSL Commands

19.1 ^SSLEN-Enable or Disable SSL

19.1.1 Command Syntax

Command	Possible Responses
^SSLEN=<SSL_id>,<Enable> [,<encode_ok>]	<CR><LF>OK<CR><LF> If any error: <CR><LF>+CME ERROR: <err><CR><LF>
^SSLEN?	<CR><LF>^SSLEN: <SSL_id>,<Enable>,<encode_ok>,<Target_IP_ad dr><CR><LF><CR><LF>OK<CR><LF>
^SSLEN=?	<CR><LF>^SSLEN: (list of supported <SSL_id>s),(list of supported enable status flag <Enable>s),(list of supported text encode mode <encode_ok>s)<CR><LF><CR><LF>OK<CR><L F>

19.1.2 Description

This command is used to enable/disable a secure/normal socket.

The READ command is used to obtain the current values for SSLEN parameters and the target IP address.

TheTEST command is used to obtain the SSL Enabled command capabilities.

Notes:

- AT^SSLEN command would also automatically load the existing certificates stored in file system when it is in proper PEM format. But it will not show any error while loading during SSLEN when the certificate is not in proper format.
- Only first 10 certificates will be loaded for CA certificates. If more than one client certificates are available in the file system, then users need to load the corresponding certificate by using AT^SSLMNG command with the <action> as 2 (read/load data) to succeed the hand shake during socket open.
- Worst case the time taken to enable the socket is 120 seconds. This will happen if signal strength is weak. It will keep on retrying for 4 times, i.e. 30 seconds timeout for each retry. After completing 4 trials or after timeout of 120 seconds socket will not get enabled.
- When PDP is deactivated from other module (e.g. using AT+CGACT=0), SSL will be disabled.

19.1.3 Defined Values

<SSL_id>: SSL socket ID.

0: Normal socket connection

1: Secure socket connection

<Enable>: enable flag.

0: Disable socket

1: Enable socket

<encode_ok>: encode type for SSLRX and SSLTX commands (optional, it will take the value as 1 by default).

0: No encoded (ASCII format) data shall be taken by AT command for SSLTX and plain data shall be displayed for SSLRX.

1: Base 64 encoded format data shall be taken by AT command for SSLTX and Base 64 encoded format data shall be displayed for SSLRX.

<Target_IP_addr>: when socket is enabled, an IP address will be allocated to the target. When socket is disabled or after board boot up ip address will be "0.0.0.0".

19.1.4 Examples

Preconditions: Target should have network connection and APN should be configured. Target should support wireless network connection.

Example 1: Socket is enabled.

```
AT^SSLEN=1,1,1
```

OK

Example 2: Socket is disabled.

```
AT^SSLEN=1,0
```

OK

Example 3: When socket is enabled:

```
AT^SSLEN?
```

^SSLEN: 1,1,1,"192.167.200.1"

OK

Examples for Abnormal Cases:

Example 1: Without enabling a socket, if the socket is disabled:

AT^SSLEN=1,0

+CME ERROR: Socket not enabled

Example 2: If the socket is enabled again (without disabling the previously enabled socket):

AT^SSLEN=1,1

+CME ERROR: Socket already enabled

Example 3: If a secure socket is enabled by AT^SSLEN=1,1 and the normal socket is disabled:

AT^SSLEN=0,0

+CME ERROR: Invalid Operation

Example 4: If any one of the input parameter is out of range, assume SSL Id is 2.

AT^SSLEN=2,1

+CME ERROR: Invalid arguments

Example 5: If the socket is enabled when there is no network.

AT^SSLEN=1,1

+CME ERROR: Socket not enabled

19.2 ^SSLCFG-SSL Configuration Command

19.2.1 Command Syntax

Command	Possible Responses
^SSLCFG=<SSL_id>,<TimeOut>[,<ciphers_suit>,<scur_level>]	<CR><LF>OK<CR><LF> If any error: <CR><LF>+CME ERROR: <err><CR><LF>
^SSLCFG?	<CR><LF>^SSLCFG: <SSL_id>,<TimeOut>,<ciphers_suit>,<scur_level><CR><LF><CR><LF>OK<CR><LF>

Command	Possible Responses
^SSLCFG=?	<CR><LF>^SSLCFG: (list of supported <SSL_id>s),(list of supported timeout range <Timeout>s),(list of supported <ciphers_suit>s),(list of supported <scur_level>s)<CR><LF><CR><LF>OK<CR><LF>

19.2.2 Description

This command is used to configure the properties of a secure socket.

The READ command is used to obtain the current values for AT^SSLCFG parameters. After device reset or before any SSL configure operation, the default values of AT^SSLCFG parameters will be shown.

Parameters	Default Values	Range
<ciphers_suit>	0	0 to 15
<scur_level>	0	0 to 2

The TEST command is used to get the SSL configuration command capabilities.

19.2.3 Defined Values

<SSL_id>: SSL socket ID.

1: Secure socket connection

<Timeout>: maximum blocking timeout in seconds for Rx and Tx operations.

<ciphers_suit>: all the available cipher suites supported by SSL are proposed to the server. It is responsibility of the remote server to select one of them. When all the available cipher suites supported by ssl are proposed to the server, the value of the <ciphers_suit> is 0.

The table below is the supported Cipher Suite List (**Currently Supported 15 Cipher Suites**):

Value	Cipher_suites
0	All supported Ciphers
1	TLS_RSA_WITH_RC4_128_SHA
2	TLS_RSA_WITH_RC4_128_MD5
3	TLS_RSA_WITH_NULL_SHA
4	TLS_RSA_WITH_NULL_SHA256
5	TLS_RSA_WITH_AES_256_CBC_SHA

Value	Cipher_suites
6	TLS_RSA_WITH_AES_128_CBC_SHA
7	TLS_RSA_WITH_AES_128_CBC_SHA256
8	TLS_RSA_WITH_AES_256_CBC_SHA256
9	TLS_RSA_WITH_3DES_EDE_CBC_SHA
10	TLS_DHE_RSA_WITH_AES_256_CBC_SHA
11	TLS_DHE_RSA_WITH_AES_128_CBC_SHA
12	TLS_DHE_RSA_WITH_AES_128_CBC_SHA256
13	TLS_DHE_RSA_WITH_AES_256_CBC_SHA256
14	SSL_RSA_WITH_RC4_128_SHA
15	SSL_RSA_WITH_RC4_128_MD5

It is optional one, it will take 0 by default which means client will send all the supported algorithms and server will select one among them.

<scur_level>: authentication mode (Optional, it will take the value as 0 by default).

0: Not authorized

1: Server side authentication.

2: Server & client both sides are authorized

Note:

We can ignore any of the optional parameters by giving only comma ",". In this case, it will take the default values for the corresponding optional parameters.

19.2.4 Examples

Preconditions: The secure socket is enabled by using AT^SSLEN command.

Example:

```
AT^SSLCFG=1,60,1,1
```

OK

Examples for Abnormal Cases:

Example 1: Without that secure socket is enabled (AT^SSLEN), if AT^SSLCFG command is run:

```
AT^SSLCFG=1,60,1,1
```

+CME ERROR: Invalid Operation

Example 2: If any one of the input parameter is out of range, assume SSL ID is 2.

AT^SSLCFG=2,60,1,1

+CME ERROR: Invalid arguments

Example 3: If run the AT^SSLCFG command after socket is open:

AT^SSLCFG=1,60,1,1

+CME ERROR: Invalid Operation

Examples for without optional parameter Cases:

Example 1: Ignore only <ciphers_suit>:

AT^SSLCFG=1,60,1

OK

Example 2: Ignore only <scur_level>:

AT^SSLCFG=1,60,1

OK

Example 3: Ignore <ciphers_suit> and <scur_level>:

AT^SSLCFG=1,60

OK

19.3 ^SSLMNG-Manage Certificate or Key

19.3.1 Command Syntax

Command	Possible response(s)
^SSLMNG=<SSL_id>,<data_type>,<action>,<file_name>,[<package_id>,<total_no_of_packages>,<cert_info>],[<password>]	<CR><LF>OK<CR><LF> If any error: <CR><LF>+CME ERROR: <err><CR><LF>
^SSLMNG?	<CR><LF>^SSLMNG: <CR><LF>[<type>,<file_name>[...]<CR><LF>][<data_type>,<action>,<file_name>,<package_id>,<total_no_of_packages><CR><LF>]<CR><LF>OK<CR><LF> If no certificate is present: <CR><LF>OK<CR><LF>
^SSLMNG=?	<CR><LF>^SSLMNG: (list of supported <SSL_id>s),(list of supported <data_type>s),(list of supported <action>s),,(list of supported <package_id>s),(list of supported <total_no_of_packages>s),,<CR><LF><CR><LF>OK<CR><LF>

19.3.2 Description

This command is used to manage certificates and other security data like private key.

Brief information about AT^SSLMNG command:

- Certificates must be in PEM format.
- For large size of certificate (greater than 1024 bytes), we have to break the certificate data into packages and maximum size of each package is 1024 bytes.
- Each package should have the unique identification number (1–10).
- We are supported upto 10 KB (10 * 1024) size.
- We can give the packages by any order in AT^SSLMNG command

Example:

```
AT^SSLMNG=1,1,0,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVkJFURSBLR  
VktLS0tLQo="
```

OK

```
AT^SSLMNG=1,1,0,"ca_cert2.pem",1,2,"SHVhd2VpIFRIY2hub2xvZ2llcyBJbmRp  
YSBQcmI2YXRlbGltaXRIZC4s"
```

OK

- After giving all the packages, the SSLMNG will integrate all the packages and do the Base64 decoding and finally store/delete/load the file into/from file system.
- If we face any error in any one of the package, then all previously received packages will be cleared.
- If we start to execute any of the SSLMNG operation with multiple packages, before completing that operation (before giving all the packages), we cannot execute any other operation in SSLMNG.

The READ command is used to obtain the name of files (certificates) stored in file system. When the module is poweroff and reset the last operation of SSLMNG will not be saved. When the certificate is not completely stored, the return of AT^SSLMNG? will not contain the file name of certificate and key.

The TEST command is used to obtain the SSL Manage command capability.

Note:

Only the following encryption types are supported for password protected encrypted certificates:

1. DES-CBC
2. DES-EDE3-CBC
3. AES-128-CBC
4. AES-192-CBC
5. AES-256-CBC

19.3.3 Defined Values

<SSL_id>: SSL socket ID.

1: Secure socket connection

<data_type>: identifies the certificate/key to be stored.

0: Certificate of the client (module). It is needed when the Server/Client authentication mode has been configured.

1: CA certificate of the remote server, it is used to authenticate the remote server. It is needed when <scur_level> parameter of AT^SSLCFG command is set to 1 or 2.

2: RSA private key of the client (module). It is needed if the Server/Client authentication mode has been configured.

<action>:

0: Store certificate

1: Delete certificate

2: Load certificate

<file_name>: the file name for "". The maximum length of the file name is 255.

<package_id>: package identification number (1–10).

<total_no_of_packages>: total number of packages after splitting the Base 64 encoded format certificate data of each package of size maximum of 1024 bytes (1–10).

<cert_info>: string type, broken certificate package (converted into Base 64 encoded format before splitting the package) data (1-1024 bytes). As we are decoding the certificates only after the last package is received, the length of every broken package need not be multiple of 4.

<password>: string type, password for Private Key (1-79 bytes) -plain text.

Notes:

- <package_id>, <total_no_of_packages> and <cert_info> are optional if <action> is 1 or 2.
- <password> is applicable only if <action> is 2 and when loading the private key with password
- It is not required to give the password in every package, but the last package must contain the correct password.

<list_of_file_names>: the name of the files stored in file system.

Notes:

- On "Delete" action, currently we are deleting certificate from file system only. To delete from SSL library context, socket needs to be disabled and re-enabled again.
- If more than one client and key certificates are available in the file system, then users need to load the corresponding certificate by using AT^SSLMNG command with the <action> as 2 (read data) to succeed the hand shake during socket open.
- AT^SSLMNG for action 0 (store data) can store a maximum of 10 certificates (10 each for ca-cert, client cert and client key) in file system beyond which it would display error "Certificate maximum limit reached".
- AT^SSLMNG for action 2 (read data) can load a maximum of 10 certificates from buffer/file system during a particular session beyond which it would display error "Certificate maximum limit reached".
- AT^SSLMNG query command would display first 10 certificates stored in file system for each type (CA, Client, Private Key) of certificates.
- Usage of <password> parameter is applicable in case of "Load" of "Private Key" during client authentication and it is required to set the password if the private key is encrypted. So this password parameter is an optional parameter.

19.3.4 Examples

Preconditions: The socket is enabled by using AT^SSLEN command.

Example 1: Certificate store case

(<package_id>, <total_no_of_packages>, <cert_info> are mandatory).

```
AT^SSLMNG=1,1,0,"ca_cert1.pem",1,3,"LS0tLS1CRUdJTiBSU0EgUFJJVkFURSBLRVktLS0tLQpNSUIfcEFJQkFBS0NBUEVbd3dQUksvNDVwREpGTzFQSWWhDc3FmSFNhdmFvcVFNZGxkVkc2dWp0QzZzWHZHCncwU2UxSUZJL1Mxb29vdG51NkYxeURZc1N0SWI5NHU2enczNTcrehnnUjU3bXdOSG1yOWx6SDIsSkdtbTZCU0oKVytRMDk4V3dGSIAxWjNzNmVuamhBVlpxa2FZVFFvM1NQRUNjVE8vUmh0ODNVU nNNb1R2MThhTktOZVRoenBiZgpHMzYyVHBMUUVPaW9DRENCcnlBTFF4VEZkR2UwTW9KdmpZYkNpRUNaTm9PNkhrQnlJaGZYVW1Va2M3RE83eG5OCnJ2OTRiSHZBRWdQVVRuSU5VrzA3b3p1am1WNmR5TmtNaGJQWml0bFVKdHR0K3F5Ny95Vk14TkY1OUhIVGhrQVvkKRTdCanRYSk9NTVNYaElZdFZpL1hGZmQvd0s3MS9GdmwrNkc2MHdJREFRQUJBb0lCQVFDaTV0aGZFSEZrQ0o0dQpiZEZ0SG9YU0NyR01SODRzVVdxZ0VwNVQzcEZNSFcZcVdYdnlkNnJaeHRtS3E5amhGdVJqSnYrMWJCTlp1T09sCnllSVhMZ3lmYitWWIAzWnZTYkVSD2xvdUZpa04zcmVPM0VEVm91N2dIcUgwdnBmYmhtT1dGTTJZQ1dBdE1IYWWMKUE0zbWIPNUhrcbmtMV2dEaVhsOFJmSDM1Q0xjZ0Jva3FYZjBBcXIMaDhMTzhKS2xISmc0ZkFDMytJWnBUVzIzVApLNnVvZ21oRE50ajJMOFlpL0xWQlhRMHpZT3FrZlg3b1MxV1JWdE5jVjQ4ZmxCY3ZxdDdwbnFqMHo0cE1qcURRciZuT3l6MctHeFdrODh5UWdpMXIXRFBwckVqdWFaOEhmeHBheXBkV1NEWnNKUW1na0VFWFVVT1FYt1VqUU5ZdVUKYlJIZWo4cFpBb0dCQU9va3AvbHBN"
```

OK

```
AT^SSLMNG=1,1,0,"ca_cert1.pem",2,3,"K2x4M0ZKOWIDRW9MMG5ldW5JvzZjeEhlb2dObEzIRVdCWtZnYkEv3MrBQpiQjZ3QmlrQWorZDNkcXpieXNmWlhwcy9KcEJTcnZ3NGtBQVV1N1FQV0pUbkwycCtIRTICSWRRcFdSOU9paHFOCnAxZHNJdGpsOUg0eXBoRExaS1ZWQTRlbUp3V013OWUySjdKTnVqRGFSNDIVMHoyTGhJMIvTRmIsQW9HQkFOVTQKRzhPUHhaTU1Sd3R2TlPmRnNJMUd5SkIZai9XQUN2ZnZvZjZBdWJVcXVzb1IzRjJsQjIvDVGpkaWNCQnpVWW82bQpKb0VCLZg2S0tTTBOVUNxYlIEZWITTnFWMDJlYnEyVFRsYVFDmJkYzRzTXJpYzZkZ3cXNWc2VHZHNSRktjCk4yZHNMZSs3cjkrbWtEekVSOCtObHA2WXFiU2Z4YvpRM0xQdysUVhBb0dBWG9NSllyMjZmS0svUW5UMWZCeiMKYWNrRURZVitQajBrXNNWWUvTXA4MThPZG14W"
```

```
mRIUkJoR21kTXZQTklxdXdOYnBLc2p6bDJWaTJZazlkM3VXZQpDc3Buc2l6M25yT
nJDbHQ1WmV4dWtVNINJUGI4L0JidDAzWU00dXgvc21rVGEzZ09Xa1prdEY2M0ph
QmFkVHBMCjc4YzhQdmY5SnJnZ3hKa0ttbk8rd3hrQ2dZRUF1a1NURkt3MedUdGZr
V0NzOTdUV2dRVtJVVvk05NkdYY3J5N2MKWVQ3SmZiaC9oL0E3bXdPQ0tUZk9jaz
RSMWJIQkRBZWdtWkZLaGvc2VjL3hPYlhwaGV4aTk5cDI2R1JOSWp3Two4dFpSO
VImWW1jQVJJRjBQS2YxYjRxN1pITmtoVm0zOGhOQmY3UkFWSEJnaDU4UTITO
WZRbm1xVnp5TepBM3VICjQyQUlvQzhDZ1IBUjBFdIBHMmU1bnhCMVl0Wmxyakh
DeGpDc1dRWIEyUSsxY0FiMzhOUeIZbnlvMm03MklUL1QKZjEvcWlxcy8y"
```

OK

```
AT^SSLMNG=1,1,0,"ca_cert1.pem",3,3,"U3BIODFIU3dqQTM0eTJqZFEwZVRTRTAx
VmR3WeltL2N1eEtibWpWelJoME0wNk1Pa1dQNXBaQQo2MIA1R1IZNIVkMkpTN0R
6K1o5ZEtkVTR2aldyeWx6bmsxTTBvVVZkRXpsbFFrYWhuODMxdnc9PqotLS0tLUV
ORCBSU0EgUFJJVkfURSBLRVktLS0tLQo="
```

OK

Example 2: Certificate delete case (<file_name> is mandatory and [<package_id>,<total_no_of_packages>,<cert_info>] are optional for delete case)

```
AT^SSLMNG=1,1,1,"ca_cert1.pem"
```

OK

Note:

In this example, buffer is not passed. So we delete the certificate using the file name passed from File System if present, else display Error.

Example 3: Certificate delete case (<file_name> is mandatory and [<package_id>,<total_no_of_packages>,<cert_info>] are optional for delete case)

```
AT^SSLMNG=1,1,1,"ca_cert2.pem",1,2,"SHVhd2VpIFRIY2hub2xvZ2llcyBJbmRpYSB
Qcm12YXRlbGltaXRIZC4s"
```

OK

```
AT^SSLMNG=1,1,1,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVkfURSBLRVktL
S0tLQo="
```

OK

Note:

In this example, both filename and buffer is passed. So we delete if both File data and buffer matches, else display Error.

Example 4: Certificate load/read case (<file_name> is mandatory and [<package_id>,<total_no_of_packages>,<cert_info>] are optional)

```
AT^SSLMNG=1,1,2,"ca_cert1.pem"
```

OK

Note:

In this example, buffer is not passed. So we load the certificate using the file name passed from file system if present, else display Error.

Example 5: Certificate load/read case (<file_name> is mandatory and [<package_id>, <total_no_of_packages>, <cert_info>] are optional)

```
AT^SSLMNG=1,1,2,"ca_cert2.pem",1,2,"SHVhd2VpIFRIY2hub2xvZ2llcyBJbmRpYSBQcmI2YXRlbGltaXRIZC4s"
```

OK

```
AT^SSLMNG=1,1,2,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVkfFURSBLRVktLS0tLQo="
```

OK

Example 6: Private key case (<package_id>, <total_no_of_packages>, <cert_info> are mandatory and <password> is mandatory only if the Private key is generated/contains with password).

```
AT^SSLMNG=1,2,2,"client-key",1,3,"LS0tLS1CRUdJTiBSU0EgUFJJVkfFURSBLRVktLS0tLQpQcm9jLVR5cGU6IDQsRU5DUllQVEVEckRFSy1JbmZvOiBBRVMTtMTI4LU0tNCQyxERke2M0Y4OTgwNTM5RkEyOTE4RDQ1NTthEODU5NDI2QwoKSUR4V3ZDcXR1NGxJano2Wk5CblMxNGYyYzFBSjg2aXdNdFNGUWVVB0ZLR1YxNSStUZWhybKx1aC91elFCaHd6RwpobTFmbGowVzJyRUU5a2xWTS8xaVdVV3IrdzVKclpUbKpkN0JUYjROYXVDRWROc1IsNm1MRSswcHVycFROZXAA4CnEzUjUxLzNabHk1R2toK3IjSGQrRnNaQjJBZUZQR0N0XWHLra2INZmk1U1Z4eXVxTHBOK0pCaUh3RkQ4RVJsQ0UKRVIXYll0OW9YQmlucGxIVkYxdzYzclBiOUUxK011SzFRZXJPWxJDQkZRRZUhl eVRYb25PZURoRGFxcGpsaDFSOAp0MFZwbmlraXE5VEJYL3VFN0NTdFpiM0IPU1BrTk9xTIBudkNBaUFCM0N4dBFcjdtQVU2WUJUJnJRWUZGaWtUCnJ2ZUpabUxl K2haeVJCQkKJwamtNQtd0eFRWb21WUzkb3U0SVRRZTZRVdV1YTZpOXpvVi9sKzZiWiIFVfV9BemgKakxPYU4zc3p6c2FSdmQxVXNhS0NEVDdkQzZ2dEFaK2tBQnZ6 akt6QlhmQUw5ZGozWE6V0ZOME5vaVYzdnhDawpLVWNCWTZzS3FDUml4bXpq dER6NTZoYXhMOWtNUTRVV9zaVg1aG8zc1YwNThwT21pN25UZ0p3dXpjc0NSV 3c2CklrZWtwNUhkUGY2c3NQSjJzZkFzbGVpQnlOZHFWFI4N0YvL1VyY2dqbTNTZ 2NjUTQveEwyK1Y2MDZhVktiNm8KQ2ZlQ2xhaHJOWTAvtUZFTnhQSFhtalQ1SkFQ TjF1NExPOWhrSHZ2NmhzZjJtQUk0S0MxSE9YU1poWHlnNHlKVApEQ1ZvRmc1", "huaweim2m"
```

OK

```
AT^SSLMNG=1,2,2,"client-key",3,3,"YXpJOQpITHkvRTdGU0hiNXREOWVrMTZZMn JoNVhuQno4b2UvTVkwVTcrS1RUMDNrVXhrL1psd0ZQZWp0dHJQVWV5anV3CitU WDhHS0NmCHBEOXRUMGpCaGNxamFuNU1MYnFTSjlzM013Y2tROC9LVGNZdH FVUnVmUEFjWnJtMXJKU1BJTXEKN3ljWTFEBUIHaHN3T0ZYMWM2UGFET0lyT0 NDcEpTSXI5ZWd6eFRRMFBidGZmUjRwejZRd1NOOUV5bzNkL0o3RgotLS0tLUV0 RCBSU0EgUFJJVkfFURSBLRVktLS0tLQo=", "huaweim2m"
```

OK

Note:

Error message will be shown on trying to store the Private key with password as it's allowed only while loading the private key.

Example 7: After device reset or before any SSLMNG operation is done and if no certificates are present.

AT^SSLMNG?

^SSLMNG:

OK

Example 8: After device reset or before any SSLMNG operation is done and if certificates are present.

AT^SSLMNG?

^SSLMNG:

1,ca-cert.pem

0,client-cert.pem

2,client-key.pem

OK

Example 9: When some SSLMNG operation is performed before.

AT^SSLMNG=1,1,2,"ca_cert2.pem",1,2,"SHVhd2VpIFRIY2hub2xvZ2llcyBJbmRpYSBQcm12YXRlbGltaXRIZC4s"

OK

AT^SSLMNG?

^SSLMNG:

1,ca_cert1.pem,

2,clientkey1.pem

1,2,"ca_cert2.pem",1,2

OK

19.4 ^SSLO-Create & Open Socket

19.4.1 Command Syntax

Command	Possible response(s)
^SSLO=<SSL_id>,<remote_IP>,<remote_port>[,<mode>,<TimeOut>]	<CR><LF>OK<CR><LF> If any error: <CR><LF>+CME ERROR: <err><CR><LF>

Command	Possible response(s)
^SSLO?	<CR><LF>^SSLO: <SSL_id>,<remote_IP>,<remote_port>,<mode>,<Timeout><CR><LF><CR><LF>OK<CR><LF>
^SSLO=?	<CR><LF>^SSLO: (list of supported <SSL_id>s),,(list of supported <remote_port>s),(list of supported <mode>s),(list of supported timeout range <Timeout>s)<CR><LF><CR><LF>OK<CR><LF>

19.4.1 Description

This command is used to create and open a secure/normal socket.

The READ command is used to obtain the current values for SSLO parameters.

The TEST command is used to obtain the socket open command capability.

After device reset or before any SSLO operation, the default values of SSLO parameters will be shown.

The default values and ranges for the parameters are in the table below:

Parameters	Default Values	Range
<mode>	0	0–1
<Timeout>	90	60–180

The Timeout mentioned while running SSLO command denotes the Time taken for connection of TCP socket. A minimal additional time is also required for handshake and resolving of hostname from DNS server for execution of SSLO command.

After SSLO it's binded with that physical port. SSLTX and SSLRX commands can be executed only on the port where the SSLO command is executed.

After closing the socket, the port binding will be released.

19.4.2 Defined Values

<SSL_id>: SSL socket ID.

1: Secure socket connection

0: Normal socket connection

<remote_IP>: string type, long-distance IP address; IP or hostname of the server. In case of SSL server IP address can be obtained from the AT^SSLEN query command. The maximum length is 255 characters.

Server side: Target ip of loop back ip address

Client side: IP of server

<remote_port>: long-distance port, the value ranges from 1 to 65535; remote port of the server (usually 443).

<mode>: async mode (optional, it will take the value as 0 by default).

0: Sync Mode

1: Async Mode:

- For Sync mode, data will be received in synchronous mode. If run AT^SSLRX command, then it will receive the data from server.
- For Async mode, data will be received in asynchronous mode (i.e.) whenever data is available in the server, it will be received automatically.

<TimeOut>: timeout value in seconds (60–180 seconds). It is optional parameter. It will take the value as 90 seconds by default.

19.4.3 Examples

Preconditions: The socket is enabled by using AT^SSLEN command.

Example:

```
AT^SSLO=1,"192.166.63.155",443,1,60
```

Or

```
AT^SSLO=1,"accounts.google.com",443,1,90
```

OK

```
AT^SSLO?
```

```
^SSLO:1, "192.166.63.155", 443,1,60
```

OK

Examples for Abnormal Cases:

Example 1: Without that socket is enabled (AT^SSLEN), if run the AT^SSLO command.

```
AT^SSLO=1,"192.166.63.155",443,1,60
```

+CME ERROR: Socket not enabled

Example 2: If the server is down:

```
AT^SSLO=1,"192.166.63.155",443,1,60
```

+CME ERROR: Fail to connect specified address

Example 3: If any of the input parameter is out of range, assume SSL ID is 2:

```
AT^SSLO=2,"192.166.63.155",480,1,60
```

+CME ERROR: Invalid arguments

Example 4: If the IP or Host name value is given without quotes:

```
AT^SSLO=1,192.166.63.155,480,1,60
```


Or:

AT^SSLO=1,www.m2mhuawei.com,480,1,60

+CME ERROR: Invalid arguments

Example 5: If socket is enabled with SSL Id of 1 (AT^SSLEN=1,1), and try to open connection with SSL Id 0.

AT^SSLO=0,"192.166.63.155",475,1,60

+CME ERROR: Invalid Operation

19.5 ^SSLC-Close Socket

19.5.1 Command Syntax

Command	Possible response(s)
^SSLC=<SSL_id>	<CR><LF>OK<CR><LF> If any error: <CR><LF>+CME ERROR: <err><CR><LF>
^SSLC=?	<CR><LF>^SSLC: (list of supported <SSL_id>s)<CR><LF><CR><LF>OK<CR><LF>

19.5.2 Description

This command is used to turn off a secure socket. It will also turn of normal socket.

The TEST command is used to obtain the SSL close command capability.

19.5.3 Defined Values

<SSL_id>: SSL socket ID.

1: Secure socket connection

0: Normal socket connection

19.5.4 Examples

Preconditions: A connection is open by using AT^SSLO command.

Example:

AT^SSLC=1

Or

AT^SSLC=0

OK

Examples for Abnormal Cases:

Example 1: Without that socket is open (AT^SSLO), if run the AT^SSLC command.

AT^SSLC=1

+CME ERROR: Socket not connected

Example 2: Without that socket is enabled (AT^SSLEN), if run the AT^SSLC command.

AT^SSLC=1

+CME ERROR: Invalid Operation

Example 3: If the socket is opened with SSL Id of 1, the socket is closed for SSL Id 0:

AT^SSLC=0

+CME ERROR: Invalid Operation

Example 4: If the input parameter is out of range, assume SSL Id is 2:

AT^SSLC=2

+CME ERROR: Invalid arguments

Example 5: When the AT^SSLC? query command is given:

AT^SSLC?

+CME ERROR: Operation not allowed

19.6 ^SSLSTAT-SSL Status command

19.6.1 Command Syntax

Command	Possible response(s)
^SSLSTAT=<SSL_id>	<CR><LF>^SSLSTAT: <conn_stat><CR><LF><CR><LF>OK<CR><LF> If any error: <CR><LF>+CME ERROR: <err><CR><LF>
^SSLSTAT=?	<CR><LF>^SSLSTAT: ((list of supported <SSL_id>s)<CR><LF><CR><LF>OK<CR><LF>

19.6.2 Description

This command is used to query the status of a secure/normal socket.

The TEST command is used to get the current support SSL query capabilities.

19.6.3 Defined Values

<SSL_id>: SSL socket ID.

- 1: Secure socket connection
 - 0: Normal socket connection
- <conn_state>: values are as follows:
- 1: Normal connection opened
 - 2: Normal connection not opened
 - 3: Secure connection opened
 - 4: Secure connection not opened

19.6.4 Examples

Preconditions: The socket is enabled by using AT^SSLEN command.

Example 1: When the socket connection is established:

```
AT^SSLSTAT=1
```

```
^SSLSTAT: Secure connection opened
```

OK

Example 2: When the socket connection is not established:

```
AT^SSLSTAT=1
```

```
^SSLSTAT: Secure connection not opened
```

OK

Example 3: When the remote end/server closes the connection:

```
AT^SSLSTAT=1
```

```
^SSLSTAT: Secure connection not opened
```

Examples for Abnormal Cases:

Example 1: Without that socket is enabled (AT^SSLEN), if run the AT^SSLSTAT command:

```
AT^SSLSTAT=1
```

```
+CME ERROR: Invalid Operation
```

Example 2: If socket is enabled with SSL Id of 1 (AT^SSLEN=1,1), and check the status for SSL Id 0:

```
AT^SSLSTAT=0
```

```
+CME ERROR: Invalid Operation
```

Example 3: If the input parameter is out of range, assume SSL Id is 2:

```
AT^SSLSTAT=2
```

```
+CME ERROR: Invalid arguments
```

Example 5: When the AT^SSLSTAT? query command is given:

AT^SSLSTAT?

+CME ERROR: Operation not allowed

19.7 ^SSLRX-Receive Data

19.7.1 Command Syntax

Command	Possible response(s)
^SSLRX=<SSL_id>,<Maxlength>[,<Timeout>]	<p><CR><LF>^SSLRX: <LengthOfRec><CR><LF><Received_data><CR><LF><CR><LF>OK<CR><LF></p> <p>If no data received: <CR><LF>^SSLRX: 0<CR><LF>TIMEOUT<CR><LF><CR><LF>OK<CR><LF></p> <p>If any error: <CR><LF>+CME ERROR: <err><CR><LF></p>
^SSLRX=?	<CR><LF>^SSLRX: (list of supported <SSL_id>s),(list of supported max-length range <Maxlength>s),(list of supported timeout range <Timeout>s)<CR><LF><CR><LF>OK<CR><LF>

19.7.2 Description

This command is used to receive the data through the secure/normal socket.

The TEST command is used to obtain the SSL received command capabilities.

- For Sync mode (if the socket is opened with <mode> value as 0), the SSLRX will work in synchronous mode. If we run AT^SSLRX command, then it will receive the data from server.
- During Async mode of operation, SSLRX command will not be allowed. In Sync mode, if server sends more than the maximum length, users have to do SSLRX till the length reaches 0.
- SSLRX is binded to the physical port where SSLconnection is opened; in other ports it will report ERROR.

In 2G network, DVCFG can be used to set the priority of call or data.TIMEOUT will appear when the configuration value of TIMEOUT set by using AT^SSLRX reaches beyond that value.

19.7.3 Defined Values

<SSL_id>: SSL socket ID.

1: Secure socket connection

0: Normal socket connection

In case of normal socket connection effect and process will be same as TCP.

<Maxlength>: may receive processing each time most greatly the data packet; specifies the maximum number of bytes that will read from the socket [1-1024].

<Time Out>: maximum blocking timeout in seconds. It is optional parameter. It can be omitted, and in this case the default timeout configurable with AT^SSLCFG will be used for secure socket RX and for normal socket RX the default Timeout value (60) will be used.

<LengthOfRec>: the actual number of bytes received.

<Received_data>: the received data.

If <encode_ok> in AT^SSLEN command is 1, then it is Base 64 encoded format data (the length of the <Received_data> is differ from <LengthOfRec>, because the <Received_data> is in Base64 encoded format). Otherwise, the actual plain data will be displayed.

19.7.4 Examples

Preconditions: A connection is open by using AT^SSLO command.

Example 1: (If <encode_ok> is 1 for AT^SSLEN command)

AT^SSLRX=1,5,60

^SSLRX: 5

SGVsbG8=

OK

Example 2: (If <encode_ok> is 0 for AT^SSLEN command)

AT^SSLRX=1,5,60

^SSLRX: 5

Hello

OK

Examples for Abnormal Cases:

Example 1: If no data received:

AT^SSLRX=1,10,60

^SSLRX: 0

TIMEOUT

OK

Example 2: Without that socket is enabled (AT^SLEN), if run the AT^SSLRX command:

AT^SSLRX=1,10,60

+CME ERROR: Invalid Operation

Example 3: Without that socket is open (AT^SSLO), if run the AT^SSLRX command:

AT^SSLRX=1,10,60

+CME ERROR: Socket not connected

Example 4: If a secure socket is open (SSL Id is 1) and receive the data from normal socket:

AT^SSLRX=0,10,60

+CME ERROR: Invalid Operation

Example 5: If any one of the input parameter is out of range, assume SSL Id is 2:

AT^SSLRX=2,10,60

+CME ERROR: Invalid arguments

Example 6: When the AT^SSLRX? query command is given:

AT^SSLRX?

+CME ERROR: Operation not allowed

19.8 ^SSLRX-Report Unsolicitedly Received Data

19.8.1 Command Syntax

URC	Possible response
	<CR><LF>^SSLRX: <LengthOfRec><CR><LF><Received_data><CR><LF>

19.8.2 Description

This command automatically reports the received data when socket is opened in Async mode.

19.8.3 Defined Values

<LengthOfRec>: the actual number of bytes received.

<Received_data>: the received data.

If <encode_ok> in AT^SLEN command is 1, then it is Base 64 encoded format data (the length of the <Received_data> is differ from <LengthOfRec>, because the <Received_data> is in Base64 encoded format). Otherwise, the actual plain data will be displayed.

In 2G network, DVCFG can be used to set the priority of call or data.

19.8.4 Examples

^SSLRX: 5

Hello

19.9 ^SSLTX-Send Data

19.9.1 Command Syntax

Command	Possible response(s)
^SSLTX=<SSL_id>,<data_buffer>[,<TimeOut>]	<CR><LF>OK<CR><LF> If any error: <CR><LF>+CME ERROR: <err><CR><LF>
^SSLTX=?	<CR><LF>^SSLTX: (list of supported <SSL_id>s),,(list of supported buffer length range <data_buffer>s)<CR><LF><CR><LF>OK<CR><LF>

19.9.2 Description

This command is used to send data through the secure/normal socket.

TheTEST command is used to obtain the SSL transmit data command capability.

- SSLTX can be performed only in the physical port where SSL connection is opened; in other ports it will report ERROR.
- In 2G network, DVCFG can be used to set the priority of call or data.

19.9.3 Defined Values

<SSL_id>: SSL socket ID.

1: Secure socket connection

0: Normal socket connection

<data_buffer>: string type, the data which are need to transmit [1-1024 bytes].

- If the <encode_ok> is set to 1, then the input buffer should be 768 bytes of raw data.
- If the <encode_ok> is set to 0, then the input buffer should be 1024 bytes of raw data.
- If <encode_ok> in AT^SSLEN command is 1, then it should be Base 64 encoded format data. Otherwise it should be normal plain data.

<TimeOut>: Maximum blocking timeout in seconds. It is optional parameter. It can be omitted, and in this case the default timeout configurable with AT^SSLCFG will be

used for secure socket TX and for normal socket TX, the default Timeout value (60) will be used.

19.9.4 Examples

Preconditions: A connection is open by using AT^SSLO command.

Example1: (If <encode_ok> is 1 for AT^SSELEN command)

```
AT^SSLTX=1,"SGVsbG8=",60
```

OK

Example2: (If <encode_ok> is 0 for AT^SSELEN command)

```
AT^SSLTX=1,"Hello",60
```

OK

Examples for Abnormal Cases:

Example 1: Without that socket is enabled (AT^SSELEN), if run the AT^SSLTX command:

```
AT^SSLTX=1,"aGVsbG8=",60
```

+CME ERROR: Invalid Operation

Example 2: Without that socket is open (SSLO), if run the AT^SSLTX command:

```
AT^SSLTX=1,"aGVsbG8=",60
```

+CME ERROR: Socket not connected

Example 3: If a secure socket is open (SSL Id is 1) and try to send the data to normal socket:

```
AT^SSLTX=0,"aGVsbG8=",60
```

+CME ERROR: Invalid Operation

Example 4: If any one of the input parameter is out of range, assume SSL Id is 2:

```
AT^SSLTX=2,"aGVsbG8=",60
```

+CME ERROR: Invalid arguments

Example 5: If socket is enabled with <encode_ok> is 1 (AT^SSELEN=1,1,1) and we are trying to send the normal data (if the data not in Base64 encoded format):

```
AT^SSLTX=1,"Hello",60
```

+CME ERROR: Invalid arguments

Example 6: When the AT^SSLTX? query command is given:

```
AT^SSLTX?
```

+CME ERROR: Operation not allowed

20 MUX Commands

20.1 +CMUX-Enable CMUX

20.1.1 Command Syntax

Command	Possible response(s)
+CMUX=<mode>[,<subset>[,<port_speed>[,<N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]]	<CR><LF>OK<CR><LF> In case of error: <CR><LF>ERROR<CR><LF>
+CMUX?	<CR><LF>+CMUX: <mode>,<subset>,<port_speed>,<N1>,<T1>,<N2>,<T2>,<T3>,<k><CR><LF><CR><LF>OK<CR><LF>
+CMUX=?	<CR><LF>+CMUX: (list of supported <mode>s),(list of supported <subset>s),(list of supported <port_speed>s),(list of supported <N1>s),(list of supported <T1>s),(list of supported <N2>s),(list of supported <T2>s),(list of supported <T3>s),(list of supported <k>s)<CR><LF><CR><LF>OK<CR><LF>

20.1.2 Description

This command enables the CMUX mode in the target as well as in the host.

From here the communication between the host and the target will be through the CMUX frames.

20.1.3 Defined Values

<mode>: multiplexer transparency mechanism

0: Basic option (default value)

1: Advanced option (not supported)

Currently only basic mode is supported, hence this value always remains 0.

<subset>: settings to set up multiplexer control channel. Subsequent virtual channels shall be set up according to control channel <subset> settings if not defined.

0: UIH frames used only (default value)

1: UI frames used only; value currently not supported.

2: I frames used only; value currently not supported.

Currently only UIH is supported, hence this value always remains 0.

<port_speed>: transmission rate

1: 9600 bps

2: 19200 bps

3: 38 400 bps

4: 57 600 bps

5: 115 200 bps (default value)

6: 230 400 bps

7: 460 800 bps

8: 921 600 bps

<N1>: maximum Frame Size. The supported value range is 31 to 1540. The default value is 31.

<T1>: acknowledgement timer in ten milliseconds units. The value range is 10 to 250. Default value is 10 (100 ms).

<N2>: maximum number of re-transmissions. The value range is 0 to 10. The default value is 3.

<T2>: response timer for the multiplexer control channel in ten milliseconds units. The value range is 10 to 250. The default value is 90 (900 ms).

<T3>: wake up response timer in seconds. The value range is 1 to 255. The default value is 10s.

<k>: window size for error recovery mode. The value range is 1 to 7. The default value is 2.

20.1.4 Examples

AT+CMUX=0,0,5,256,10,3,90,10,1

OK

AT+CMUX=?

+CMUX: (0),(0),(1-8),(31-1540),(10-250),(0-10),(10-250),(1-255),(1-7)



OK

AT+CMUX?

+CMUX: 0,0,5,256,10,3,90,10,1

OK

21 STK Commands (Raw Data Mode)

21.1 ^STSF-Configuration Tool

21.1.1 Command Syntax

Command	Possible response(s)
^STSF=<Mode>[,<RawMode>]	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR:<err><CR><LF>
^STSF?	<CR><LF>^STSF: <Mode>,<RawMode><CR><LF><CR><LF>OK<CR><LF>
^STSF=?	<CR><LF>^STSF: (0-1),(0,1)<CR><LF><CR><LF>OK<CR><LF>

21.1.2 Description

This command is used to configure the SIM toolkit (STK) function, including the following: enabling the STK function, disabling the STK function, and setting STK Raw data Mode or Common Mode.

21.1.3 Defined Values

<Mode>:

0: Disable the STK function

1: Enable the STK function (default value)

<RawMode>:

0: Raw data Mode (default value)

1: Common Mode (not supported currently)

Note:

AT^STSF=<Mode> is the same as AT^STSF=<Mode>,0.

21.1.4 Examples

Example 1: Disable the STK function:

AT^STSF=0

OK

Example 2: Enable the STK function and set raw data mode:

AT^STSF=1,0

OK

21.2 ^STIN-Report STK Event Notification

21.2.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^STIN: <CmdType>,<rawdata><CR><LF>

21.2.2 Description

This command is used to notify the TE that the SIM card reports a proactive command to the MS. When the TE receives the notification, it sends the AT^STGI command to obtain the proactive command data and complete the unsolicited request

21.2.3 Defined Values

<CmdType>:

0: The SIM card has sent a proactive command.

1: The SIM card has sent a event notification command.

99: The SIM card has sent a End Session command.

<rawdata>: string type, the raw data contents of proactive report command.

21.3 ^STGI-Obtain Command Data

21.3.1 Command Syntax

Command	Possible response(s)
<code>^STGI=<CmdType>, <CmdIndex></code>	<code><CR><LF>^STIN: <stkmode><rawdata><CR><LF><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>+CME ERROR:<err><CR><LF></code>

21.3.2 Description

This command is used to obtain raw data of main menu.

21.3.3 Defined Values

`<CmdType>`:

0: Main Menu command.

`<CmdIndex>`:

0: The index of the proactive command, obtain the main menu using `AT^STGI=0,0`.

`<stkmode>`:

0: Proactive report command.

1: Event notification command.

99: End Session command.

`<rawdata>`: string type, the raw data contents of main menu.

21.3.4 Examples

Obtain Main Menu:

`AT^STGI=0,0`

`^STIN:`

0,"D081C8810301250082028182850B8051687403901A4E13533A8F0F014C41554
E43482042524F575345528F0D024F50454E204348414E4E454C8F0E03434C4F53
45204348414E4E454C8F0D045245434549564520444154418F0A0553454E442044
4154418F1306474554204348414E4E454C205354415455538F150743414C4C2043
4F4E54524F4C204259205553494D8F21084D4F2053484F5254204D455353414745
20434F4E54524F4C204259205553494D8F0A4C805E9475287BA174068F0A4D804
E0B8F7D8BBE7F6E"

OK

21.4 ^STGR-Responding Command

21.4.1 Command Syntax

Command	Possible response(s)
^STGR=<CmdType>,<rawdata>	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^STGR?	<CR><LF>OK<CR><LF>
^STGR=?	<CR><LF>OK<CR><LF>

21.4.2 Description

This command is used to report the result of the proactive command that the TE executes to the SIM card.

The TEST command is used to return OK.

21.4.3 Defined Values

<CmdType>:

0: Envelope command

1: Terminal response command

<rawdata>: string type, the raw data contents of envelope command or terminal response command.

21.4.4 Examples

Example 1: Send Envelope command MENU SELECT:

```
AT^STGR=0,"D30782020181900102"
```

OK

^STIN:

```
0,"D01B8103012400820281828F0701372E31392E318F0702372E31392E32"
```

Example 2: Send Terminal response command SELECT ITEM:

```
AT^STGR=1,"810301240082028281830100900101"
```

OK

^STIN:

```
0,"D0568103012400820281828F0901372E31392E312E318F0902372E31392E312E  
328F0903372E31392E312E338F0904372E31392E312E348F0905372E31392E312  
E358F0906372E31392E312E368F0907372E31392E312E37"
```

22 FOTA Commands

22.1 ^FOTAMODE-Set Operation Mode

22.1.1 Command Syntax

Command	Possible response(s)
<code>^FOTAMODE=<detect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]</code>	<code><CR><LF>OK<CR><LF></code> In case of an error: <code><CR><LF>ERROR<CR><LF></code>
<code>^FOTAMODE?</code>	<code><CR><LF>^FOTAMODE: <detect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]<CR><LF><CR><LF>OK<CR><LF></code>
<code>^FOTAMODE=?</code>	<code><CR><LF>^FOTAMODE: (list of supported <detect_mode>s),(list of supported <download_mode>s),(list of supported <update_mode>s),(list of supported <en_resume>s),(list of supported <period>s)<CR><LF><CR><LF>OK<CR><LF></code>

22.1.2 Description

The SET command is used to set the modes (manual or automatic) for version detection, download, and update, enable or disable resumable data transfer, and specify the interval between version detections.

The READ command is used to query the modes of version detection, download, and update, status of resumable data transfer, and interval between version detections.

The TEST command is used to return the supported parameter ranges.

22.1.3 Defined Values

<detect_mode>: specifies the version detection mode. The default value is 1.

Available values are:

0: Manual detection. In this mode, the user manually checks whether a new version is available for the module.

1: Automatic detection. In this mode, the module checks whether a new version is available after the specified interval ends.

<download_mode>: specifies the version download mode. The default value is 0.

Available values are:

0: Manual download. In this mode, the module starts to download the detected new version only after the user confirms the download operation.

1: Automatic download. In this mode, the module starts the download process upon detection of a new version.

<update_mode>: specifies the update mode. The default value is 0. Available values are:

0: Manual update. In this mode, the module starts the update only after the user confirms the update operation.

1: Automatic update. In this mode, the module starts the update once the download is complete.

<en_resume>: enables or disables resumable data transfer is supported. The default value is 1.

0: Disables resumable data transfer.

1: Enables resumable data transfer.

<period>: integer; specifies the interval between version detections. Value unit: day. The value range is 1 to 65535. This parameter is available only when <detect_mode> is 1. The default value is 7. If <detect_mode> is 1, <period> must be specified.

Notes:

- When <detect_mode> is set to 1, the module will check for a new version when the time specified by <period> times out, regardless of whether the module is awake.
- There are two timing methods for <period>: local timing and network timing. If the module is able to obtain the network time, network timing will be used; otherwise, the local timing will be used. Yet there may be time errors when local timing is used.
- The parameters will be restored to their default values after updates.

22.1.4 Implementation

Huawei Proprietary Interface.

Optional

22.1.5 Actions Performed by the Client

None

22.1.6 Examples

AT^FOTAMODE=1,0,1,1,22

OK

AT^FOTAMODE?

^FOTAMODE: 1,0,1,1,22

OK

AT^FOTAMODE=?

^FOTAMODE: (0-1),(0-1),(0-1),(0-1),(1-65535)

OK

AT^FOTAMODE=0,0,1,1

OK

AT^FOTAMODE?

^FOTAMODE: 0,0,1,1,7

OK

AT^FOTAMODE=0,0,1,1,22

ERROR

22.2 ^FOTACFG-Set FOTA Connection Parameters

22.2.1 Command Syntax

Command	Possible response(s)
^FOTACFG=<APN>,<username>,<password>,<auth_type>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^FOTACFG?	<CR><LF>^FOTACFG: <APN>,<username>,<password>,<auth_type> ><CR><LF><CR><LF>OK<CR><LF>

22.2.2 Description

This command is used to set the access point name (APN), user name, password, and authentication mode for dial-up connections.

22.2.3 Defined Values

<APN>: specifies the APN. Its value is a string with double quotation marks, consisting of a maximum of 100 bytes. It can be omitted.

<username>: specifies the user name. Its value is a string with double quotation marks, consisting of a maximum of 31 bytes. This parameter can be omitted, but only when <password> is also omitted.

<password>: specifies the password. Its value is a string with double quotation marks, consisting of a maximum of 31 bytes. This parameter can be omitted, but only when <username> is also omitted.

<auth_type>: indicates the authentication mode. The default mode is Challenge Handshake Authentication Protocol (CHAP). This parameter is not supported when 3GPP2 is used. The authentication mode is determined based on the negotiation between the module and network. Available values are:

0: No authentication

1: Password Authentication Protocol (PAP)

2: CHAP

22.2.4 Implementation

Huawei Proprietary Interface.

Optional

22.2.5 Actions Performed by the Client

When the module is not detecting or downloading a new version or being updated, run ^FOTACFG to set the APN, user name, password, and authentication mode for dial-up connections.

22.2.6 Examples

SET command:

```
AT^FOTACFG="1234","12","12",1
```

OK

READ command:

```
AT^FOTACFG?
```

```
^FOTACFG: "1234","12","12",1
```

OK

22.3 ^FOTADET–Manually Detect a New Version

22.3.1 Command Syntax

Command	Possible response(s)
^FOTADET	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

22.3.2 Description

This command is used to detect a new version available for the module.

22.3.3 Defined Values

None

22.3.4 Implementation

Huawei Proprietary Interface.

Optional

22.3.5 Actions Performed by the Client

When the module is not detecting or downloading a new version or being updated, run ^FOTADET to initiate a new version detection.

Each detection attempt consumes 1 KB to 3 KB traffic.

22.3.6 Examples

1. If the command is executed successfully, the following is returned:

```
AT^FOTADET
```

```
OK
```

If the module detects a new version, the following is returned:

```
^FOTASTATE: 12,12.815.00.01.00,86763,"feature1: add fota future;feature2: repair  
some bugs of sms"
```

If the module detects no new version, the following is returned:

```
^FOTASTATE: 14
```

2. If the command fails to be executed because the module is processing other service or the Firmware Over-the-Air (FOTA) status is incorrect, the following is returned:

```
AT^FOTADET
```

+CME ERROR: <err>

3. If the command fails to be executed because of failure to set up a network connection or connection to the server, the following is returned:

^FOTASTATE: 13,18

22.4 ^FOTADL–Manually Download a New Version

22.4.1 Command Syntax

Command	Possible response(s)
^FOTADL=<n>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>
^FOTADL=?	<CR><LF>^FOTADL: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

22.4.2 Description

The SET command is used to start or stop a version download.

The TEST command is used to query the control mode available for version downloads.

22.4.3 Defined Values

<n>: specifies the control mode for version downloads. Available values are:

0: Cancels a download, deletes the downloaded file, and restores the FOTA status to idle state.

1: Starts a download or resumes data transfer.

22.4.4 Implementation

Huawei Proprietary Interface.

Optional

22.4.5 Actions Performed by the Client

When the module is downloading a new version, run ^FOTADL to stop the download.

If no download or update is undergoing on the module, and the module has detected a new version available, run ^FOTADL to download the new version.

22.4.6 Examples

AT^FOTADL=?

^FOTADL: (0–1)

OK

AT^FOTADL=1

OK

^FOTASTATE: 30

^FOTASTATE: 40

22.5 ^FWUP–Start a FOTA Update

22.5.1 Command Syntax

Command	Possible response(s)
^FWUP	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

22.5.2 Description

This command is used to start a Firmware FOTA update.

22.5.3 Defined Values

None

22.5.4 Implementation

Huawei Proprietary Interface.

Optional

22.5.5 Actions Performed by the Client

If a new version has been downloaded to the module, run ^FWUP to start the update. The module then reports an OK message and starts the update.

22.5.6 Examples

AT^FWUP

OK

^FOTASTATE: 50

If the update succeeds:

^FOTASTATE: 90

If the update fails:

^FOTASTATE: 80

22.6 ^FOTASTATE-Report the FOTA Status

22.6.1 Command Syntax

Command	Possible response(s)
^FOTASTATE?	<CR><LF>^FOTASTATE: <status><CR><LF><CR><LF>OK<CR><LF>
	If <status> is 12: <CR><LF>^FOTASTATE: <status>,<version>,<packet_size>,<description><CR><LF> In other cases: <CR><LF>^FOTASTATE: <state>[,<error_code>]<CR><LF>

22.6.2 Description

During an update, the module reports the current update state after ^FOTASTATE is executed.

22.6.3 Defined Values

<status>: indicates the current status. Its value is an integer. Available values are:

10: Idle.

11: Querying.

12: New version found.

13: New version query failed.

14: No version found.

20: Download failed.

30: Download progressing.

31: Download Pending. This value indicates that the module has a download task that is not yet complete after the module restarts. If resumable data transfer has been enabled, the module resumes the download.

40: Download Complete.

50: Ready to update.

60: Update Progressing.

80: Update failed.

90: Update successful.

<version>: indicates the software version number. Its value is a string containing a maximum of 31 characters, which exclude 0<CR> or OK<CR>.

<description>: indicates the software description. Its value is a string with a valid character in English and a maximum of five entries. The entries are separated by semicolon, and each contains 255 characters or less.

<packet_size>: indicates the number of bytes in the update package.

Valid values of <version>, <description>, and <packet_size> are unsolicitedly reported when <status> is 12. If <status> is not 12, empty values are returned.

<error_code>: indicates the reason for a version query failure. Its value is an integer. This parameter is available only when <status> 13, 20, or 80.

22.6.4 Implementation

Huawei Proprietary Interface.

Optional

22.6.5 Actions Performed by the Client

During an update, the module unsolicitedly reports the current update state whenever the status changes.

The module will not report <status> as 11 if the following conditions are met:

The module is forced to sleep.

The interval between version detections times out.

22.6.6 Examples

If the download succeeds:

AT^FOTADL=1

OK

^FOTASTATE: 30

^FOTASTATE: 40

If the download fails:

AT^FOTADL=1

OK

^FOTASTATE: 30

^FOTASTATE: 20,18

AT^FOTASTATE?

^FOTASTATE: 10

OK

22.7 ^FOTADLQ-Query Download Status of Update Files

22.7.1 Command Syntax

Command	Possible response(s)
^FOTADLQ	[<CR><LF>^FOTADLQ: <index>,<file_name>,<dl_size>,<file_size>[<CR><LF>^FOTADLQ: <index>,<file_name>,<dl_size>,<file_size>[...]]<CR><LF>]<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>

22.7.2 Description

Run ^FOTADLQ to query the download progress of update files.

22.7.3 Defined Values

<index>: indicates the file sequence number. Its value ranges from 1 to 10.

<file_type>: indicates the file type. Its value is a string with double quotation marks.

"IMAGE": Firmware differential file.

"XNV": NV configuration file.

<dl_size>: indicates the number of downloaded bytes. Its value is an integer.

<file_size>: indicates the number of total bytes. Its value is an integer.

22.7.4 Implementation

Huawei Proprietary Interface.

Optional

22.7.5 Actions Performed by the Client

During an update (when <status> is 30 or 31), run ^FOTADLQ to query the list of update files to download, the size of downloaded files, and the total size of update files to download.

22.7.6 Examples

AT^FOTADLQ

^FOTADLQ: 1,"IMAGE",9012,9012

^FOTADLQ: 2,"XNV",0,77751

OK

22.8 ^FWLOAD–Perform a Local Upgrade

22.8.1 Command Syntax

Command	Possible response(s)
^FWLOAD=<update_type>	<CR><LF>><CR><LF>(1K-Xmodem ctrl character)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

22.8.2 Description

This command is used to specify the upgrade type, transmit the upgrade file into the module using 1K-Xmodem, and start the upgrade. The following table lists the ports supported by the full and differential upgrades.

Upgrade type	UART port	MODEM port	PCUI port
Full upgrade	√	×	√
Differential upgrade	√	√	×

You can run AT+IPR? to query the baud rates supported by the current module. To set the baud rates for a module, run the IPR SET command. When you do so, refer to the following baud rates supported by the full and differential upgrades.

1. Differential upgrades support baud rates of 9600, 19200, 38400, 57600, 115200, and 230400 bps.
2. Full upgrades support the baud rate of 115200 bps.

Note:

During a local update, if module restarts, the Host needs re-open the port to receive the data sent by the module. Meanwhile, in order to avoid some adverse impact, other ports cannot perform other operations, and the Host cannot transmit data through PCUI port and UART port in the full updates.

22.8.3 Defined Values

<update_type>: an integer, specifying the upgrade type.

0: Full upgrade

1: Differential upgrade

The 1K-XMODEM protocol is used to transmit update files.

22.8.4 Examples

Local differential upgrade

```
AT^FWLOAD=1
```

```
>
```

```
C
```

```
OK
```

The board restarts, and the upgrade starts.

```
^FWLSTATE: 90
```

Local full upgrade

```
AT^FWLOAD=0
```

The board restarts.

```
>
```

```
C
```

```
OK
```

The board restarts, and the upgrade starts.

^FWLSTATE: 90

Note:

After the data transmit is normally end in during full updates, OK will not be reported.

22.9 ^FWLSTATE-Report the Upgrade Status

22.9.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^FWLSTATE: <state>[,<error_code>]<CR><LF>

22.9.2 Description

During an update, the board reports the current update status after ^FWLSTATE is executed.

22.9.3 Defined Values

<state>: an integer, specifying the current upgrade status.

50: Ready to update

80: Update failed

90: Update succeeded

<error_code>: an integer, specifying the cause of the upgrade failure. See the error list in appendix 22.12 .

22.9.4 Examples

Local differential upgrade

AT^FWLOAD=1

>

C

OK

The board restarts, and the upgrade starts.

^FWLSTATE: 90

22.10 ^FOTASMS–Notify Users to Decide on FOTA Upgrade

22.10.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^FOTASMS <CR><LF>

22.10.2 Description

Once parsing of FOTA SMS is done, it will notify to user every 4 seconds for 3 times for his confirmation of FOTA upgrade.

If user does not give any confirmation, it will go for force upgrade.

22.11 ^FOTAP–Confirm FOTA Upgrade

22.11.1 Command Syntax

Command	Possible response(s)
^FOTAP=<n>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^FOTAP=?	<CR><LF>^FOTAP: (0-1)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^FOTAP?	<CR><LF>^FOTAP: <n><CR><LF><CR><LF>OK<CR><LF>

22.11.2 Description

Once FOTASMS notification comes, users can confirm the FOTA upgrade using this command. If user does not give any confirmation by default, it will go for force upgrade.

22.11.3 Defined Values

<n>: integer value with 0 or 1

0: Do not do FOTA upgrade

1: Go for FOTA upgrade

22.11.4 Examples

^FOTASMS

AT^FOTAP=1

OK

^FOTASTATE: 11

AT^FOTAP?

^FOTAP: 1

OK

22.12 Appendix

22.12.1 CME ERROR Values and String Text for the FOTA Feature

<err> code	String Text
1502	Operation failed due to unknown error
1503	Previous command is not complete
1504	Error command parameters
1505	Operation not supported
1512	The network has not been opened yet
1513	The network has been opened already
1514	Fail to open network
1515	The link has not been established yet
1517	Fail to establish link
1518	Fail to bind the specified port
1519	Fail to connect to the specified address
1520	Invalid domain name
1521	Fail to resolve DNS
1523	File type is not correct

<err> code	String Text
1524	File source is not correct
1555	FOTA is in collision state
1602	Fail to send data because TE cancel
1603	Fail to send data because retry times are bigger than 10
1604	Fail to send data because file tag is error
1605	Fail to send data because packet number is error
1606	Fail to send data because the protocol is not 1K-Xmodem
1607	Invalid port for fwload mode
1608	Fail to send data because file crc or subfile crc is error
1609	Fail to send data because update type is error
1610	Fail to send data because model product is error
1611	Fail to send data because source version is error
1612	Fail to send data because some tag length is error
1613	Fail to send data because file num error
1614	Fail to send data because open subfile failed
1615	Fail to send data because write subfile to flash error

22.12.2 ERROR CODE Values and Descriptions for the FOTA Feature

<err> code	Description
01	Operation failed due to unknown error
02	Previous command is not complete
03	Error command parameters
04	Operation not supported
05	Operation failed due to system error
11	The network has not been opened yet
12	The network has been opened already
13	Fail to open network
14	The link has not been established yet
15	The link has been established already

<err> code	Description
16	Fail to establish link
17	Fail to bind the specified port
18	Fail to connect to the specified address
19	Invalid domain name
20	Fail to resolve DNS
21	Http server error
22	File type is not correct
23	File source is not correct
51	Fail to get filelist file
52	MD5 check failed
54	FOTA is in collision state
101	Fail to send data because TE cancel
102	Fail to send data because retry times are bigger than 10
103	Fail to send data because input file tag is error
104	Fail to send data because packet number is error
105	Fail to send data because the protocol is not 1K-Xmodem
106	Invalid port for fwload mode
107	Fail to send data because file crc or subfile crc is error
108	Fail to send data because update type is error
109	Fail to send data because model product is error
110	Fail to send data because source version is error
111	Fail to send data because some tag length is error
112	Fail to send data because file num error
113	Fail to send data because open subfile failed
114	Fail to send data because write subfile to flash error
151	Fail to write flag
152	Fail to read flag
153	Fail to erase region
154	Fail to copy osbl
155	Fail to replace image
156	Fail to copy xnv



<err> code	Description
157	Fail to write xnv
158	Fail to backup nv
159	Fail to restore nv
200	Downloaded size does not match (either exceeds total size or 0 bytes received)

23 Overall Design Constraints

23.1 Standards Compliance

AT command standards. For details, see the protocols 27.007, 27.005 and V0025-TE.

23.2 Hardware Limitations

23.3 Technology Limitations

24 Appendixes

24.1 Appendix 1 AT Command Description

24.1.1 Basic Commands

The format of a basic command is:

<command>[<number>]

Where, <command> is a single letter (A–Z) or a "&" plus a single letter, and <number> is a decimal number composed of one or more digits. The 0s at the head of <number> will be ignored. If a basic command that can carry <number> carries no <number>, the <number> value is 0 by default. If a basic command that cannot carry <number> carries a <number>, the information "TOO MANY PARAMETERS" will be returned.

24.1.2 S Register Command

All commands that begin with "S" are collectively called "S register command".
Command format:

S<parameter number>?

S<parameter number>=<value>

The S register command name is composed of the letter "S" combined with a decimal number. This decimal number is called "register sequence number (parameter number)". If the register is not identified, it indicates that this command does not exist, and the "ERROR" information will be returned. Each S register saves a character. If the command name is followed by "?", it indicates a READ recommend. The ASCII code values currently saved in this S register expressed by a 3-digit decimal number, will be returned. Make up three digits by filling 0s at the end if there are less than 3 digits. If the command name is followed by "=", the command is a SET command. In this case, replace the characters stored in this S register with the characters corresponding to the <value>.

24.1.3 Extended Commands and Manufacturer Defined Commands

The extended commands begin with "+". The commands defined by the manufacturer also begin with a special character, e.g. "\$", "^". For purpose of this document, all commands defined by manufacturers begin with "^". All extended commands and

manufacturer-defined commands are divided into two categories: Action command and parameter command.

1. Action commands

Action commands are the commands that carry out a specific action rather than only dealing with local parameters of the MS, e.g. AT+CMGS. An action command may carry parameters or not. Action commands include SET and TEST.

- SET command

Command format:

No parameter <name>

With 1 parameter <name> [=<value>]

With more parameters <name> [=<compound_value>]

<compound_value> indicates multiple parameters, separated by "," in the middle. For the parameters that have a default value, they can be omitted and substitute the default value. If all the parameters are omitted, the "=" behind <name> should be omitted too. If <name> is not identified, it indicates that this command does not exist, and the information "ERROR" will be returned. If <name> is identifiable, and the command contains uncalled-for parameters, or the number of parameters goes beyond the defined range, the information "TOO MANY PARAMETERS" will be returned.

- TEST command

Command format:

<name>=?

If the MS cannot identify <name>, the information "ERROR" will be given. If the MS can identify <name>, and the command carries no parameter, the information "OK" will be returned. If the command carries parameters, the value range of each parameter will be returned first, then "OK" will be returned.

2. Parameter commands

Parameter commands refer to the commands that can only deal with the local parameters of MS. These parameters may affect the execution of the action commands. Parameter commands include SET, READ and TEST commands.

- SET command

Command format:

With 1 parameter: <name> [=<value>]

With more parameters <name> [=<compound_value>]

The SET command is used to set the parameters. <compound_value> means multiple parameters, separated by "," in the middle. For the parameters that have a default value, they can be omitted and substitute the default value. If all the parameters are omitted, the "=" behind <name> should be omitted too. If <name> is not identified, it indicates that this command does not exist, and the "ERROR" information will be returned. If <name> is identifiable, and the command contains uncalled-for parameters, or the number of parameters goes beyond the defined range, the information "TOO MANY PARAMETERS" will be returned.

- READ command

Command format:

<name>?

The READ command is used to read the current value of the parameter.

- TEST command

Command format:

<name>=?

If the MS cannot identify <name>, the information "ERROR" will be given. If the MS can identify <name>, and the command carries no parameter, the information "OK" will be returned. If the command carries parameters, the value range of each parameter will be returned first, then "OK" will be returned.

24.1.4 Abort Attribute

Abort means the TE sends an instruction to interrupt a command being executed. The "Abort" command must be issued before the command finishes execution, so it makes sense only to the commands that require a certain time period for executing. However, not all commands that require a certain time period for executing can be aborted, depending on the abort attribute of the command. Each AT command has the abort attribute. This attribute is a two-option choice. Namely, the command either supports abort or does not support abort. The commands that support abort include some basic commands and the SET command of action command. These commands do not accept any abort request within 125ms after being issued. After the command has been issued for 125 ms but has not finish execution, if any character is received from the TE, it will interrupt the execution of the command immediately.

The commands that support abort are as follows:

AT+CLCK	Can be aborted
AT+COPS	Can be aborted except "AT+COPS=?"
AT^IPINIT	Can be aborted
AT^IPOPEN	Can be aborted
AT^IPSEND	Can be aborted
AT^IPSENDEX	Can be aborted
AT^IPCLOSE	Can be aborted
AT^SSLTX	Can be aborted
AT^SSLRX	Can be aborted

24.2 Appendix 2 CME Error List

Note:

The following table lists the possible CME errors and reasons for all the interface command. The code in the first row of the table represents the <err> value of CME ERROR. The numerals in the table represent the sequence number of reasons. The table of correspondence between CME ERROR and text string is attached later, together with detailed description on the reasons.

For example: "7" is filled in the column whose <err> is 16 in the "+CPWD=" command. This indicates the "+CPWD=" may incur the CME ERROR whose <err> is 16. Its text string is "incorrect password". The reason is that the sequence number is 7, and the detailed reason is "password incorrect".

	0	3	4	5	10	11	12	13	14	16	17	18	20	21	22	23	24
+CPWD=							5	6		7							
+CPIN=		3					5 7										
+CPIN?								4	1								
+CGSN																8	
+COPS=	31														32		
+CSCA=						9	5	4	1								
+CSCA?						9	5	4	1								
+CPBS=						9	5	4	1								
^CPBR=						9	5	4	1					10			
^CPBW=						9	5	4	1				13	10			14
^SPN=						9	5	4	1								
+CNMI						9	5	4									
+CMGD						9	5	4									
+CNMA						9	5	4									
+CMGS						9	5	4									
+CMGW						9	5	4									
+CMGL						9	5	4									
+CMGR						9	5	4									
+CSQ						9	5	4									
+IFC						9	5	4									
^BAR						9	5	4									

	0	3	4	5	10	11	12	13	14	16	17	18	20	21	22	23	24
+CEER						9	5	4									
H						9	5	4									
+CRC						9	5	4									
+CSCS						9	5	4									
O						9	5	4									
D						9	5	4									
A						9	5	4									
+CNUM						9	5	4									
+CLCK						9	5	4									
+CREG						9	5	4									
^IPINIT						9	5	4									
^IPOPEN						9	5	4									
^IPLISTEN						9	5	4									
^IPSEND						9	5	4									
^IPGETDATA						9	5	4									
^IPCLOSE						9	5	4									
^IPENTRANS						9	5	4									

	26	27	30	31	32	100	134	257	258	259	260	261	262	263	264
+COPS=			27												
^CPBW=	15	16													

	65280	65281	65282	65283	65284	65285	65286	65287
^SPN=					28	29	30	39

The reasons are described as follows:

- 1 SIM card busy
- 2 Operation not supported

- | | |
|----|---|
| 3 | Check performed without the check request |
| 4 | No SIM card |
| 5 | PUK check request existent |
| 6 | SIM card failure |
| 7 | Password error |
| 8 | Failure in obtaining IMEI from NV or invalid IMEI |
| 9 | Requiring PH-SIM PIN code |
| 10 | Index number not correct |
| 11 | Corresponding phonebook storage entry not found |
| 12 | Unknown error |
| 13 | Phonebook storage is full |
| 14 | Too long text string |
| 15 | Too long number |
| 16 | Invalid characters included in the number |
| 17 | Network timeout |
| 18 | Temporary disorder of service options |
| 19 | Rejected by network |
| 20 | Retry operations caused by system error or operation busy |
| 23 | User unidentifiable |
| 24 | Service resources nonexistent |
| 25 | Unknown service type |
| 26 | Unknown network message |
| 27 | CM has no buffer to send command request |
| 28 | Incorrect SPN file contents in SIM card |
| 29 | Access to SPN file is rejected |
| 30 | SPN file nonexistent |
| 31 | MCC/MNC fails to construct PLMN |
| 32 | Long name/short name of the operator is not found |
| 34 | Operation mode is not in the online state |
| 35 | Service state is not a service valid state. |
| 38 | Corresponding call is not in an activated state. |
| 39 | Another SPN query operation is underway |
| 40 | Operation not allowed |

41 SCA file does not exist in SIM card

The correspondence between <err> value of CME ERROR and the text string is as follows:

- 0 Phone failure
- 3 Operations not allowed
- 4 Operations not supported
- 10 SIM not inserted (not supported currently. If no SIM is inserted, return SIM failure)
- 11 SIM PIN required
- 12 SIM PUK required
- 13 SIM failure
- 14 SIM busy
- 15 SIM wrong
- 16 incorrect passwords
- 17 SIM PIN2 required
- 18 SIM PUK2 required
- 20 Memories full
- 21 Invalid index
- 22 Not found
- 23 Memory failure
- 24 Text string too long
- 30 No network service
- 31 Network timeout
- 32 Networks not allowed - emergency calls only
- 100 Unknown
- 134 Service option temporarily out of order (#34)
- 257 Network rejected request
- 258 Retry operation
- 259 Invalid deflected to number
- 260 Deflected to own number
- 261 Unknown subscribers
- 262 Service not in use
- 263 Unknown classes

264	Unknown network messages
1001	Normal error
1002	The link has not been established yet
1003	The link has been established already
1004	Fail to establish link
1005	Fail to bind the specified port
1006	Fail to connect to the specified address
1007	The server has not been established yet
1008	The server has been established already
1009	Fail to establish server
1010	Fail to bind the specified port with server
1011	Fail to establish listening
1012	The network has not been opened yet
1013	The network has been opened already
1014	Fail to open network
1015	Invalid domain name
1016	Fail to resolve DNS
1017	Port error
1018	Remain data is sending
1019	Previous command is not complete
1020	Too many data to be sent
1021	Forbidden operation in transparent mode
1022	Invalid port for transparent mode
1023	Fail to send data in transparent mode
1024	Fail to send data because it is too long
1025	Quit transparent mode because buffer is full
1026	More than one link in physical port
1027	The physical port is in listen state and has no client
1028	Quit transparent mode because link is down
65282	Sys state error
65283	Parameters error
65284	Spn file wrong
65285	Spn file accessed denied

- 65286 Spn file not exist
- 65287 Another SPN query operation still not finished

24.3 Appendix 3 Other CME Error List

- 1030 The TCP or UDP link has been established already
- 1031 The FTP link has been established already
- 1032 The SMTP link has been established already
- 1033 The HTTP link has been established already
- 1035 The FTPS link has been established already
- 1036 The SMTPS link has been established already
- 1037 The HTTPS link has been established already
- 1038 SSL not enabled
- 1039 SSL handshake failed
- 2101 Operations failed due to system error
- 2102 Socket not enabled
- 2104 Socket already enabled
- 2110 Invalid arguments
- 2111 Certification error
- 2112 Invalid Operation
- 2113 Certificate maximum limit reached

24.4 Appendix 4: SSL CME Error List

- 2101 Operations failed due to system error
- 2102 Socket not enabled
- 2103 Socket not connected
- 2104 Socket already enabled
- 2105 Socket already connected
- 2107 SSL error during handshake
- 2109 Fail to connect specified address
- 2110 Invalid arguments
- 2111 Certification error
- 2112 Invalid Operation

- 2113 Certificate maximum limit reached
- 2114 Network timeout
- 2115 SSL read failed
- 2116 SSL write failed

24.5 Appendix 5 CMS Error List

The following table presents all <err> values of CMS Errors that may be returned by the AT command of SMS.

	0 ... 1 2 7	12 8 ... 25 5	30 1	30 2	30 3	30 4	30 5	31 0	31 1	31 2	31 6	32 0	32 1	32 2	33 0	33 1	33 2	34 0	500
+CNMI			3		4														17
+CMGD			3										1 1						
+CNMA						5												1 6	
+CPMS			3																
+CSCA																			
+CMGS	1	2	3			5	1 8								1 9		1 5		
+CMGW			3			5	1 8							1 2	1 9				
+CMGL			3																
+CMGR			3										1 1						
+CMSS	1	2	3			5	1 8						1 1		1 9		1 5		

- 1 RP layer error
- 2 TP layer error
- 3 Some other applications leave SMS interface reserved
- 4 Operation not supported.
- 5 In the PDU mode, the PDU parameter is incorrect (actual data length of PDU packet is inconsistent with the given <length>; or PDU format error is detected)

- 6 SIM card not inserted
- 7 PIN request of SIM card
- 8 PH-(U)SIM PIN request of SIM card
- 9 PUK request of SIM card
- 10 Memory error (communication with database of SMS is faulty)
- 11 Invalid memory index number <index>
- 12 Memory is full
- 13 SMSC error (message contains no SCA, or the SCA set via the CSCA command is unavailable)
- 14 No network service is available
- 15 Network timeout
- 16 No status of new SM, error execute this command
- 17 Unknown error
- 18 Invalid text mode parameter
- 19 SMSC address unknown

24.6 Appendix 6 Summary of Final Result Codes

Final result code	Code	Description
OK	0	It indicates a command line is executed correctly.
CONNECT	1	Connection established
RING	2	Incoming call
NO CARRIER	3	Connection terminated
ERROR	4	Ordinary error
BUSY	7	Opposite party busy
NO ANSWER	8	Connection completion timeout, no answer
+CME ERROR: <err>		Error type is specified by the parameter <err>
+CMS ERROR: <err>		SMS-related error
TOO MANY PARAMETERS	Numbering mode is not supported	Too many parameters in the issued command

24.7 Appendix 7 List of Initial Values of Command Parameter After MS First Powerup

The following table presents the initial values of interface parameters mentioned herein at the time of MS first startup (upgrade or factory initial value).

Command	Description of initial value
E	<value> is 1
V	<value> is 1
S3	<value> is 013
S4	<value> is 010
S5	<value> is 008
Q	<value> is 0
+CPMS	<mem1> , <mem2> and <mem3> are "SM", <mem3> will keep last setting.
+CMEE	<value> is 2
+CSCA	<sca> and <tosca> are empty, and the parameters are stored in SIM, and will keep the setting with the same SIM.
+CSMS	<service> is 0
+CMGF	<mode> is 0
+CNMI	<mode>,<mt>,<bm>,<ds> and <bfr> are 0
+COPS	<mode> is 0, <format> is 0, <rat> is 0
+CREG	<n> is 0
+CGREG	<n> is 0
+CMMS	<n> is 0
^CURC	<curc_status> is 0
&C	<value> is 1
&D	<value> is 2
S0	<value> is 0
+ICF	<format> is 3, <parity> is 3
+IFC	<DCE_by_DTE> is 0, <DTE_by_DCE> is 0
&S	<value> is 0
+IPR	<Rate> is 115200, after changed, and stored by &W, the baudrate will keep the last value.
^RESET	<delay_time> is 0

Command	Description of initial value
+CRC	<mode> is 0
+CSCS	<chset> is "IRA"
+CPBS	<storage> is "SM"
+CLVL	<level> is 2
+CMIC	<level> is 5
^SMUT	<n> is 0

24.8 Appendix 8 Examples of Show Mode

Query Mode: We can use "AT^SYSINFO" to acquire system server domain and system mode. According to the parameter <srv_domain> and the parameter <sys_mode>, host software will achieve the mode which would be shown to the user.

<srv_domain>	<sys_mode>	shown
1	3	GSM
2	3	GPRS
3	3	GPRS
1	5	3G CS
2	5	3G PS
3	5	3G

Report Mode: We can get the parameter <sys_mode> by the command "^MODE", and then get the parameter <stat> by the command "+CREG" (or "+CGREG"). Finally, host software can use them to determine the mode which would be shown to the user.

<sys_mode>	creg: <stat>	cgreg: <stat>	shown
3	reg(1, 5)	unreg(0, 2, 3, 4)	GSM
3	any	reg(1, 5)	GPRS
5	reg(1, 5)	unreg(0, 2, 3, 4)	3G CS
5	unreg(0, 3, 4)	reg(1, 5)	3G PS
5	reg(1, 5)	reg(1, 5)	3G

24.9 Appendix 9 List of Command Allowed in PIN Restricted Mode

No.	Command	Comments
1	E	-
2	S3	-
3	S4	-
4	S5	-
5	V	-
6	I	-
7	Q	-
8	Z	-
9	&W	-
10	&F	-
11	&V	-
12	+CMEE	-
13	+CFUN	-
14	+CGMM/+GMM	-
15	+CGMI/+GMI	-
16	+CGMR/+GMR	-
17	+CGSN/+GSN	-
18	+CCLK	-
19	+CCID	-
20	+CRSM	-
21	^HWVER	-
22	^HS	-
23	^RESET	-
24	^RESETCNT	-
25	^CURC	-
26	&C	-
27	&D	-
28	&S	-

No.	Command	Comments
29	+IPR	-
30	+IFC	-
31	+CSMS	
32	^ECHO	-
33	+CPIN	-
34	^CPIN	-
35	+CGDCONT	-
36	+CHUP	-
37	S0	-
38	^SYSINFO	-
39	^SYSCFG	-
40	+CLVL	-
41	^IOC	-
42	^MSO	-
43	^AUTOANSWER	-
44	+CMIC	-
45	^CPCM	-
46	^STN	-
47	D	-
48	+CLCC	-
49	^DTMF	-
50	+CBST	-
51	+CSTA	-
52	+CMGF	-
53	+CNMI	-
54	+CSCS	-
55	+CRC	-
56	+ICF	-
57	^RXGAIN	-
58	^PCMFIR	-
59	^SETAUDIO	-

24.10 Appendix 8 List of Reference

- [1] 3GPP TS 22.002
- [2] 3GPP TS 23.038
- [3] 3GPP TS 23.040
- [4] 3GPP TS 23.041
- [5] 3GPP TS 24.008
- [6] ITU-T T.50
- [7] GSM 07.05
- [8] GSM 11.11
- [9] ISO/IEC10646
- [10] 3GPP TS 31.101
- [11] 3GPP TS 31.102
- [12] 3GPP TS 22.088
- [13] 3GPP TS 22.067
- [14] 3GPP TS 22.082
- [15] 3GPP TS 22.030
- [16] 3GPP TS 22.081
- [17] ITU-T E.212 Annex A
- [18] 3GPP TS 45.008

24.11 Appendix 9 List of Abbreviations

Abbreviations	Full spelling
3GPP	Third Generation Partnership Project
APN	Access Point Name
BER	Bit Error Rate
CDMA	Code Division Multiple Access
CS	Circuit Switched (CS) domain
CUG	Closed User Group
DCE	Data Circuit Equipment
DCS	Data Coding Scheme
DTE	Data Terminal Equipment

Abbreviations	Full spelling
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
MCC	Mobile Country Code
ME	Mobile Equipment
MNC	Mobile Network Code
MS	Mobile Station
MSIN	Mobile Station Identification Number
MSISDN	Mobile Station International ISDN Number
MT	Mobile Terminal
PD	Position Determination
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PPP	Point-to-Point Protocol
PUK	PIN Unblocking Key
PS	Packet Switched (PS) domain
QoS	Quality of Service
RPLMN	Registered PLMN
RSSI	Receive Signal Strength Indicator
SCA	Service Center Address
SDU	Service Data Unit
SIM	GSM Subscriber Identity Module
SM	Short Message
SMS	Short Message Service
SMSC	Short Message Service Center

Abbreviations	Full spelling
TA	Terminal Adapter
TE	Terminal Equipment
TPDU	Transfer Protocol Data Unit
UIM	User Identity Module
URC	Unsolicited Result Code
USIM	Universal Subscriber Identity Module
USSD	Unstructured Supplementary Service Data
VP	Validity Period
XCD	Carrier Detection Signal
XER	DTE Ready Signal
WCDMA	Wideband CDMA