



HUAWEI MU509-65 HSDPA LGA Module
V100R001

AT Command Interface Specification

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About This Document

Revision History

Document Version	Date	Chapter	Descriptions
01	2015-03-29		Initial release
02	2016-04-23	9.2	Updated +CCFC–Set Call Forwarding Number and Conditions section
		9.6	Updated +CCWA–Set Call Waiting Status section
		9.7	Updated +CCWA–Report of Call Waiting section
		20.8	Added ^RSCPCFG–Query or Set the RSCP Level section



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1 Scope

1.1 Terminal Display

This document describes the AT interface of Huawei UMTS Module MU509-65. 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 MU509-65 module and this document.

1.1.1 Interface Overview

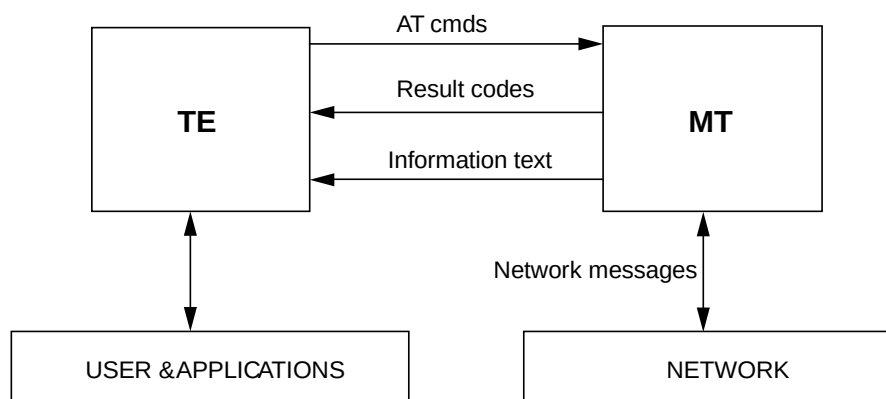
HUAWEI UMTS Module is a wireless terminal of UART or USB interface. It is used to provide data service, voice and SMS functions.

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 MS



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 string refers to a byte stream that is placed inside double quotation marks, excluding the quotation marks or commas.
9. 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).
10. 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.
11. 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 ERROR. No equal mark itself is deemed a surplus command parameter.

All extended AT command interfaces of MU509-65 begin with "^". It specifies that: In the AT command such as "AT^XXX", the number of X cannot be more than 9 currently.

1.4 Document Conventions

Throughout the document, the module is referred to as ME (Mobile Equipment), MS (Mobile Station), TA (Terminal Adapter) or DCE (Data Circuit terminating Equipment). To control your module you can simply send AT Commands via its serial interface. The controlling device at the other end of the serial line is referred to as TE (Terminal Equipment), DTE (Data Terminal Equipment) or plainly 'the application' (probably running on an embedded system).

Section "Property Description" of each command marks the property of each AT command. Where, **N** means No, **Y** means Yes and **NA** means Not Applicable.

For example:

Saving upon Power-off	PIN
N	Y

The settings are described as follows:

- Parameter settings in the command are not saved after the MT is powered off.
- This command is controlled by personal identity numbers (PINs).



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 21.1 . 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.

3.1.4 Property Description

Saving upon Power-off	PIN
N	N

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> to 1, you can input "ATS3=001", or "ATS3=1", the result is the same.

3.2.4 Property Description

Saving upon Power-off	PIN
N	N

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> to 1, you can input "ATS4=001", or "ATS4=1", the result is the same.

3.3.4 Property Description

Saving upon Power-off	PIN
N	N

3.4 S5-Set Backspace Character

3.4.1 Command Syntax

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

Command	Possible Response(s)
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> to 1, you can input "ATS5=001", or "ATS5=1", the result is the same.

3.4.4 Property Description

Saving upon Power-off	PIN
N	N

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.

3.5.4 Property Description

Saving upon Power-off	PIN
N	N

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 Property Description

Saving upon Power-off	PIN
NA	N

3.6.5 Example

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.

3.7.4 Property Description

Saving upon Power-off	PIN
N	N

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>
+ICF	<format>,<parity>
S0	<value>

3.8.3 Property Description

Saving upon Power-off	PIN
N	N

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>
+IFC	<DCE_by_DTE>,<DTE_by_DCE>
+ICF	<format>,<parity>
S0	<value>

3.9.3 Property Description

Saving upon Power-off	PIN
NA	N

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
+CRC	0

Command	Parameter
+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.

3.10.3 Property Description

Saving upon Power-off	PIN
N	N

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>

Command	Parameter
S3	<value>
S4	<value>
S5	<value>
+CRC	<mode>
+CMGF	<mode>
+CSDH	<show>
+CNMI	<mode>,<mt>,<bm>,<ds>,<bfr>
+IPR	<rate>
+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.

3.11.3 Property Description

Saving upon Power-off	PIN
NA	N

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 21.2 .

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

3.12.4 Property Description

Saving upon Power-off	PIN
N	N

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).

1: Set as online mode (default value) (previous mode must not be offline).

<rst>: whether to restart MS 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.

Notes:

- AT+CFUN without value will set as LPM (low power consumption) mode.
- When the MS is being restarted, running **AT+CFUN?** will return **6**, indicating that a restart is in progress.

3.13.4 Property Description

Saving upon Power-off	PIN
NA	N

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 type value; 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 is -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 Property Description

Saving upon Power-off	PIN
NA	N

3.14.5 Example

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.

The 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.

Note:

"AT+CSCS" have the same function with "AT+CSCS="IRA"".

3.15.4 Property Description

Saving upon Power-off	PIN
N	Y

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>: integer value; identifier of EF file (Elementary data File) on SIM. 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, 31.102.

<data>: information with hexadecimal character format

<sw1>, <sw2>: the response from SIM after the execution 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.

3.16.4 Property Description

Saving upon Power-off	PIN
NA	N

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 (reserved, not supported currently)

<is_offline>:

0: Online

1: Offline (reserved, not supported currently)

2: LPM

<product_class>: product class

0: WCDMA

<product_id>: product id

6: MU509-65

<software_id>: reserved

3.17.4 Property Description

Saving upon Power-off	PIN
NA	N

3.17.5 Example

```
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)
<code>^RESET[=<delay_time>]</code>	<code><CR><LF>OK<CR><LF></code>
<code>^RESET?</code>	<code><CR><LF>^RESET:<delay_time><CR><LF><CR><LF>>OK<CR><LF></code>
<code>^RESET=?</code>	<code><CR><LF>^RESET:(list of supported <delay_time>s)<CR><LF><CR><LF>OK<CR><LF></code>

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

3.18.4 Property Description

Saving upon Power-off	PIN
NA	N

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, ^SMEMFULL. 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.

3.19.4 Property Description

Saving upon Power-off	PIN
N	N

3.20 ^SLEEP_CFG-Configure Module's Sleep Function by Host

3.20.1 Command Syntax

Command	Possible Response(s)
^SLEEP_CFG=<para>,<val>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^SLEEP_CFG?	<CR><LF>^SLEEP_CFG: <para>,<value>[<CR><LF>^SLEEP_CFG: <para>,<value>[...]]<CR><LF><CR><LF>OK<CR><LF>
^SLEEP_CFG=?	<CR><LF>^SLEEP_CFG: (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 wakes up 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#.

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



Note:

When **<para>** is set to **5** and **<value>** to **0**, make sure data services are disconnected before pulling down WAKEUP_IN#.

3.20.4 Property Description

Saving upon Power-off	PIN
Y	N

3.20.5 Example

The set command:

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

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

```
OK
```

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

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

```
OK
```

The read command:

```
AT^SLEEPCFG?
```

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

```
^SLEEPCFG: 5,1
```

```
OK
```

The test command:

```
AT^SLEEPCFG=?
```

```
^SLEEPCFG: (0-9)
```

```
OK
```

3.21 ^WAKEUPCFG-Configure Module's Remote Wakeup Function by Host

3.21.1 Command Syntax

Command	Possible response(s)
<code>^WAKEUPCFG=<n>[,<channel>[,<source>]]</code>	<code><CR><LF>OK<CR><LF></code> In case of an error: <code><CR><LF>ERROR<CR><LF></code>
<code>^WAKEUPCFG?</code>	<code><CR><LF>^WAKEUPCFG:</code> <code><n>,<channel>,<source><CR><LF><CR><LF></code> <code>OK<CR><LF></code>
<code>^WAKEUPCFG=?</code>	<code><CR><LF>^WAKEUPCFG: (list of supported</code> <code><n>s),(list of supported <channel>s),(list of</code> <code>supported</code> <code><source>s)<CR><LF><CR><LF>OK<CR><LF></code>

3.21.2 Description

The set command enables or disables the module's Remote Wake-up feature, and sets the wake-up channels and sources for the feature.

The read command queries the current configuration of remote wakeup function.

The test command returns the parameter range supported by this command.

Note:

This command only supports the function when the data could wakeup the host by WAKEUP_OUT# currently.

3.21.3 Defined Values

`<n>`: enables or disables the Remote Wake-up feature.

0: Disables the module's Remote Wake-up feature (reserved, not supported currently).

1: Enables the module's Remote Wake-up feature (default value).

`<channel>`: sets Remote Wake-up channels.

The length of this parameter is 1 byte (8 bits). Eight Remote Wake-up channels can be controlled by this parameter. This parameter is entered in decimal format. Each bit of this parameter controls one channel, where:

0: Disables the channel controlled by the bit.

1: Enables the channel controlled by the bit.

Bit[1-7]	Bit[0]
Not defined	Wakeup PIN

0x01 Wakeup PIN (default value)

Other Reserved

<source>: sets Remote Wake-up sources.

The length of this parameter is 2 bytes (16 bits). This parameter is entered in decimal format. Each bit of this parameter controls one source, where:

0: Disables the source controlled by the bit.

1: Enables the source controlled by the bit.

Bit[3-15]	Bit[2]	Bit[1]	Bit[0]
Not defined	DATA	SMS(message)	VOICE

0x0003 Voice + SMS (default value)

0x0007 Voice + SMS + DATA

Other Reserved

The values that NV saved are not influenced by factory default recovery and will not backup when update. This command supports variable-parameter input. If parameters are not input entirely, the previous value will not be changed.

3.21.4 Property Description

Saving upon Power-off	PIN
Y	N

3.21.5 Example

The set command:

If WAKEUP_OUT# is allowed to output a voltage pulse lasting for 1s during data wake-up source arrives:

AT^WAKEUPCFG=1,1,7

OK

The read command

AT^WAKEUPCFG?

^WAKEUPCFG: 1,1,7

OK

The test command

AT^WAKEUPCFG=?

^WAKEUPCFG: (1),(1),(3,7)

OK

3.22 ^MSO-Power Off Module

3.22.1 Command Syntax

Command	Possible Response(s)
^MSO	<CR><LF>OK<CR><LF>

3.22.2 Description

This command is used to power off the module.

3.22.3 Property Description

Saving upon Power-off	PIN
NA	N

3.23 ^IOC-Set GPIO Pin Output Level

3.23.1 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>

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

3.23.2 Description

This command defines values of eight GPIO pins.

3.23.3 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>: describes 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.

3.23.4 Property Description

Saving upon Power-off	PIN
N	N

3.24 ^IOCTRL-Control the GPIO

3.24.1 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>



3.24.2 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

3.24.3 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 are input mode.

00000001: GPIO1 is output mode, others are input mode.

00000010: GPIO2 is output mode, others are input mode.

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

11111111: All GPIO are 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.

3.24.4 Property Description

Saving upon Power-off	PIN
N	N

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 Property Description

Saving upon Power-off	PIN
NA	N



4.1.5 Example

ATI

Manufacturer: Huawei Technologies Co., Ltd.

Model: MU509

Revision: 11.815.00.00.00

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 max 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 Property Description

Saving upon Power-off	PIN
NA	N

4.2.5 Example

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 without double quotation marks.

4.3.4 Property Description

Saving upon Power-off	PIN
NA	N

4.3.5 Example

AT+CGMI

Huawei Technologies Co., Ltd.

OK

AT+GMI



Huawei Technologies Co., Ltd.

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 Property Description

Saving upon Power-off	PIN
NA	N

4.4.5 Example

```
AT+CGMR
11.815.00.00.00

OK

AT+GMR
11.815.00.00.00

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 Property Description

Saving upon Power-off	PIN
NA	N

4.5.5 Example

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 Property Description

Saving upon Power-off	PIN
NA	Y

4.6.5 Example

If the value of MCC is "123", the value of MNC is "45", and 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 identification (ICCID) of a SIM.

4.7.3 Defined Values

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

4.7.4 Property Description

Saving upon Power-off	PIN
NA	N

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 Property Description

Saving upon Power-off	PIN
NA	N

4.8.5 Example

```
AT^HWVER
^HWVER:"MD2MU509M"
```

```
OK
```

4.9 ^SPN-Get Service Provider Name

4.9.1 Command Syntax

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

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>:
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 Property Description

Saving upon Power-off	PIN
Y	Y

4.9.5 Example

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 ^SIMRESET-Report SIM Reset Event

4.10.1 Command Syntax

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

4.10.2 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.



4.10.3 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.

4.10.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.10.5 Example

^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 is 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.

5.1.4 Property Description

Saving upon Power-off	PIN
N	N

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.

5.2.4 Property Description

Saving upon Power-off	PIN
N	N

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 is 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).

5.3.4 Property Description

Saving upon Power-off	PIN
N	N

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).

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)

5.4.4 Property Description

Saving upon Power-off	PIN
N	Y

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: (supported auto detectable rates),(list of supported fixed-only rates)<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.

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

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

5.5.3 Defined Values

<rate>: valid numeric values with bps.

600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 (default value), 230400, 460800, 921600

5.5.4 Property Description

Saving upon Power-off	PIN
Y	N

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> In case of an MT-related error: <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>+IFC: (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.

5.6.4 Property Description

Saving upon Power-off	PIN
N	N

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 <service> setting 1.

6.1.4 Property Description

Saving upon Power-off	PIN
N	N

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-Send Message.

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 mode (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.

6.2.4 Property Description

Saving upon Power-off	PIN
N	Y

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.
- The command of AT&F will not set the parameter of CNMI to factory defined configuration.

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 supported 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.

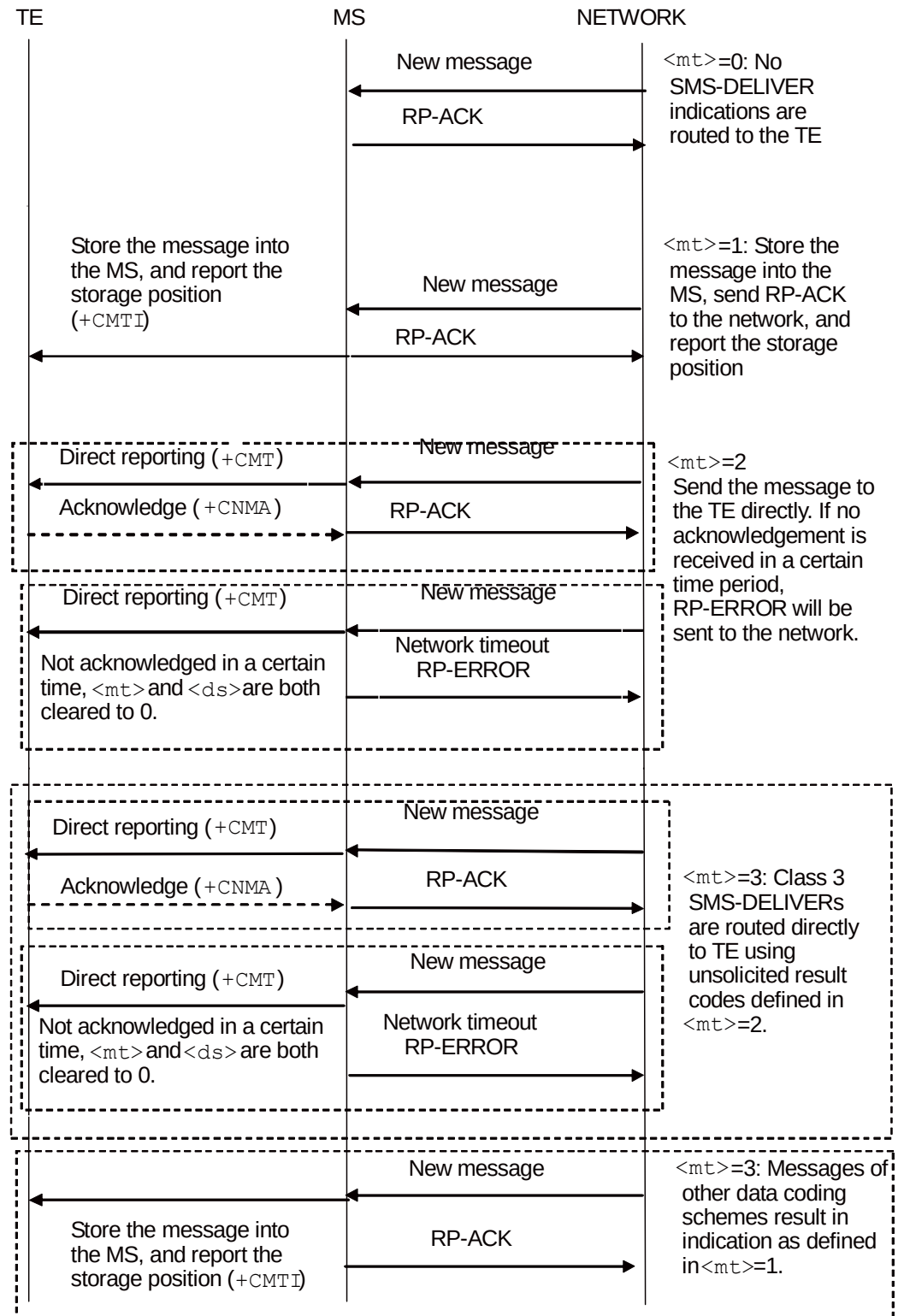
+CMTI: <mem>,<index>

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 +CMGS–Send Message.
- +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> is not recommended to 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>

<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 Property Description

Saving upon Power-off	PIN
N	Y

6.3.5 Example

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: "SM", 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

This command indicates that a new message is received.

6.4.3 Defined Values

<mem>:

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

"ME": ME message storage (not supported currently)

"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.

6.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

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.

- In PDU mode:
 - <length>: integer value, which indicates the number of bytes of PDU data.
 - <pdu>: protocol data unit.
- In 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 +CMGS-Send Message

6.5.4 Property Description

Saving upon Power-off	PIN
NA	NA

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.

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.

6.6.4 Property Description

Saving upon Power-off	PIN
NA	NA

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>: 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 (default value is 17), SMS-STATUS-REPORT, or SMS-COMMAND (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.

6.7.4 Property Description

Saving upon Power-off	PIN
NA	NA

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.

6.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

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.

Note:

Set AT+CSMS=1 before AT+CNMI settings.

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—Send Message, 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

Abbr.	Reference	P1)	P2)	Description
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:

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

		TE according to the user's options)	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.
			00	With voice message waiting.
		bit1~0 (message waiting type)	01	With fax message waiting.
			10	With E-mail message waiting.
			11	Message waiting of other unknown types
			11	Message waiting of other unknown types
	1111 (TE does not select this value either)	bit3	0	Reserved bits, which make no sense.
			0	7bit code
		bit2	1	8bit data
			00	Class 0, providing display and reply to SC that the message is received but not stored.
		bit1~0	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.
			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

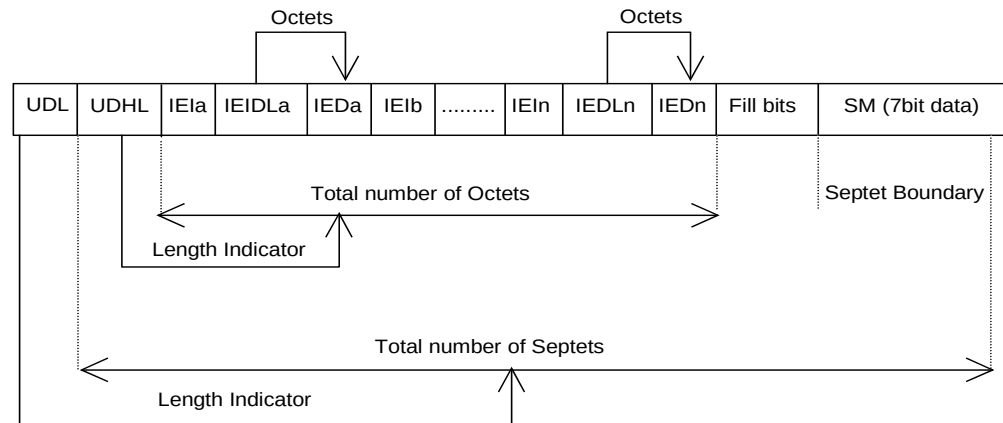
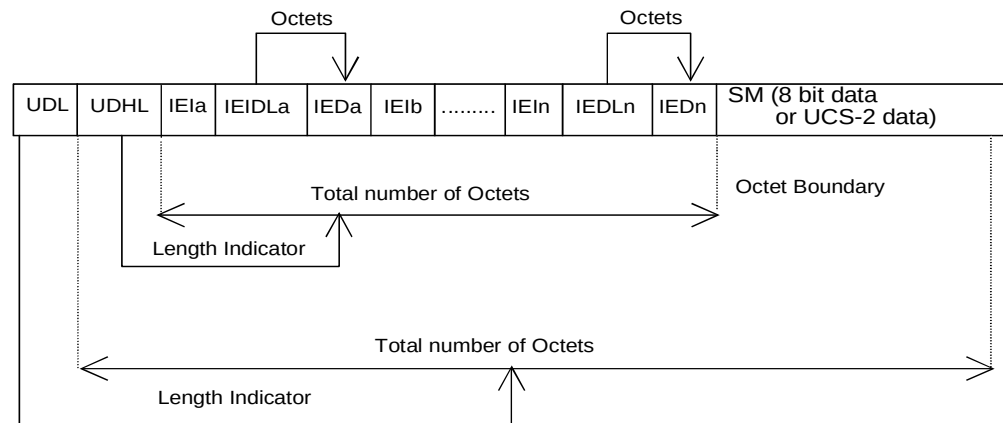


Figure 6-3 Format of User data of 8bit code or UCS2 code



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

Notes:

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

6.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.10 +CPMS-Select Message Storage

6.10.1 Command Syntax

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

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 (reserved, not supported currently)

"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. (reserved, not supported currently)

<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>.

6.10.4 Property Description

Saving upon Power-off	PIN
N	Y

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 +CMGS–Send Message) 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 +CMGS–Send Message.

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

6.11.4 Property Description

Saving upon Power-off	PIN
Y	Y

6.11.5 Example

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:

- In 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).
- In 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 7 bit codec, and 70 characters with UCS2S.

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 range is: 0–255.

<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'

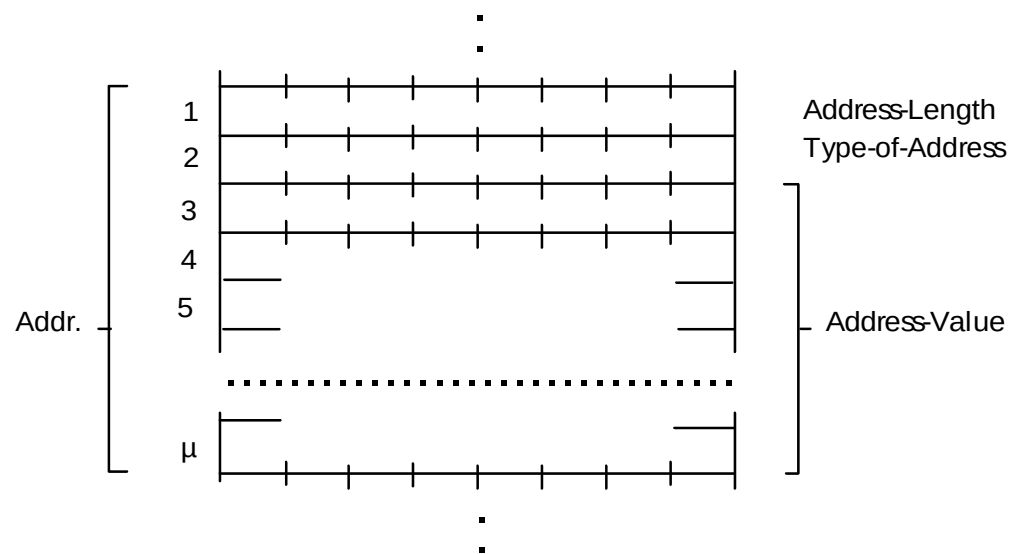
The structure of the PDU packet is as follows: (The values of the characters described in the packet are: 0–9, A–F, a–f. Two characters make up one Octet value. For example: '23'=0x23, '2a'=0x2a, all are hexadecimal)

Table 6-8 The structure of the PDU packet

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

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

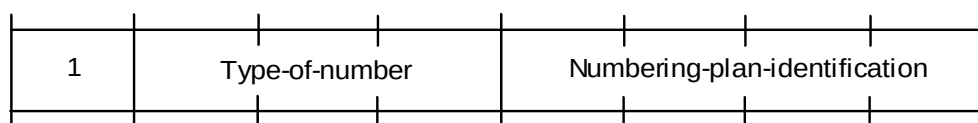
Figure 6-4 The structure of SMSC address



<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.

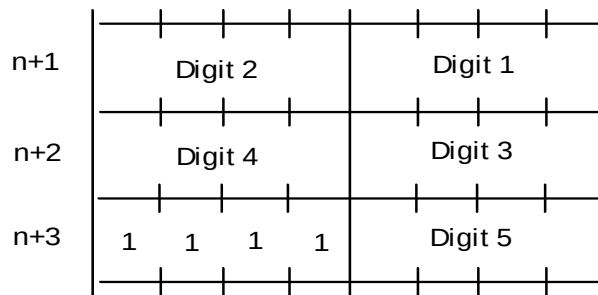
1 0 0 0 National numbering plan, not in use currently.

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

1 0 1 0ERMES 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. Value range: 0–255.

<DA>: DA (destination address), same as defined in SCA. There are a total of 2–120 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 140Octets.

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

6.12.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.12.5 Example

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
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

This command stores a message to the <mem2> storage and set via the "+CPMS" command.

6.13.3 Defined Values

In 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 (when AT+CSMP <fo> indicates message type as non-submit)

1: "REC READ" Received read message (when AT+CSMP <fo> indicates message type as non-submit)

2: "STO UNSENT" Stored unsent message (when AT+CSMP <fo> indicates message type as submit, or <fo> is default value)

3: "STO SENT" Stored sent message (when AT+CSMP <fo> indicates message type as submit, or <fo> is default value)

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 to maximum capacity of storage of –1.

The PDU packet structure is consistent with the description of +CMGS–Send Message.

In 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.

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

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

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

6.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.14 +CMGL-List Message List

6.14.1 Command Syntax

Command	Possible Response(s)
+CMGL[=<stat>]	In case of PDU mode and successful execution of command: <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> If text mode, command successful and SMS-SUBMITs and/or SMS-DELIVERs: <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> If text mode, command successful and SMS-STATUS-REPORTs: <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> Otherwise: <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

In 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							OA	PID	DCS	SCTS	UDL	UD
Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7					

<MTI>: 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 2–12Octets. 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.

In 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 value is 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>: 3GPP TS 24.011 TP-Recipient-Address Type-of-Address octet in integer format (when first character of <ra> is + (IRA 43) default value is 145, otherwise default value 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 2–12Octets. 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-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"

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

<data>: data unit to send.

Note:

If the <stat> message does not exist, the read command will return OK.

6.14.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.15 +CMGR-Read A Message

6.15.1 Command Syntax

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

<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.

6.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

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

6.16.4 Property Description

Saving upon Power-off	PIN
Y	Y

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 to 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 to 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).

6.17.4 Property Description

Saving upon Power-off	PIN
N	Y

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 MT-related error: <CR><LF>+CME 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>:

If <fo> indicates validity period as relative format: integer value, range from 0 to 255.

If <fo> indicates validity period as absolute format: string value.

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

<dcs>: 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.

6.18.4 Property Description

Saving upon Power-off	PIN
N	Y

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 MT-related error: <CR><LF>+CME 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.

6.19.4 Property Description

Saving upon Power-off	PIN
N	Y

6.20 +CMSS-Send Message from Storage

6.20.1 Command Syntax

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

6.20.3 Property Description

Saving upon Power-off	PIN
NA	Y

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 (reserved, not supported currently)

6.21.4 Property Description

Saving upon Power-off	PIN
NA	NA

6.22 ^MWMSG-Query and Report Voice Mail Message

6.22.1 Command Syntax

Command	Possible Response(s)
^MWMSG?	<CR><LF>^MWMSG: <indicator>,<count>,<length>,<msg><CR><LF><CR><LF>OK<CR><LF>
	<CR><LF>^MWMSG: <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 +CMTI (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. It indicates the number of bytes of TPDU data of voice mail.

<msg>: protocol data unit of the voice mail msg.

6.22.4 Property Description

Saving upon Power-off	PIN
NA	NA

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' and '+'. '+' 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.

6.23.4 Property Description

Saving upon Power-off	PIN
Y	NA

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 MT-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>

Command	Possible Response(s)
+CSVM?	<CR><LF>+CSVM: <mode>,<number>,<type><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+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 MT-related error: <CR><LF>+CME 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 21.2 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

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.



6.24.4 Property Description

Saving upon Power-off	PIN
Y	NA

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: lists of supported (<fac>,<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.

7.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.2 +CLCK-Enable and Query PIN

7.2.1 Command Syntax

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

Command	Possible Response(s)
+CLCK=?	<CR><LF>+CLCK: (list of supported <fac>s)<CR><LF><CR><LF>OK<CR><LF>

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 UMTS supplementary services (refer 3GPP TS 22.088). The interaction of these with other commands based on other UMTS supplementary services is described in the 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": BAOC (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 (USIM) fixed dialing memory feature

"PN": Network personalization

"PU": Network subset 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 Property Description

Saving upon Power-off	PIN
Y	Y

7.2.5 Example

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>

Command	Possible Response(s)
+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, PIN2 and PH-NET PIN.

If the current password input request is PIN, PIN2 or PH-NET PIN, 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'. Legal length is from 4 to 8.

<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.

PH-NET PIN: MT is waiting network personalization password to be given.

SIM PIN2: PIN2 password request.

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

7.3.4 Property Description

Saving upon Power-off	PIN
N	N

7.4 ^CPIN-PIN Management

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 check and unlock the PIN and PUK.

If the current password inputting request is PIN or PIN2, input "+CPIN=<pin>" to check. If the current password inputting 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 there is no PIN inputting request currently, an error message "+CME ERROR" 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'. Legal length is from 4 to 8.

<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 after verification fail at the third time.

SIM PIN2: PIN2 password request.

SIM PUK2: PUK2 password request to unblock the SIM PIN2 which was blocked after verification fail at the third time.

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

Note:

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

Otherwise, <times> will be empty.

<puk_times>: remaining PUK verification times, the maximum is ten.

<pin_times>: remaining PIN verification times, the maximum is three.

<puk2_times>: remaining PUK2 verification times, the maximum is ten.

<pin2_times>: remaining PIN2 verification times, the maximum is three.

7.4.4 Property Description

Saving upon Power-off	PIN
N	N

8 Call Control Commands

8.1 D-Originate Call

8.1.1 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 MT-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>

8.1.2 Description

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

Notes:

- Voice call command needs the semicolon, but data call command couldn't have the semicolon.
- This command shall not be used for USSD request. According to 3GPP TS 27.007, +CUSD will be used for USSD request.

8.1.3 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 (excluding '+').

Notes:

- The modifiers "D T W @ ! \$ A B C" are not supported and will be ignored when appearing in the dial string. The modifiers "P," are supported for DTMF pause.
- '+' indicates an 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 cannot 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

8.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.2 A-Answer Call

8.2.1 Command Syntax

Command	Possible Response(s)
A	Data call: <CR><LF>CONNECT [<text>]<CR><LF> Voice call: <CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.2.2 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.

8.2.3 Defined Values

<text>: indicator of interface speed.

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

USB: 384000

8.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.3 O-Return to Data State

8.3.1 Command Syntax

Command	Possible Response(s)
O[<value>]	<CR><LF>CONNECT [<text>]<CR><LF> <CR><LF>NO CARRIER<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR <err><CR><LF>

8.3.2 Description

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

8.3.3 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".

8.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.4 +++-Switch Data Mode to Command Mode

8.4.1 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>

8.4.2 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 900ms before and after inputting "+++", and it must be less than 900ms between two '+' input.

Note:

Not Support PCUI port.

8.5 +CRC-Set Cellular Result Codes

8.5.1 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>

8.5.2 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.

8.5.3 Defined Values

<mode>:

0: Disables extended format (default value)

1: Enables extended format

<type>:

ASYNC [,<priority>[,<subaddr>,<satype>]] asynchronous transparent

SYNC [,<priority>[,<subaddr>,<satype>]] synchronous transparent

REL ASYNC [,<priority>[,<subaddr>,<satype>]] asynchronous non-transparent

REL SYNC [,<priority>[,<subaddr>,<satype>]] synchronous non-transparent

VOICE [,<priority>[,<subaddr>,<satype>]] normal voice (TS 11)

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 <mode> of "AT+CRC" will be set to 0.

8.5.4 Property Description

Saving upon Power-off	PIN
N	Y

8.6 +CHUP-Hangup call

8.6.1 Command Syntax

Command	Possible Response(s)
+CHUP	<CR><LF>OK<CR><LF>
+CHUP=?	<CR><LF>OK<CR><LF>

8.6.2 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.

8.6.3 Property Description

Saving upon Power-off	PIN
NA	N

8.7 +CSTA-Select Type of Address

8.7.1 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>

8.7.2 Description

The set command selects the type of number for further dialing commands (D) according to UMTS specifications. Test command returns values supported a compound value.

8.7.3 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.

8.7.4 Property Description

Saving upon Power-off	PIN
N	Y

8.8 +CBST-Select Bearer Service Type

8.8.1 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>

8.8.2 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.

8.8.3 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) (reserved, not supported)

134: 64000 bps (multimedia) (reserved, not supported)

<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.

8.8.4 Property Description

Saving upon Power-off	PIN
N	Y

8.9 +CLCC-List Current Calls

8.9.1 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><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>

Command	Possible Response(s)
+CLCC=?	<CR><LF>OK<CR><LF>

8.9.2 Description

The execution command is used to return the list of current calls of MS.

8.9.3 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 (refer 3GPP TS 24.008 subclause 10.5.4.7).

8.9.4 Property Description

Saving upon Power-off	PIN
NA	N

8.9.5 Example

```
AT+CLCC  
+CLCC: 1,0,3,0,0,"13801000841",129
```

```
OK
```

8.10 H-Hook Control

8.10.1 Command Syntax

Command	Possible Response(s)
H[<value>]	<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>

8.10.2 Description

The execution command is used to terminate data call in progress by default.

8.10.3 Defined Values

<value>:

0: Terminate data call in progress by default.

Note:

Only if the value is 0, data call can be terminated. ATH and ATH0 have the same function.

8.10.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.11 S0-Ring Before Automatic Answer

8.11.1 Command Syntax

Command	Possible Response(s)
S0=<value>	<CR><LF>OK<CR><LF>
S0?	<CR><LF><value><CR><LF><CR><LF>OK<CR><LF>

8.11.2 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.

8.11.3 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 is reset.

8.11.4 Property Description

Saving upon Power-off	PIN
N	N

8.12 ^AUTOANSWER-Auto Answer

8.12.1 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>

8.12.2 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 command 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.

8.12.3 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.

8.12.4 Property Description

Saving upon Power-off	PIN
Y	N

8.13 ^DTMF-Send DTMF Key Value

8.13.1 Command Syntax

Command	Possible Response(s)
<code>^DTMF=<call_id>,<dtmf_digit></code>	<code><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>ERROR<CR><LF></code> or <code><CR><LF>+CME ERROR: <err><CR><LF></code>

8.13.2 Description

The execution command is used to send DTMF key value to network during voice call.

8.13.3 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.

8.13.4 Property Description

Saving upon Power-off	PIN
N	Y

8.14 ^ORIG-Indicate Call Origination

8.14.1 Command Syntax

Command	Possible Response(s)
	<code><CR><LF>^ORIG:<call_id>,<call_type><CR><LF></code>

8.14.2 Description

This command indicates that MS is originating a voice call or an emergency call.

8.14.3 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

8.14.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.15 ^CONF-Indicate Call Origination Accepted

8.15.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>^CONF:<call_id><CR><LF>

8.15.2 Description

MS originate a call, and if the call is accepted by network, MS will report ^CONF to TE.

8.15.3 Defined Values

<call_id>: the ID of the current call. The value ranges from 1 to 9.

8.15.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.16 ^CONN-Indicate Call Connection

8.16.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>^CONN:<call_id>,<call_type><CR><LF>

8.16.2 Description

This command indicates that the call is accepted by the target UE.

8.16.3 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

8.16.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.17 ^CEND-Indicate Call End

8.17.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>^CEND:<call_id>,<duration>,<end_status>[,<cc_cause>]<CR><LF>

8.17.2 Description

This command indicates that the call is hung up.

8.17.3 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 call.
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 client.
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



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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.

8.17.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.18 RING–Indicate Incoming Call

8.18.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>RING<CR><LF>

8.18.2 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.

8.18.3 Property Description

Saving upon Power-off	PIN
NA	NA

8.19 +CRING–Indicate Incoming Call

8.19.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>+CRING: <type><CR><LF>

8.19.2 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–Set Cellular Result Codes.

8.19.3 Property Description

Saving upon Power-off	PIN
NA	NA

8.20 ^DDTMFCFG-DTMF Decoder configuration command

8.20.1 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>

8.20.2 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.

8.20.3 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.

8.20.4 Property Description

Saving upon Power-off	PIN
Y	N

8.20.5 Example

```
AT^DDTMFCFG=0,1
```

```
OK
```

```
AT^DDTMFCFG?
```

```
^DDTMFCFG: 0,1
```

```
OK
```

```
AT^DDTMFCFG=?
```

```
^DDTMFCFG: (0)
```

```
OK
```

8.21 ^DDTMF-Unsolicited Report of DTMF Characters Sent by the Remote Subscriber

8.21.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>^DDTMF: <key><CR><LF>

8.21.2 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.

8.21.3 Defined Values

<key>: value type: character; value range: [0–9, A–D, *, #].

8.21.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.21.5 Example

^DDTMF: 1

9 Supplementary Service Commands

9.1 +CHLD–Set Call Related Supplementary Services

9.1.1 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> or <CR><LF>+CME ERROR: <err><CR><LF>
+CHLD=?	<CR><LF>+CHLD: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

9.1.2 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.

9.1.3 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 specified call (in originate connecting status, held 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 held calls to the conversation. The maximum number of remote parties is 5.

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".
- Refer to 3GPP TS 27.007 subclause 9.2 for possible <err> values.

9.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.2 +CCFC-Set Call Forwarding Number and Conditions

9.2.1 Command Syntax

Command	Possible Response(s)
+CCFC=<reason>,<mode>,<number>,<type>,<class>,<subaddr>,<satype>,<time>]]]]]]	when <mode>=2 and command successful: <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> In case of an MT-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
+CCFC=?	<CR><LF>+CCFC: (list of supported <reason>s)<CR><LF><CR><LF>OK<CR><LF>

9.2.2 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.

9.2.3 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); 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); default value is 128.

<class> is a sum of integers each representing a class of information (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 (not supported)
- 16: Data circuit sync
- 32: Data circuit async
- 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 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>: the 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, default value is 20.

<status>:

0: Not active

1: Active

9.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.3 +CLIP–Set Calling Line Identification Status

9.3.1 Command Syntax

Command	Possible Response(s)
+CLIP[=<n>]	<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>
+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>

9.3.2 Description

This command refers to the 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.

9.3.3 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".

9.3.4 Property Description

Saving upon Power-off	PIN
N	Y

9.4 +CLIP-Report of Calling Line Identification

9.4.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>+CLIP: <number>,<type>,,,<CLI validity><CR><LF>

9.4.2 Description

An unsolicited report will be sent to TE after RING every 5 seconds if +CLIP is enabled by the set command of CLIP.

9.4.3 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-Send Message.

<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.

9.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.4.5 Example

<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

9.5 +CLIR-Set Calling Line Identification Restriction Status

9.5.1 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> or <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>

9.5.2 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.

9.5.3 Defined Values

<n> (parameter sets the adjustment for outgoing calls):

0: Presentation indicator is used according to the subscription of the CLIR service (default value).

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".

9.5.4 Property Description

Saving upon Power-off	PIN
N	Y

9.6 +CCWA–Set Call Waiting Status

9.6.1 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>

9.6.2 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>.

9.6.3 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)
- 4: Fax (facsimile services)
- 8: Short message service (not supported)
- 16: Data circuit sync
- 32: Data circuit async
- 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 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.
- <status>:
- 0: Not active
- 1: Active

Note:

The "AT+CCWA" is the same as "AT+CCWA=0".

9.6.4 Property Description

Saving upon Power-off	PIN
N	Y

9.7 +CCWA–Report of Call Waiting

9.7.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>+CCWA: <number>,<type>,<class>,,<CLI validity><CR><LF>

9.7.2 Description

When the Call Waiting supplementary service is active an unsolicited report will be generated when there is an incoming call.

9.7.3 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);

<class> is a sum of integers each representing a class of information (default 7 only supports telephony):

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 (not supported)

16: Data circuit sync

32: Data circuit async

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 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.

<CLI validity>: integer type

0: CLI valid

1: CLI has been withheld by the originator.

2: CLI is not available due to interworking problems or limitations of originating network.

9.7.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.8 +CUSD-USSD Command

9.8.1 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>

9.8.2 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.

9.8.3 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 USSD (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 USSD (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

9.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.9 ^USSDMODE-Set USSD mode

9.9.1 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>

Command	Possible Response(s)
^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>

9.9.2 Description

The execution 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.

9.9.3 Defined Values

<mode>:

0: USSD non-transparent transfer mode (default value)

1: USSD transparent transfer mode

9.9.4 Property Description

Saving upon Power-off	PIN
N	N

10 Audio Commands

10.1 ^SWSPATH-Switch Sound Path

10.1.1 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>

10.1.2 Description

This command is used to switch sound path in voice call. Resetting the module will not affect the value. Module updating will reset the value to default value.

10.1.3 Defined Values

<n>:

0: Handset (default value)

1: Speaker

2: PCM

10.1.4 Property Description

Saving upon Power-off	PIN
Y	N

10.2 ^CPCM-Configure PCM Audio

10.2.1 Command Syntax

Command	Possible Response(s)
^CPCM=<mode>,<format>,<clock>,<frame>,<offset>	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>
^CPCM?	<CR><LF>^CPCM: <mode>,<format>,<clock>,<frame>,<offset><CR><LF><CR><LF>OK<CR><LF>
^CPCM=?	<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>

10.2.2 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.

10.2.3 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).

10.2.4 Property Description

Saving upon Power-off	PIN
Y	N

10.3 +CMIC-Tune Microphone Gain Level

10.3.1 Command Syntax

Command	Possible Response(s)
+CMIC=<level>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CMIC?	<CR><LF>+CMIC: <level><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CMIC=?	<CR><LF>+CMIC: (list of supported <level>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

10.3.2 Description

This command is used to adjust the microphone gain of the MT.

The test command returns supported values as compound value.

10.3.3 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.

10.3.4 Property Description

Saving upon Power-off	PIN
Y	N

10.4 +CLVL-Tune Loudspeaker Volume Level

10.4.1 Command Syntax

Command	Possible Response(s)
+CLVL=<level>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CLVL?	<CR><LF>+CLVL: <level><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CLVL=?	<CR><LF>+CLVL: (list of supported <level>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

10.4.2 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.

10.4.3 Defined Values

<level>:

0–5: integer type value with manufacturer specific range (smallest value represents the lowest sound level). Default value is 2. Resetting the module will not affect the value. Module updating will reset the value to default value.

10.4.4 Property Description

Saving upon Power-off	PIN
Y	N

10.5 +CMUT-Switch Mute Status

10.5.1 Command Syntax

Command	Possible Response(s)
+CMUT=<n>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CMUT?	<CR><LF>+CMUT: <n><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CMUT=?	<CR><LF>+CMUT: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

10.5.2 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.

10.5.3 Defined Values

<n>:

0: Mute off (default value)

1: Mute on

This value is restored to 0 when voice call is ended.

10.5.4 Property Description

Saving upon Power-off	PIN
Y	Y

10.6 +VTS–Generate DTMF and Tone

10.6.1 Command Syntax

Command	Possible Response(s)
+VTS=<DTMF_CHAR>[,<duration>]	<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>
+VTS=?	<CR><LF>+VTS: (list of supported <DTMF_CHAR>s)<CR><LF><CR><LF>OK<CR><LF>

10.6.2 Description

This command is intended to send ASCII characters which cause the Mobile Switching Center (MSC) to transmit DTMF tones to a remote subscriber. The command can only be used during active voice calls and offers the following rules:

AT+VTS=<DTMF_CHAR>[,<duration>] allows to send a single DTMF tone. In this case, the duration can be individually determined during the call.

10.6.3 Defined Values

<DTMF_CHAR>: a single ASCII character in the set 0-9, #, *, A, B, C, D.

Note:

Lower case a,b,c,d will be treated as capital A,B,C,D .

<duration>: tone duration in 1/10 seconds with tolerance. The minimum duration of DTMF signals is 100ms (default value).

1–255: Duration of a tone in 1/10 second

10.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.7 ^ECHO-Switch Echo Canceller Mode

10.7.1 Command Syntax

Command	Possible Response(s)
^ECHO=<n>	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR: <err><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>

10.7.2 Description

This command is used to switch the echo canceller mode before a voice call.

The test command returns supported values as compound value.

10.7.3 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 64ms 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.

10.7.4 Property Description

Saving upon Power-off	PIN
Y	N

10.8 ^KEYTONE–Play Local DTMF Key Tone

10.8.1 Command Syntax

Command	Possible Response(s)
<code>^KEYTONE=<key>[,<duration>]</code>	<code><CR><LF>OK<CR><LF></code> <code><CR><LF>ERROR<CR><LF></code>
<code>^KEYTONE=?</code>	<code><CR><LF>^KEYTONE: (list of supported <key>s)<CR><LF><CR><LF>OK<CR><LF></code>

10.8.2 Description

This command is used to play the DTMF key tone local.

The test command returns supported values as compound value.

10.8.3 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).

10.8.4 Property Description

Saving upon Power-off	PIN
Y	N

10.9 ^AUDIOCFG–Set Tone Volume Level

10.9.1 Command Syntax

Command	Possible Response(s)
<code>^AUDIOCFG=<tone_type>,<tone_volume></code>	<code><CR><LF>OK<CR><LF></code> <code><CR><LF>ERROR<CR><LF></code>
<code>^AUDIOCFG?</code>	<code><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></code>

Command	Possible Response(s)
^AUDIOCFG=?	<CR><LF>^AUDIOCFG: (list of supported <tone_type>s)<CR><LF><CR><LF>OK<CR><LF>

10.9.2 Description

This command is used to set the volume of specific type tone.

The test command returns supported values as compound value.

10.9.3 Defined Values

<tone_type>: 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.

10.9.4 Property Description

Saving upon Power-off	PIN
Y	N

10.10 ^STN-Switch Sidetone Status

10.10.1 Command Syntax

Command	Possible Response(s)
^STN=<vol>	<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF> or <CR><LF>ERROR<CR><LF>
^STN?	<CR><LF>^STN:<vol><CR><LF><CR><LF>OK<CR><LF>
^STN=?	<CR><LF>^STN:(list of <vol>s)<CR><LF><CR><LF>OK<CR><LF>

10.10.2 Description

This command is used to enable and disable the sidetone before a voice call. During a voice call this setting cannot be changed.

The test command returns supported values as compound value.

10.10.3 Defined Values

<vol>:

0: Sidetone off

1: Sidetone on (default value)

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

10.10.4 Property Description

Saving upon Power-off	PIN
Y	N

10.11 ^ECHOPARA–Set Echo Suppression Parameters

10.11.1 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>

10.11.2 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.

10.11.3 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 (The default value is 1.)

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.

10.11.4 Property Description

Saving upon Power-off	PIN
Y	N

10.11.5 Implementation

Huawei proprietary interface

Optional

10.11.6 Example

AT^ECHOPARA=?

^ECHOPARA: (0–1)

OK

AT^ECHOPARA?

^ECHOPARA: 0,1

^ECHOPARA: 1,6

OK

AT^ECHOPARA=0,0

OK

10.12 ^RXGAIN-Set Codec RX Gain

10.12.1 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>
^RXGAIN?	<CR><LF>^RXGAIN: <codec_rx_gain><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>

Command	Possible response(s)
<code>^RXGAIN=?</code>	<code><CR><LF>^RXGAIN: (list of supported <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>

10.12.2 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.

10.12.3 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.

10.12.4 Property Description

Saving upon Power-off	PIN
Y	N

10.12.5 Example

```
AT^RXGAIN=6
```

```
OK
```

```
AT^RXGAIN=?
```

```
^RXGAIN: (1-12)
```

```
OK
```

```
AT^RXGAIN?
```



^RXGAIN: 6

OK

11 Phonebook Commands

11.1 +CPBS-Select Phonebook Memory

11.1.1 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>

11.1.2 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.

11.1.3 Defined Values

<storage>: phonebook memory type. Currently, only "SM","ON","FD","EN" are supported.

"SM": SIM/UICC phonebook

"DC": MT dialed calls list (reserved, not supported currently)

"FD": SIM/USIM fix-dialing phonebook

"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 (CPBW may not be applicable for this storage)

<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.

11.1.4 Property Description

Saving upon Power-off	PIN
N	Y

11.2 +CPBF-Query Phonebook Query

11.2.1 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>

11.2.2 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

11.2.3 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.

11.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.3 +CPBR–Read Phonebook Entries

11.3.1 Command Syntax

Command	Possible Response(s)
+CPBR=<index1>[,<index2>]	[<CR><LF>+CPBR: <index1>,<number>,<type>,<text>[,<hidden>]][...]<CR><LF> +CPBR: <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>

11.3.2 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).

11.3.3 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 +CSCS–Select TE Character Set.

<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.

11.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.4 +CPBW–Write Phonebook Entry

11.4.1 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>

Command	Possible Response(s)
+CPBW=?	<code><CR><LF>+CPBW: (list of supported <index>s),[<nlength>],(list of supported <type>s),[<tlength>]<CR><LF><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>+CME ERROR: <err><CR><LF></code>

11.4.2 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.

11.4.3 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) ; the default value is 145 when dialling string includes international access code character "+", otherwise 129.

`<text>`: string type field of maximum length `<tlength>`; character set as specified by +CSCS–Select TE Character Set.

`<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.

11.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.5 ^CPBR–Read Phonebook

11.5.1 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>

11.5.2 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>, and <text>.

11.5.3 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 +CMGS–Send Message.

<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.

11.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.6 ^CPBW–Write Phonebook

11.6.1 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>

11.6.2 Description

This command writes the phonebook entries into the position specified by "index" in the currently selected phonebook memory. The <number> field cannot be null and the <text> field can be null. 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, and maximum length of the "text" field. When storing the phonebook, all input lengths must fall within the maximum length range.

11.6.3 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 +CMGS—Send Message.

<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.

11.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.6.5 Example

```
AT^CPBW=1,"28780808",129,"80534E4E3A",1
```

```
OK
```

Notes:

- 1 (the location of this record in the memory);
- "28780808" (telephone number);
- 129 (number style);
- "80534E4E3A" (name Huawei);
- 1 (encode format of UCS2)

11.7 ^ECCLIST-Read the Emergency Number

11.7.1 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>

11.7.2 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 function of querying the emergency number.

11.7.3 Defined Values

<list of supported eccs>: string type, telephone number. (legal characters only include: '0'-'9', '*', '#'. It can support 18 emergency numbers, and each number can have a maximum length of 6 digits.

11.7.4 Property Description

Saving upon Power-off	PIN
NA	N

11.7.5 Example

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
```

11.8 +CGREG-PS Domain Registration Status

11.8.1 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>

11.8.2 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.

11.8.3 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.)

11.8.4 Property Description

Saving upon Power-off	PIN
N	Y

12

Commands for UMTS Packet Domain

12.1 +CGDCONT-Define PDP Context

See the +CGDCONT command described in 3GPP TS 27.007. The following description is for reference only. Observe the 3GPP specifications if the following description conflicts with the 3GPP specifications.

12.1.1 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 MT-related 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><CR><LF>OK<CR><LF>

12.1.2 Description

The MT locally saves a group of PDP contexts with <cid> as the index. Each record of the saved setting environment contains a group of PDP-related parameters. SET command saves the group of PDP-related parameters in the PDP contexts that use <cid> as the index. Each PDP context is initially undefined. After SET command saves a group of parameters in a PDP context, the PDP context is defined. The number of

defined PDP contexts that can be saved at the same time is determined by the value range of <cid>.

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

READ command returns the current settings for each defined context displayed in a separate line.

Note:

If all PDP contexts are undefined, the default parameters of PDP context are returned. In which, the default value of <cid> is 1, and it will be saved when MT is powered off.

TEST command returns all the values supported for each context. In the response, the <PDP_type> value supported by the MT is taken as the index and displayed in a separate line. Each context has a confirmed <PDP_type> value and includes the supported value ranges of other parameters with the specified <PDP_type> value. Each context is displayed in a separate line.

12.1.3 Defined Values

<cid>:

1–16: Index of a PDP context. Other PDP-related commands can use this index to use the defined PDP context. The PDP context in index 15 is used for AGPS, and it is not suggested to be used for packet data service.

<PDP_type>: a string parameter that specifies the type of packet data protocol.

"IP": Internet Protocol

"PPP": Point to point Protocol (not supported currently)

"IPV6": IPV6 Protocol (not supported currently)

"IPV4V6": IPV4V6 Dual Stack (not supported currently)

<APN>: a string parameter which is a logical name that is used to select the GGSN or the external packet data network. The maximum length of <APN> is 100 characters. If the value is null or omitted, the subscription value will be requested.

<PDP_addr>: a string parameter that identifies the MT in the IPv4 address space applicable to the PDP. If the values of <PDP_addr> is got dynamically, READ command returns "" or "0.0.0.0" (not supported currently).

<d_comp>: a numeric parameter that controls PDP data compression (not supported currently).

0: Off

1: On

2: V.42bis

3: V.44 (not supported currently)

If <d_comp> is not specified in the command, it is equivalent to <d_comp>=0.

<h_comp>: a numeric parameter that controls PDP header compression (not supported currently).

0: Off

1: On

2: RFC1144 (applicable for SNDCP only)

3: RFC2507

4: RFC3095 (applicable for PDCP only)

If <h_comp> is not specified in the command, it is equivalent to <h_comp>=0.

12.1.4 Property Description

Saving upon Power-off	PIN
Y	N

12.1.5 Implementation

Follow the 3GPP TS 27.007 3d0

Mandatory unless only a single subscribed context is supported.

12.1.6 Example

- Step 1

AT+CGDCONT=?

+CGDCONT: (1-16),"IP",,,(0-2),(0-4)

OK

- Step 2

AT+CGDCONT?

+CGDCONT: 1,"IP","vcol.com","0.0.0.0",0,0

OK

Note:

The MT saves one PDP context, and the <cid> value of this context is 1.

- Step 3

AT+CGDCONT=16,"IP","abc.com"

OK

Note:

This command saves one PDP context to the MT and the <cid> value is 16.

- Step 4

AT+CGDCONT?

+CGDCONT: 1,"IP","vcol.com","0.0.0.0",0,0

+CGDCONT: 16,"IP","abc.com","0.0.0.0",0,0

OK

Note:

The response shows that the PDP context has been successfully saved to the MT at the previous step.

- Step 5

AT+CGDCONT=16

OK

Note:

This command removes the PDP context with <cid> 16.

- Step 6

AT+CGDCONT?

+CGDCONT: 1,"IP","vcol.com","0.0.0.0",0,0

OK

Note:

The response shows that the PDP context with <cid> 16 has been removed.

12.2 +CGATT-Attach or Detach PS Domain

12.2.1 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>

Command	Possible Response(s)
+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>

12.2.2 Description

SET command is used to attach the MT to, or detach the MT from, the packet-switched (PS) domain service. After the command has been completed, the MT remains in V.25ter command state. If the MT is already in the requested state, the command is ignored and OK is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command.

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

READ command returns the current GPRS service state.

TEST command is used for requesting information about the supported PS domain service states

12.2.3 Defined Values

<state>: indicates the state of PS domain service.

0: Detached

1: Attached

Other values are reserved and will result in an ERROR response to the execution command.

12.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

12.2.5 Implementation

Follow the 3GPP TS 27.005 320

Optional

12.3 +CGDATA–Enter Data State

12.3.1 Command Syntax

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

12.3.2 Description

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.25ter online data state.

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

The detailed behavior after the online data state has been entered is dependent on the PDP type. It is described briefly in 3GPP TS 27.060 and in more detail in 3GPP TS 29.061 and the specifications for the relevant PDPs.

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.25ter 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.25ter 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.

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.

12.3.3 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.

M-xxxx: Manufacturer-specific protocol (xxxx is an alphanumeric string) (not supported currently).

If the value is omitted, the layer 2 protocol is unspecified. Other values are reserved and will result in an ERROR response.

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

12.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

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;

Typically, the text will consist of a single line containing the cause information given by 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>.

13.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

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 5 dBm, 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: Equal to or less than -113 dBm

1: -111 dBm

2-30: -109 to -53 dBm

31: Equal to or higher than -51 dBm

99: Unknown or immeasurable.

13.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

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: $RSCP \leq -109$ dBm

1: -109 dBm < $RSCP \leq -97$ dBm

2: -97 dBm < $RSCP \leq -85$ dBm

3: -85 dBm < $RSCP \leq -73$ dBm

4: -73 dBm < $RSCP \leq -61$ dBm

5: $RSCP > -61$ dBm

13.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

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

13.4.4 Property Description

Saving upon Power-off	PIN
N	N

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.

5: WCDMA mode

<sys_submode>: system sub mode. The values are as follows:

- 0: No service.
- 4: WCDMA mode
- 5: HSDPA mode

13.5.4 Property Description

Saving upon Power-off	PIN
NA	N

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

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

4: WCDMA mode

5: HSDPA mode

13.6.4 Property Description

Saving upon Power-off	PIN
NA	N

13.6.5 Example

AT^SYSINFO

^SYSINFO: 0,0,0,0,255,,0

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

14: WCDMA ONLY (default value)

16: No change

<acqorder>: network access sequence reference:

0: Automatic search

1: GSM first, WCDMA later (not support 2G)

2: WCDMA first, GSM later (default value) (not support 2G)

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:

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.

13.7.4 Property Description

Saving upon Power-off	PIN
NA	N

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>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>

Command	Possible Response(s)
^RESETCNT=<clear_flag>	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>

13.8.2 Description

This command is 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.

13.8.4 Property Description

Saving upon Power-off	PIN
NA	N

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 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.)

14.1.4 Property Description

Saving upon Power-off	PIN
N	Y

14.2 +COPS-Select Operator

14.2.1 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>

Command	Possible Response(s)
+COPS=?	<code><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)]</code> <code><CR><LF><CR><LF>OK<CR><LF></code> In case of an MT-related error: <code><CR><LF>+CME ERROR: <err><CR><LF></code>

14.2.2 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 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.

Notes:

- 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.

14.2.3 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)

2: WCDMA

14.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

14.2.5 Example

(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.)

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

14.3 +CSQ-Query RSSI

14.3.1 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>

14.3.2 Description

The set command returns the RSSI and BER of ME.

The test command returns the supported RSSI and BER values.

14.3.3 Defined Values

<rss>: indication of the receiving signal strength.

0: Equal to or less than -113 dBm

1: -111 dBm

2-30: -109 to -53 dBm

31: Equal to or higher than -51 dBm

99: Unknown or unmeasurable.

<ber>(bit error rate): currently, the BER query is not supported, and 99 will be returned after issuing the set or test command.

14.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

14.4 +CNUM-Query Subscriber Number

14.4.1 Command Syntax

Command	Possible Response(s)
+CNUM	[<CR><LF>+CNUM: [<alpha1>],<number1>,<type1>[,<speed>,<service>[,<itc>]]][<CR><LF>+CNUM: [<alpha2>],<number2>,<type2>[,<speed>,<service>[,<itc>]]][...]]<CR><LF><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CNUM=?	<CR><LF>OK<CR><LF>

14.4.2 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 UMTS 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.

Note:

It need send the "AT\$QCPBMPREF=2" before sending "AT+cnum". The command of AT\$QCPBMPREF=2 is used to set the session appropriately for getting the MSISDN (2 is for USIM session on slot 1).

14.4.3 Defined Values

<alphax>: optional alphanumeric string associated with <numberx>; used character set should be the one selected with command Select TE Character Set
+CSCS-Select TE Character Set.

<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>: (not supported currently)

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): (not supported currently)
- 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): (not supported currently)
- 0: 3.1 kHz
- 1: UDI

14.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

14.5 ^NWINFO-Query Network Information

14.5.1 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>,<neig_hbor_cell_num>,<neig_psc1>,<neig_psc2>,<neig_psc3>,<neig_psc4>,<neig_psc5>,<neig_psc6><CR><LF><CR><LF>OK<CR><LF>

14.5.2 Description

This command is used to query the registered network information of the wireless module in the normal state, including serving cell information, neighbour cells information of the active set, base station ID, frequency and so on.

14.5.3 Defined Values

<srv_band>: information of frequency the wireless module registered.

<srv_nodeB_PLMN> and <srv_nodeB_BS>: information of base station the wireless module maintained.

0-255: Base station ID.

<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>:

-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> to <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.

14.5.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.5.5 Example

AT^NWINFO

^NWINFO: 84,0,0,1,405,-7,-113,0x2513,0xe0195,0,0,0,0,0,0

OK

14.6 ^NTCT-Set Presentation of Network Time

14.6.1 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>

Command	Possible Response(s)
^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>

14.6.2 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.

14.6.3 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.

14.6.4 Property Description

Saving upon Power-off	PIN
N	Y

14.6.5 Example

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
```


14.7 ^NWTIME-Query Presentation of Network System Time

14.7.1 Command Syntax

Command	Possible Response(s)
^NWTIME?	If the command is successfully executed: <pre><CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF><CR><LF>OK<CR><LF></pre> If the command is unsuccessfully executed: <pre><CR><LF>ERROR<CR><LF></pre>
	<pre><CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF></pre>

14.7.2 Description

This command controls the presentation of network system time, time zone, and daylight saving time.

14.7.3 Defined Values

<date>: specifies date in the format of yy/MM/dd.

<time>: specifies the time and time zone in the format of hh:mm:ss+tz. The value of <time> consists of time and time zone, for example, 05:56:13+32. 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 00. 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
00	No adjustment for Daylight Saving Time
01	+1 hours adjustment for Daylight Saving Time
02	+2 hours adjustment for Daylight Saving Time
03	Reserved

14.7.4 Property Description

Saving upon Power-off	PIN
N	Y



14.7.5 Example

Query network system time, time zone, and daylight saving time:

AT^NWTIME?

^NWTIME: 11/12/20,12:33:18+32,00

OK

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.

<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 Property Description

Saving upon Power-off	PIN
N	Y

15.1.5 Example

```
AT^IPINIT="1234","card","card"
```

```
OK
```

```
AT^IPINIT?
```

```
^IPINIT: 1,"192.168.70.94","1234","172.22.44.200","172.22.44.201"
```

```
OK
```

15.2 ^IPOPEN-Establish a TCP/UDP Connection

15.2.1 Command Syntax

Command	Possible response(s)
^IPOPEN=<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>
^IPOPEN?	If connection is establishment: <CR><LF>^IPOPEN: <link_id>,<type>,<local_port>,<remote_ip>,<remote_port>,<SIO_port>,<MSS>[<CR><LF>^IPOPEN: <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>
^IPOPEN=?	<CR><LF>^IPOPEN: (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 and FTP are supported.

During the execution command running, the command can be interrupted.

Note:

^IPINIT should be success before doing ^IPOPEN for establishing any link.

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.

"HTTP": Establishes the HTTP 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 server. String of character type and allowed maximum character is 255. (only supported by the FTP connection)

<password>: indicates the password used to log in to the FTP server. String of character type and allowed maximum character is 64. (only supported by the FTP connection)

<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 Property Description

Saving upon Power-off	PIN
N	Y

15.2.5 Example

```
AT^IPOPEN=1, "TCP", "192.168.18.8", 10000,9000
```

```
OK
```

```
AT^IPOPEN=2, "TCP", "192.168.18.8", 10000,8000
```

```
OK
```

```
AT^IPOPEN=3, "UDP", "192.168.18.8", 7000,6000
```

```
OK
```

AT^IPOPEN?

^IPOPEN: 1, "TCP", 9000, "192.168.18.8", 10000,1,1460

^IPOPEN: 2, "TCP", 8000, "192.168.18.8", 10000,1,1460

^IPOPEN: 3, "UDP", 6000, "192.168.18.8", 7000,1,0

OK

AT^IPOPEN=1, "TCP", "www.example.com", 80, 3081

OK

AT^IPOPEN?

^IPOPEN: 1, "TCP", 3081, "192.168.111.147", 80,1,1440

OK

AT^IPOPEN=1,"HTTP","192.168.63.35",9001

OK

AT^IPOPEN?

^IPOPEN: 1,"HTTP",48559,"192.168.63.35",9001,1,1460

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><CR><LF>OK<CR><LF>
^IPLISTEN=?	<CR><LF>^IPLISTEN: (list of supported <type>s),(list supported <listen_port>s),(list 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 Property Description

Saving upon Power-off	PIN
N	Y

15.3.5 Example

```
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)
^IPSEND=<link_id>,<data>	<CR><LF>^IPSEND: <link_id><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^IPSEND=?	<CR><LF>OK<CR><LF>

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 Property Description

Saving upon Power-off	PIN
N	Y

15.4.5 Example

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:</code> <code>^IPSENDEX=<link_id>,<mode>,<data></code> <code><mode>=2:</code> <code>^IPSENDEX=<link_id>,<mode>,<len><CR>entered data</code>	<code><CR><LF>^IPSENDEX:</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>^IPSENDEX=?</code>	<code><CR><LF>^IPSENDEX: (list of supported</code> <code><link_id>s),(list of supported</code> <code><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.

15.5.4 Property Description

Saving upon Power-off	PIN
N	Y

15.5.5 Example

```
AT^IPSENDEX=1,1,"393830"
```

```
^IPSENDEX: 1
```

```
OK
```

```
AT^IPSENDEX=1,2,3
```

```
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 Property Description

Saving upon Power-off	PIN
N	Y

15.6.5 Example

^IPDATA: 3,4,asdf

15.7 ^IPCLOSE–Disable 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>

Command	Possible Response(s)
^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.

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 party. UDP connection can be disconnected directly.

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 can not finish TCP release on time. But the server will close the link after some time. The waiting time depends on the server's implementation.

If <link_id> is set to 6, it indicates that the server listening function is disabled for the module. (not supported by the FTP connection)

If <link_id> is set to 7, it indicates that the module deregisters from the network, which is similar to dial-up disconnection.

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.

1–5: Actual connection ID

6: Established connection and the local server (not supported by the FTP connection)

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 Property Description

Saving upon Power-off	PIN
N	Y

15.7.5 Example

```
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 900ms.

- The interval between two '+' cannot 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 cannot 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 Property Description

Saving upon Power-off	PIN
N	Y

15.8.5 Example

```
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

Command	Possible Response(s)
	<CR><LF>^IPSTATE: <link_id>,<state>,<errcode><CR><LF>

15.9.2 Description

When a TCP/UDP link was closed by AT command IPCLOSE (linked is 1~5), the MT will not send this unsolicited report to TE. Otherwise, the MT will send this unsolicited report to TE.

When a TCP/UDP link was created by AT command IPOPEN, the MT will not send this unsolicited report to TE. Otherwise, the MT will send this unsolicited report to TE.

15.9.3 Defined Values

<link_id>: specifies the ID of an established connection. The value ranges from 0 to 7.

0: Illegal ID

1~5: The ID of an established connection

6: Local server

7: Network

<state>: link state

0: The link is closed

1: The remote TCP link is accepted.

Others reserved

<errcode>: error information

0: Link has been closed by remote or ME

1: Remote link has been accepted by MT

2: Network error

3: No idle link

4: Reject the remote request link in the transparent transmission mode

Others reserved

15.9.4 Property Description

Saving upon Power-off	PIN
N	Y

15.9.5 Example

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(Unit)	Description
5	1–100 (unit: 0.1s, Default value: 10)	The value of the transparent transmission timer.
10	1–1472 (unit: 1Byte, Default value: 1024)	The transparent transmission length Trigger.
12	0–1 (default value: 0)	The transparent transmission mode, see the command ^IPENTRANS.
13	0–1 (default value: 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: 0)	0: The transparent transmission mode 1: The commend transmission mode 2: The get buffer transmission mode

15.10.4 Property Description

Saving upon Power-off	PIN
N	Y

15.10.5 Example

- The value of the transparent transmission timer is set to 0.2 seconds.
AT^IPCFL=5,2
OK
- FTP file data is saved to the OBD division (this file data processing mode only applies to obtaining or upgrading specified firmware from the server. The size of

the file data cannot exceed 1 MB. The file data saved to the OBD division can be read by upgrade bootstrapper program).

AT^IPCFL=13,1

OK

15.11 ^IPFLOWQ-Query TCP/UDP Flow

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.

15.11.4 Property Description

Saving upon Power-off	PIN
N	Y

15.12 ^FTPCMD–Create File Transfer Service Commands

15.12.1 Command Syntax

Command	Possible Response(s)
^FTPCMD=<link_id>,<ftp_cmd>[,<filename>]	If data is saved on the MT, neglect <CR><LF><file content>: If the command is successfully executed: <CR><LF>CONNECT<CR><LF><file content><CR><LF><CR><LF>OK<CR><LF> If the command is unsuccessfully executed: <CR><LF>ERROR<CR><LF> Or <CR><LF>CONNECT<CR><LF><file content><CR><LF> <CR><LF>ERROR<CR><LF>
^FTPCMD=?	<CR><LF>^FTPCMD: (list of supported <link_id>s),(list of supported <ftp_cmd>s)<CR><LF><CR><LF>OK<CR><LF>

15.12.2 Description

After an FTP connection is successfully established, this command is used for exchanging data with, uploading data to, and downloading data from the specified FTP server. During data transmission, the ME enters the transparent transmission mode and does not respond to any AT command. After data is downloaded, the ME quits the transparent transmission mode; after data is uploaded, the user must manually enter +++ to enable the ME to quit the transparent transmission mode.

15.12.3 Defined Values

<link_id>: indicates the link ID. The value ranges from 1 to 5 and is the same as the FTP link ID.

<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, which is not supported currently.

PASV: Establishes data connection in PASV mode.

PORT: Establishes data connection in PORT mode (default value).

<filename>: indicates the name of the file downloaded using FTP. The value is a character string with a maximum of 256 characters and cannot contain any of the following characters:

"|", "*", "<", ">", "\"", "?"

Note:

You do not need to specify the parameter <filename> when setting the <ftp_cmd> for establishing data connection.

15.12.4 Property Description

Saving upon Power-off	PIN
N	Y

15.12.5 Example

1. Configure the connection mode for downloading data. (In the following examples, the link ID of the FTP link is 1).
AT^FTPCMD=1,PORT
OK
2. Download the file test.txt. The content of the file is "ftp test."
AT^FTPCMD=1,GET,"test.txt"
CONNECT
ftp test! (If the ipcfl=13,1 is configured, the content of the downloaded file is not displayed.)

OK
3. Query the range of the parameters supported by AT^FTPCMD.
AT^FTPCMD=?
^FTPCMD: (1-5),("GET","PASV","PORT")

OK

15.13 ^IPSRVST-Report the Socket Service State

15.13.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>^IPSRVST: <link_id>,<state_type>,<state_code><CR><LF>

15.13.2 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.

15.13.3 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, indicating the user operating state.

11: FTPservice, indicating the data transmission state.

12: HTTP service event.

13–255: reserved.

<state_code>: indicates the state information.

Note:

If IPCFL=13,1 is configured, the parameter state_code is determined according to the result of the verification performed by the MT on the downloaded files. If the result is correct, the value of state_code is 1; if not, the value is 0.

<state_type>	<state_code>	Meaning
0 to 9	Reserved	Reserved.
	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.

<state_type>	<state_code>	Meaning
	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
	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

<state_type>	<state_code>	Meaning
	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 failed.
	1	Data transmission completed.
12	200	The requested operation succeeds.
	301	Moved permanently
	302	Moved temporarily
	400	The requested operation is not understood by the server.
	401	User name and password are required for the requested page.
	403	Forbidden
	404	Resource not found
	405	Method not allowed on resource
	406	Requested representation not accepted
	408	Request timeout
	410	Requested source is no longer available server
	500	Internal server error
	501	Requested HTTP operation not supported
	505	HTTP version not supported
13 to 255	Reserved	Reserved.

15.13.4 Property Description

Saving upon Power-off	PIN
N	Y

15.13.5 Example

/*An FTP user successfully logged in to an FTP server.*/

AT^IPOPEN=1,"FTP","172.22.44.4",21,,"loader","loader"

OK

^IPSRVST: 1,10,230 (assume that the link ID of the control link is 1.)

/*FTP data transmission succeeds.*/

AT^FTPCMD=1,GET,"test.txt"

CONNECT

ftp test! (If the ipcfl=13,1 is configured, the content of the downloaded file is not displayed.)

OK

^IPSRVST: 1,11,1

15.14 ^DVCFG-Set Priority of Voice Call and Data Service

15.14.1 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>

15.14.2 Description

This command sets and queries the priority of voice call and data service.

15.14.3 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.

15.14.4 Property Description

Saving upon Power-off	PIN
N	Y

15.15 ^HTTPCMD-Data Services Command

15.15.1 Command Syntax

Command	Possible responses
^HTTPCMD=<http_linkID>,<operation>,<http_data_path>[,<http_data_length>[,http_data_type]]	In case of successful execution: Transparent mode of transmission, returns <CR><LF>CONNECT<CR><LF><http data content><CR><LF><CR><LF>OK<CR><LF> Command mode of transmission, returns <CR><LF>OK<CR><LF> In case of error: <CR><LF>ERROR<CR><LF> Or <CR><LF>CONNECT<CR><LF><http data content><CR><LF><CR><LF>ERROR<CR><LF>
^HTTPCMD=?	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> In the case of an error during command execution: <CR><LF>ERROR<CR><LF>

15.15.2 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).

15.15.3 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>.

15.15.4 Property Description

Saving upon Power-off	PIN
N	Y

15.15.5 Example

- AT^HTTPCMD=?
^HTTPCMD: (1–5),("GET","POST")

OK
- AT^IPOPEN=1,"HTTP","www.example.com",80
OK
AT^HTTPCMD=1,GET,"http://www.example.com:80/example.html"
CONNECT
<file Content>

OK

^IPSRVST: 1,12,200
- AT^IPOPEN=1,"HTTP","www.example.com",80
OK
AT^HTTPCMD=1,POST,"http://www.example.com:80/example.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://www.example.com:80/example.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.example.com:80/example.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

^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.example.com:80/example.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,"agddhmwdgwcfgjwdgjsjsjsdfg"

OK

Note:

To use HTTP, please find the configuration in AT^IPOPEN.

15.16 ^IPRCV-Read Network Service Data

15.16.1 Command Syntax

Command	Possible Response
^IPRCV=<link_id>,<reqReceiveLength>	When the buffer contains data: <CR><LF>^IPRCV: <link_id>,<reqReceiveLength><CR><LF>.....(returns reads data) <CR><LF><CR><LF>OK<CR><LF> When the buffer contains no data or the length of the read data is 0: <CR><LF>^IPRCV: <link_id>,<reqReceiveLength><CR><LF><CR><LF>OK<CR><LF> In case of an error during command execution: <CR><LF>ERROR<CR><LF> In case of an error related to the MT: <CR><LF>+CME ERROR: <err><CR><LF>
^IPRCV=?	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>

15.16.2 Description

This command reads data out from the service buffer.

15.16.3 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.

15.16.4 Property Description

Saving upon Power-off	PIN
N	Y



15.16.5 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

16

AT&T Extended Commands

16.1 +PACSP-Network Selection Menu Control

16.1.1 Command Syntax

Command	Possible Response(s)
+PACSP?	<CR><LF><mode><CR><LF><CR><LF>OK<CR><LF>

16.1.2 Description

The read Command is used to indicate Network Selection Menu available to User or not (ENS support). Valid responses are +PACSP0 if the Menu is disabled and +PACSP1 if enabled.

16.1.3 Defined Values

<mode>: network selection menu mode.

+PACSP0: Menu is disabled.

+PACSP1: Menu is enabled.

16.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

16.1.5 Implementation

This command is derived from AT&T requirement document: 13340_42.pdf.

16.2 \$CSQ–Signal Quality

16.2.1 Command Syntax

Command	Possible Response(s)
\$CSQ	<CR><LF>\$CSQ: <rss>,<ber>[,<Ec/Io>]<CR><LF><CR><LF>OK<CR><LF>
\$CSQ=?	<CR><LF>\$CSQ: (list of supported <rss>s),(list of supported <ber>s) ,(list of supported <Ec/Io>s)<CR><LF><CR><LF>OK<CR><LF>

16.2.2 Description

The execution command returns the RSSI, BER, Ec/Io of ME.

The test command returns the supported RSSI ,BER and Ec/Io values.

16.2.3 Defined Values

<rss>: indication of the receiving signal strength with 2 dBm in step.

0: equal to or less than –113 dBm

1: –111 dBm

2–30: –109 to –53 dBm

31: Equal to or higher than –51 dBm

99: Unknown or immeasurable.

<ber>(bit error rate):

0–7: As RXQUAL values in the table in TS 45.008 sub-clause 8.2.4.

99: Not known or not detectable

<Ec/Io> (in db):

–24–0: No output if not supported.

16.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

16.2.5 Implementation

This command is derived from AT&T requirement document: 13340_42.pdf

16.3 \$CREG–Network Registration Indicator

16.3.1 Command Syntax

Command	Possible Response(s)
\$CREG[=<n>]	<CR><LF>OK<CR><LF>
\$CREG?	<CR><LF>\$CREG: <n>,<stat>[,<lac>,<ci>[,<AcT>,<PSC>]]<CR><LF><CR><LF>OK<CR><LF>
\$CREG=?	<CR><LF>\$CREG: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

16.3.2 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>].

The read command returns the current registration state <stat>. The position information <lac>, <ci>, <AcT>, <PSC> are reported only when <n>=2.

16.3.3 Defined Values

<n>:

0: Disable proactive reporting of "+CREG".

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.

<AcT>: access technology of the registered network.

2: UTRAN

<PSC>: primary Scrambling Code of the serving cell when <AcT>=2.

16.3.4 Property Description

Saving upon Power-off	PIN
N	Y

16.3.5 Implementation

This command is derived from AT&T requirement document: 13340_42.pdf

16.4 \$CCLK-Return Current Time of the Module

16.4.1 Command Syntax

Command	Possible Response(s)
\$CCLK=<time>	<CR><LF>OK<CR><LF>
\$CCLK?	<CR><LF>\$CCLK: <time><CR><LF><CR><LF>OK<CR><LF>

16.4.2 Description

The set command is used to set real time of MT. Read command is used to return the real time of MT.

16.4.3 Defined Values

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

Note:

If MT does not support time zone information then the three last characters of <time> are not returned by +CCLK?. The format of <time> is specified by use of the +CSDF command. If +CSDF is not supported the default format should of "yy/MM/dd,hh:mm:ss zz" should be used.

16.4.4 Property Description

Saving upon Power-off	PIN
NA	N

16.4.5 Implementation

This command is derived from AT&T requirement document: 13340_42.pdf.

Because time zone and +CSDF are not supported, format "yy/MM/dd,hh:mm:ss" is used in product MU509-65.

16.5 *CNTI-Access Technology Display

16.5.1 Command Syntax

Command	Possible Response(s)
*CNTI=<n>	<CR><LF>*CNTI:<n>,<tech>[,<tech>[...]]<CR><LF><CR><LF>OK<CR><LF>
*CNTI=?	<CR><LF>*CNTI: (comma separated list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

16.5.2 Description

Action command returns a list of technologies based on the value of <n>.

The test command returns the values of <n> supported by the device.

16.5.3 Defined Values

<n>: parameter controls the results displayed by the response

0: Technology currently in use to access the network

1: The available technologies on the current network

2: All technologies supported by the device

<tech>: alphanumeric string used to identify technology

UMTS

HSDPA

16.5.4 Property Description

Saving upon Power-off	PIN
NA	N

16.5.5 Implementation

This command is derived from AT&T requirement document: 13340_42.pdf.

16.6 %EONS-Enhance Operator Name Display

16.6.1 Command Syntax

Command	Possible Response(s)
%EONS=<value>	<CR><LF>OK<CR><LF>
%EONS?	<CR><LF>%EONS: <value><CR><LF><CR><LF>OK<CR><LF>
%EONS=?	<CR><LF>%EONS: list of supported <value>s <CR><LF><CR><LF>OK<CR><LF>

16.6.2 Description

In general cases, the network name display priority from high to low is as follows:
EONS (displaying the name based on the PNN and OPL), name information received by the NITZ service, network name stored on the module, and broadcast MCC-MNC.

- If the PNN is activated but OPL is not, and the module is registered with the HPLMN, the first network name in the PNN file will be displayed.
- If the PNN is activated, there is only one record in the PNN file, and the module is registered with the HPLMN, the first network name in the PNN file will be displayed.
- If the PNN is activated but OPL is not, and the module is registered with a network other than the HPLMN, the default display rule will be used (similar to the case where EONS is disabled).
- If neither PNN nor OPL is activated, the network name will be displayed as if EONS is disabled.

Note:

^EONS and %EONS can both be used in this command. %EONS is returned.

16.6.3 Defined Values

<value>:

0: Disable EONS

1: Enable EONS (default value)



Notes:

- The return value of %EONS? is affected by the SIM card initialization status. Before SIM card initialization is complete, the return value is 0. After initialization is complete, the return value is 0 or 1 (default value), depending on whether EONS is enabled.
- Running this command requires the module to be PIN unlocked.

16.6.4 Property Description

Saving upon Power-off	PIN
N	N

16.6.5 Implementation

This command is derived from AT&T requirement document: 13340_42.pdf.

17

Huawei Extended AT Interface Description

17.1 ^CARDLOCK-Card Lock Administration

17.1.1 Command Syntax

Command	Possible Response(s)
^CARDLOCK?	<CR><LF>^CARDLOCK:<status>,<times>,<operator><CR><LF><CR><LF>OK<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>

17.1.2 Description

This command is used for query the module. When the SIM card which is not allowed by the operator (Called illegal SIM card) is inserted into the module, the module can detect it is a illegal SIM card and require a unlock code before it can register the network. If the right unlock code is inputted, the module is unlocked and then any other operator's SIM card can work in this module. If the wrong unlock code input exceeds 10 times, the module is locked forever and only the SIM card which is allowed by the operator (Called legal SIM card) can work with this module.

The locked module with the illegal SIM Card can only provide emergency call service.

Read command is used for inquire the lock state of the module, the remain times of unlock, the operator currently.

17.1.3 Defined Values

<status>: it is an integer number that denotes the lock status of the module currently, including the following states:

- 1: Unlocked code need to be provided
- 2: Unlocked code need not to be provided

3: The module is locked forever

<times>: it is an integer number which value range is 0 to 10, denote the remain times of the attempt of unlock the module. When this parameter value is 0, it means this module is locked forever. After the module is unlocked, this parameter has no use.

<operator>: it is an integer number denotes which operator lock this module, in fact it is the operator's PLMN ID, for example:

24202: Netcom China locks this module

46000: Mobile China locks this module

0: No any operators lock this module

Note:

This parameter is not supported currently, and the value is 0.

17.1.4 Property Description

Saving upon Power-off	PIN
NA	N

17.2 ^OPL-Read OPL

17.2.1 Command Syntax

Command	Possible Response(s)
^OPL=<opl_type>[,<index>]	<CR><LF>(list)^OPL:<plmn>,<lac_range>,<index_pnn><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^OPL?	<CR><LF>OK<CR><LF>
^OPL=?	<CR><LF>(list)^OPL:<opl_type>,<record_range>,<record_len><CR><LF><CR><LF>OK<CR><LF>

17.2.2 Description

The execution command is used to read OPL file from SIM card, read the defined record or all records.

The test command reports the OPL file supporting type lists, recode index scope and length of each record.

If this file is not exists, or the service is not supported by SIM card, then error is reported.

17.2.3 Defined Values

<opl_type>: opl file type.

1: OPL extracting from ADFUSIM of USIM, called USIM_OPL.

<index>: OPL record index, index>=1.

If parameter <index> is not exists, read all OPL record.

<plmn>: public Land Mobile Network, numeric format.

<lac_range>: lac range.

<index_pnn>: the PNN record with index

<record_range>: record range

<record_len>: record length

17.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

17.3 ^PNN-Read PNN

17.3.1 Command Syntax

Command	Possible Response(s)
^PNN=<pnn_type>[,<index>]	<CR><LF>(list)^PNN:<full_name_seg>,<short_name_seg>,<additional_information><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^PNN?	<CR><LF>OK<CR><LF>
^PNN	<CR><LF>OK<CR><LF>
^PNN=?	<CR><LF>(list)^PNN:<pnn_type>,<record_range>,<record_len><CR><LF><CR><LF>OK<CR><LF>

17.3.2 Description

The execution command is used to read PNN from SIM card, read the defined record or all records.

The test command reports the PNN file supporting type lists, recode index scope and length of each record.

If this file does not exist, or the service is not supported by SIM card, then error is report.

17.3.3 Defined Values

<pnn_type>: pnn file type.

1: PNN extracting from ADFUSIM of USIM, called USIM_PNN.

<index>: PNN record index. If parameter <index> is not exist, read all PNN record.

<record_range>: PNN index scope.

<full_name_seg>: long name segment, including long name indicator, length and data.

<short_name_seg>: short name segment, including short name indicator, length and data. <additional_information>: additional message, till now, it is just used to show the actual data of PNN file of SIM card.

<record_len>: record length.

17.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

17.4 ^LOCCHD-Indicate Location Area Change

17.4.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>^LOCCHD: <LAC>[,<x>]><CR><LF>

17.4.2 Description

^LOCCHD is a new AT command, it is in order to notify user that the location area has changed, once received the command, the user should update the PNN because the PNN may be different when Location Area changed according to AT&T requirements.

17.4.3 Defined Values

<LAC>: Location Area Code

<x>: reserved

17.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

17.4.5 Implementation

This command is implemented according to AT&T requirement document "13340_42.pdf".

17.5 ^SIMFILEREFFRESH-Indicate PNN&OPL Update

17.5.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>^SIMFILEREFFRESH: <id><CR><LF>

17.5.2 Description

^SIMFILEREFFRESH is a new AT command, it is in order to notify user that the PNN or OPL has been updated via OTA, once received the command, the user should update the PNN and OPL.

17.5.3 Defined Values

<id>: per the following values:

0: No file updated

1: EFpnn is refreshed, the dashboard need to read the EFpnn by the command AT^PNN

2: EFopl is refreshed, the dashboard need to read the EFopl by the command AT^OPL

3: Both EFpnn and EFopl are refreshed, the dashboard need to read the EFpnn and EFopl by command AT^PNN and AT^OPL.

For example, if the EFpnn and EFopl are updated via OTA, ^SIMFILEREFFRESH: 3 will be reported from the device, then the ACM shall perform to read the EFpnn and EFopl and update the display text of the network name.

17.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

17.5.5 Implementation

This command is implemented according to AT&T requirement document "13340_42.pdf".

17.6 +PACSP-Indicate Network Selection Menu Control

17.6.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>+PACSP<Ind><CR><LF>

17.6.2 Description

Valid responses of this command are +PACSP0 and +PACSP1. It will be used in the following ways:

Initialize network selection menu mode. On activation of the terminal and client, the terminal shall send the +PACSP1 or +PACSP0 as needed. When the terminal/client is activated, the device shall select and read the EF-CSP and depending upon the value of the PLMN Mode bit it shall perform one of the following:

- If the value is "0", the Mobile terminal shall send the command +PACSP0 to the client.
- If the value is "1", the Mobile terminal shall send the command +PACSP1 to the client.

Notify resetting of network selection menu when file EF-CSP is refreshed and PLMN Mode bit is changed.

- If PLMN Mode bit is changed to 1, string "+PACSP1" will be reported to client.
- If PLMN Mode bit is changed to 0, string "+PACSP0" will be reported to client. The MT will set selection mode as automatic.

17.6.3 Defined Values

<Ind>: network selection menu mode indicator.

0: Menu is disabled, the report string is "+PACSP0".

1: Menu is enabled, the report string is "+PACSP1".



17.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

17.6.5 Implementation

This command is implemented according to AT&T requirement document "13340_42.pdf".

18 FOTA Commands

18.1 ^FOTAMODE-Set Operation Mode

18.1.1 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>

18.1.2 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.

18.1.3 Defined Values

<detect_mode>: specifies the version detection mode. The default value is 0.
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.

18.1.4 Property Description

Saving upon Power-off	PIN
Y	N

18.1.5 Implementation

Huawei Proprietary Interface.

Optional

18.1.6 Actions Performed by the Client

None

18.1.7 Example

```
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=0,0,1,1,1
```

```
OK
```

```
AT^FOTAMODE?
```

```
^FOTAMODE: 0,0,1,1,7
```

```
OK
```

```
AT^FOTAMODE=0,0,1,1,22
```

```
ERROR
```

18.2 ^FOTACFG-Set FOTA Connection Parameters

18.2.1 Command Syntax

Command	Possible Response(s)
<pre>^FOTACFG=<APN>,<username>,<password>,<auth_type></pre>	<pre><CR><LF>OK<CR><LF></pre> In case of an error: <pre><CR><LF>ERROR<CR><LF></pre>

Command	Possible Response(s)
^FOTACFG?	<CR><LF>^FOTACFG: <APN>,<username>,<password>,<auth_type> ><CR><LF><CR><LF>OK<CR><LF>

18.2.2 Description

This command is used to set the access point name (APN), user name, password, and authentication mode for dial-up connections.

18.2.3 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 (default value)

18.2.4 Property Description

Saving upon Power-off	PIN
Y	N

18.2.5 Implementation

Huawei Proprietary Interface.

Optional

18.2.6 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.

18.2.7 Example

The set command:

```
AT^FOTACFG="1234","12","12",1
```

OK

The read command:

```
AT^FOTACFG?
```

```
^FOTACFG: "1234","12","12",1
```

OK

18.3 ^FOTADET-Manually Detect a New Version

18.3.1 Command Syntax

Command	Possible Response(s)
^FOTADET	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

18.3.2 Description

This command is used to detect a new version available for the module.

18.3.3 Defined Values

None

18.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

18.3.5 Implementation

Huawei Proprietary Interface.

Optional

18.3.6 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.

18.3.7 Example

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
```

Note:

The MU509 module does not support multi-PDP active. Therefore, the host cannot operate other data services during FOTA version detection.

18.4 ^FOTADL-Manually Download a New Version

18.4.1 Command Syntax

Command	Possible Response(s)
<code>^FOTADL=<n></code>	<code><CR><LF>OK<CR><LF></code> In case of an error: <code><CR><LF>+CME ERROR: <err><CR><LF></code>

Command	Possible Response(s)
^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>

18.4.2 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.

18.4.3 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.

18.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

18.4.5 Implementation

Huawei Proprietary Interface.

Optional

18.4.6 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.

18.4.7 Example

AT^FOTADL=?

^FOTADL: (0–1)

OK

AT^FOTADL=1

OK

^FOTASTATE: 30

^FOTASTATE: 40

Note:

The MU509 module does not support multi-PDP active. Therefore, the host cannot operate other data services during FOTA version detection.

18.5 ^FWUP–Start a FOTA Update

18.5.1 Command Syntax

Command	Possible Response(s)
^FWUP	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

18.5.2 Description

This command is used to start a Firmware FOTA update.

18.5.3 Defined Values

None

18.5.4 Property Description

Saving upon Power-off	PIN
NA	N

18.5.5 Implementation

Huawei Proprietary Interface.

Optional

18.5.6 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.

18.5.7 Example

AT^FWUP

OK

^FOTASTATE: 50

If the update succeeds:

^FOTASTATE: 90

If the update fails:

^FOTASTATE: 80

18.6 ^FOTASTATE–Report the FOTA Status

18.6.1 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>

18.6.2 Description

During an update, the module reports the current update state after ^FOTASTATE is executed.

18.6.3 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.

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.

18.6.4 Property Description

Saving upon Power-off	PIN
Y	N

18.6.5 Implementation

Huawei Proprietary Interface.

Optional

18.6.6 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.

18.6.7 Example

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

18.7 ^FOTADLQ-Query Download Status of Update Files

18.7.1 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><L F>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>

18.7.2 Description

Run ^FOTADLQ to query the download progress of update files.

18.7.3 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.

18.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

18.7.5 Implementation

Huawei Proprietary Interface.

Optional

18.7.6 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.

18.7.7 Example

AT^FOTADLQ

^FOTADLQ: 1,"IMAGE",9012,9012

^FOTADLQ: 2,"XNV",0,77751

OK

18.8 ^FOTASMS–Notify Users to Decide on FOTA Upgrade

18.8.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^FOTASMS<CR><LF>

18.8.2 Description

This command is used by the FOTA module to report to the host computer to decide whether to perform an update after receiving a forcible update request from the modem.

Notes:

- When the module receives a message querying SN, SN will be automatically returned to the sender, without reported and noticed to the host.
- When the module receives a message requesting upgrade, ^FOTASMS will be unsolicitedly reported once every 4s. If the module enables FOTA auto-upgrade by AT^FOTASMSCFG, and the host does not run AT^FOTAP to confirm or refuse the upgrade within 10s, FOTA will automatically initiate the upgrade.

18.8.3 Property Description

Saving upon Power-off	PIN
NA	NA

18.9 ^FOTAP–Confirm FOTA Upgrade

18.9.1 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>

Command	Possible response(s)
^FOTAP?	<CR><LF>^FOTAP: <n><CR><LF><CR><LF>OK<CR><LF>

18.9.2 Description

Once FOTA SMS notification comes, users can confirm the FOTA upgrade using this command. If the module enables FOTA auto-upgrade by AT^FOTASMSCFG, and the host does not run AT^FOTAP to confirm or refuse the upgrade within 10s, FOTA will automatically initiate the upgrade.

18.9.3 Defined Values

<n>: integer value with 0 or 1

0: Do not do FOTA upgrade.

1: Go for FOTA upgrade.

18.9.4 Property Description

Saving upon Power-off	PIN
NA	N

18.9.5 Example

^FOTASMS

AT^FOTAP=1

OK

^FOTASTATE: 11

AT^FOTAP?

^FOTAP: 1

OK

18.10 ^FOTASMSCFG-Set FOTA SMS Auto- Upgrade

18.10.1 Command Syntax

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

18.10.2 Description

This command enables and disables the FOTA SMS auto-upgrade function.

When the function is enabled, the module automatically does the FOTA upgrade if it does not receive ^FOTAP within 10 seconds after ^FOTASMS is reported.

When the function is disabled, the module does the FOTA upgrade only if it receives ^FOTAP after ^FOTASMS is reported.

Note:

Checking and downloading the new version may incur data usage fees charged by the operator.

18.10.3 Defined Values

<operation>: an integer indicating whether the FOTA SMS auto-upgrade function is enabled.

0: Disable

1: Enable (default value)

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

18.10.4 Property Description

Saving upon Power-off	PIN
Y	N



18.10.5 Example

AT^FOTASMSCFG=1

OK

AT^FOTASMSCFG?

^FOTASMSCFG: 1

OK

AT^FOTASMSCFG=?

^FOTASMSCFG: (0-1)

OK

19 DM Commands

19.1 ^OMADM-Start DM Session

19.1.1 Command Syntax

Command	Possible Response(s)
^OMADM=<Profile id>,<Type of session>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^OMADM?	<CR><LF>^OMADM: <Profile id>,<Type of session><CR><LF><CR><LF>OK<CR><LF>
^OMADM=?	<CR><LF>^OMADM: (list of profile ids),(list of supported sessions<CR><LF><CR><LF>OK<CR><LF>

19.1.2 Description

The command is used to know if the device can start DM Session. The main thing to be checked is if the device satisfies all the conditions to start a session. This interface is called by DMClient.

19.1.3 Defined Values

<ProfileID>: The default value is 1. Currently only one profile is supported.

<SessionType>: Type of session DM Client is starting

0: San session

1: Generic Alert session

2: User initiated session

3: Polling session

4: Download session

- 5: Update session
- 6: Device initiated session
- 7: HFA Session

19.1.4 Property Description

Saving upon Power-off	PIN
N	N

19.1.5 Implementation

Huawei Proprietary Interface.

Optional

19.1.6 Actions Performed by the Client

None

19.1.7 Example

```
AT^OMADM=1,2
OK
AT^OMADM=?
^OMADM: (0-1),(0-12)
```

```
OK
AT^OMADM?
^OMADM: 0,0
```

```
OK
```

19.2 ^OMAAPN-Query the APN Information the OMA Obtains from the Server

19.2.1 Command Syntax

Command	Possible response(s)
^OMAAPN?	<CR><LF>^OMAAPN: <APN>,<auth_type><CR><LF><CR><LF>OK<CR><LF>

Command	Possible response(s)
	In case of an error: <CR><LF>+CME ERROR<CR><LF>

19.2.2 Description

This command is used to query the latest APN information the OMA obtains from the server, including APN and authentication type.

19.2.3 Defined Values

<APN>: APN. The value starts and ends with a double quotation mark. The default value is an empty string ("").

The value length does not exceed 100 bytes, excluding the double quotation marks.

<auth_type>: authentication type. The default value is -1^[1].

0: None

1: PAP

2: CHAP

Note:

[1]: If the OMA server has not delivered the APN and authentication type, the obtained value of <auth_type> is -1.

19.2.4 Property Description

Saving upon Power-off	PIN
Y	N

19.2.5 Example

AT^OMAAPN?

^OMAAPN: "ipv4",0

OK

Notes:

- If the APN or authentication type has not been changed, running this command will return the default value of <APN> or <auth_type>, respectively.
- If neither <APN> nor <auth_type> is set, running this command will return the message "operation not allowed".

19.3 ^OMAAPN-Report the APN Information the OMA Obtains from the Server

19.3.1 Command Syntax

Command	Possible Response(s)
	<CR><LF>^OMAAPN: <APN>,<auth_type><CR><LF>

19.3.2 Description

This command is used to unsolicitedly report the latest APN information the OMA obtains from the server, including APN and authentication type.

Notes:

- If neither <APN> nor <auth_type> is set, the module will not report the APN information after being powered on and registered with a network.
- If either <APN> or <auth_type> is set, the module will report the settings after being powered on and registered with a network.
- Once the OMA obtains the updated APN information from the server, the module will unsolicitedly report the information.

19.3.3 Defined Values

<APN>: APN. The value starts and ends with a double quotation mark. The default value is an empty string ("").

The value length does not exceed 100 bytes, excluding the double quotation marks.

<auth_type>: authentication type. The default value is -1^[1].

0: None

1: PAP

2: CHAP

Note:

[1]: If the OMA server has not delivered the APN and authentication type, the obtained value of <auth_type> is -1.

19.3.4 Property Description

Saving upon Power-off	PIN
Y	Y



19.3.5 Example

^OMAAPN: "ipv4",0

20

Customer Production Line Test Commands

20.1 ^TMODE-Set the Operating Mode

20.1.1 Command Syntax

Command	Possible Response(s)
^TMODE=<test_mode>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^TMODE?	<CR><LF>^TMODE: <status><CR><LF><CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^TMODE=?	<CR><LF>^TMODE: <test_mode><CR><LF><CR><LF>OK<CR><LF>

20.1.2 Description

This command specifies or reads the test mode of an MT.

20.1.3 Defined Values

<test_mode>: test mode

0: Signaling mode. A module can change from mode 0 to mode 1.

1: Non-signaling mode, performing RF-related non-signaling control. (In non-signaling mode, RF circuits on the module are disabled by default.)

3: Restart mode, instructing the module to perform a soft reset.

<status>: module switching status

0: Switching is in progress.

1: Switching is complete.

Note:

After this command sets the module to the non-signaling mode, the module must be changed back to the signaling mode after the non-signaling test is complete. Otherwise, the module may fail to register.

20.1.4 Property Description

Saving upon Power-off	PIN
Y	N

20.2 ^FCHAN-Set Non-signaling Channels

20.2.1 Command Syntax

Command	Possible Response(s)
^FCHAN=<mode>,<band_switch>,<channel>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^FCHAN?	<CR><LF>^FCHAN[:<mode>,<band_switch>,<ul channel>,<dl channel>]<CR><LF><CR><LF>OK<CR><LF>

20.2.2 Description

This command sets the uplink/downlink channel for a specific frequency band in debugging state. After the setting, the module automatically sets the uplink/downlink channel accordingly. This command is used in non-signaling mode (^TMODE=1) and returns the error code 0 in other modes.

20.2.3 Defined Values

<mode>:

0: WCDMA

<band_switch>: frequency band

Operating Band	band_switch
II	1
V	7

<channel>: specific channel number (any channel number in the uplink/downlink, ranging from 0 to 65535)

<ul channel>: uplink channel (if the uplink reporting is required as the downlink reporting is)

<dl channel>: uplink channel (if the downlink reporting is required as the uplink reporting is)

20.2.4 Property Description

Saving upon Power-off	PIN
N	N

20.3 ^RSIM-Check External SIM/USIM card Status

20.3.1 Command Syntax

Command	Possible Response(s)
^RSIM?	<CR><LF>^RSIM: <state><CR><LF><CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>

20.3.2 Description

This command checks whether the external SIM/USIM card is in good position. If no, 0 is returned.

20.3.3 Defined Values

<state>:

0: No any card

1: Card is detected well.

2: Card is busy, please waiting.

20.3.4 Property Description

Saving upon Power-off	PIN
NA	N

20.4 ^PRODTYPE-Query Product Type

20.4.1 Command Syntax

Command	Possible Response(s)
^PRODTYPE?	<CR><LF>^PRODTYPE: <result><CR><LF><CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>

20.4.2 Description

This command is used to query product type.

20.4.3 Defined Values

<result>:

0: Data card

1: Module

2: E5

20.4.4 Property Description

Saving upon Power-off	PIN
NA	N

20.5 ^AUDIO-Test Audio Path

20.5.1 Command Syntax

Command	Possible Response(s)
^AUDIO=<path>,<cmd>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^AUDIO=?	<CR><LF>^AUDIO: (list of supported <path>s), (list of supported <cmd>s)<CR><LF><CR><LF>OK<CR><LF>

20.5.2 Description

This command is used to test audio by loopback mode.

20.5.3 Defined Values

<path>: Audio path, the value ranges from 0 to 255, 0 means the first path.

<cmd>:

0: End audio test

1: Start audio test

20.5.4 Property Description

Saving upon Power-off	PIN
N	N

20.5.5 Example

```
AT^AUDIO=1,1
```

```
OK
```

```
AT^SWSPATH=2
```

```
OK
```

```
Insert headset to start loopback test
```

```
AT^AUDIO=1,0
```

```
OK
```

20.6 ^ENAGINT-Enter Aging Test Mode

20.6.1 Command Syntax

Command	Possible Response(s)
^ENAGINT=<string>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^ENAGINT?	<CR><LF>%ENAGINT: <mode><CR><LF><CR><LF>OK<CR><LF> In case of MT error: <CR><LF>ERROR<CR><LF>

20.6.2 Description

This command is used to enter the aging test mode.

20.6.3 Defined Values

<string>: the string of the authentication, and the length is 10 bytes.

<mode>:

0: Disabled aging mode

1: Enabled aging mode

20.6.4 Property Description

Saving upon Power-off	PIN
N	N

20.6.5 Example

```
AT^ENAGINT="AgingTest"  
OK
```

20.7 ^SMAXTXP-Set the Maximum Power

20.7.1 Command Syntax

Command	Possible Response(s)
^SMAXTXP=<power>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^SMAXTXP?	<CR><LF>%SMAXTXP: <power><CR><LF><CR><LF>OK<CR><LF> In case of MT error: <CR><LF>ERROR<CR><LF>

20.7.2 Description

This command is used to set the maximum Tx signal power, the unit is dBm. The command must be used in the aging test mode (^ENAGINT) and needs to be executed after the non-signaling channel is set (^FCHAN).

20.7.3 Defined Values

<power>: the maximum Tx signal power, range is 0-25 under WCDMA.

20.7.4 Property Description

Saving upon Power-off	PIN
N	N



20.8 ^RSCPCFG–Query or Set the RSCP Level

20.8.1 Command Syntax

Command	Possible Response(s)
^RSCPCFG=<index>,<threshold>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^RSCPCFG?	<CR><LF>%RSCPCFG: <(1)><threshold0>,<(2)><threshold1>,<(3)><threshold2>,<(4)><threshold3><CR><LF><CR><LF>OK<CR><LF> In case of MT error: <CR><LF>ERROR<CR><LF>

20.8.2 Description

This command is used to query or set the RSCP level. The set function is disabled by default, and can be enabled only after you run ^OPWORD=HWDZT2007. It will be disabled after you run ^CPWORD or restart the module. Restarting the module will also restore the RSCP level settings to defaults.

This command is obsolete.

20.8.3 Defined Values

<index>: integer value, which indicates the RSCP level and ranges from 0 to 3.

<threshold>: integer value, which indicates the RSCP absolute value in dBm and ranges from 50 to 200.

20.8.4 Property Description

Saving upon Power-off	PIN
N	N

20.8.5 Example

```
AT^OPWORD=HWDZT2007
OK
AT^RSCPCFG=0,119
OK
AT^RSCPCFG?
%RSCPCFG: (1)119,(2)109,(3)103,(4)97
```



OK

AT^CPWORD

OK

21 Appendix

21.1 Appendix 1 AT Command Description

21.1.1 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 "ERROR" will be returned.

21.1.2 S Register Commands

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>`.

21.1.3 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 "ERROR" 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 "ERROR" 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.

21.1.4 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 125ms 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=?"

21.2 Appendix 2 General CME Error List

The following describes the mapping between numeric mode and verbose mode.

Table 21-1 General CME ERROR Codes

Numeric mode	Verbose mode
0	phone failure
1	no connection to phone
2	phone adaptor link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required

Numeric mode	Verbose mode
6	PH-FSIM PIN required
7	PH-FSIM PUK required
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 password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed - emergency calls only
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required

Numeric mode	Verbose mode
48	hidden key required
49	EAP method not supported
50	Incorrect parameters
51	Parameter length error for all Auth commands
52	Temporary error for all auth cmds
100	unknown
103	Illegal Mem_Store
106	Illegal ME
107	GPRS services not allowed
111	PLMN not allowed
112	Location area not allowed
113	Roaming not allowed in this location area
132	service option not supported
133	requested service option not subscribed
134	service option temporarily out of order (#34)
148	unspecified GPRS error
149	PDP authentication failure
150	invalid mobile class
257	network rejected request
258	retry operation
259	invalid deflected to number
260	deflected to own number
261	unknown subscriber
262	service not available
263	unknown class
264	unknown network message
273	Minimum TFT per PDP address error
274	Duplicate TFT eval prec index
275	Invalid TFT param combination
323	Parameters error

Table 21-2 IPSTACK related CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
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
1030	The TCP or UDP link has been established already
1031	The FTP link has been established already

Numeric mode	Verbose mode
1032	The SMTP link has been established already
1033	The HTTP link has been established already
1038	SSL not enabled
1039	SSL handshake failed
1042	PDP operation in progress, please wait

Table 21-3 General CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
65280	call index error
65281	call state error
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
65289	input value is out of range
65290	amr file header lost

Table 21-4 FOTA related CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
1502	Operation failed due to unknown error
1503	Previous command is not complete
1504	Error command parameters
1505	Operation not supported
1506	Operation failed due to system error
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

Numeric mode	Verbose mode
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
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 num is bigger than 10
1604	Fail to send data because input file size 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 data mode

Table 21-5 CME ERROR Values and Descriptions for the FOTA Feature

<error_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
16	Fail to establish link
17	Fail to bind the specified port
18	Fail to connect to the specified address

<error_code>	Description
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 size 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	Fail to send data because invalid port
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
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)

21.3 Appendix 3 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		

Notes:

- 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

21.4 Appendix 4 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

21.5 Appendix 5 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>=1
V	<value>=1
S3	<value>=013

Command	Description of initial value
S4	<value>=010
S5	<value>=008
Q	<value>=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>=0
+CMGF	<mode> is 0
+CNMI	<mode>,<mt>,<bm>,<ds> and <bfr> are 0
+COPS	<mode>=0, <format>=0, <rat>=0
+CREG	<n>=0
+CGREG	<n>=0
+CMMS	<n>=0
^CURC	<curc_status>=0
&C	<value>=1
&D	<value>=2
S0	<value>=0
+ICF	<format>=3, <parity>=3
+IFC	<DCE_by_DTE>=0, <DTE_by_DCE>=0
&S	<value> is 0
+IPR	<Rate> is 115200
^RESET	<delay_time>=0
+CRC	<mode>=0
+CSCS	<chset> is "IRA"
+CPBS	<storage> is "SM"
+CLVL	<level>=2
+CMIC	<level>=2

21.6 Appendix 6 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	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
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

21.7 Appendix 8 List of Reference

- [1] 3GPP TS 22.088
- [2] 3GPP TS 22.082
- [3] 3GPP TS 22.030
- [4] 3GPP TS 22.081
- [5] GSM MoU SE.13
- [6] ITU-T E.212
- [7] 3GPP TS 27.005
- [8] 3GPP TS 27.007
- [9] 3GPP TS 31.101
- [10] GSM 11.11
- [11] 3GPP TS 22.002
- [12] 3GPP TS 23.038
- [13] 3GPP TS 23.040
- [14] 3GPP TS 23.041
- [15] 3GPP TS 24.008
- [16] 3GPP TS 24.011
- [17] 3GPP TS 22.067

- [18] 3GPP TS 27.060
- [19] 3GPP TS 29.061
- [20] AT&T requirement document: 13340_42.pdf
- [21] ITU-T Recommendation V.25 ter V0025-TE.DOC
- [22] ISO/IEC10646
- [23] ITU-T T.50

21.8 List of Abbreviations

Abbreviations	Full spelling
3GPP	Third Generation Partnership Project
APN	Access Point Name
BER	Bit Error Rate
CS	Circuit Switched (CS) domain
CUG	Closed User Group
DCE	Data Circuit-terminating Equipment
DCS	Data Coding Scheme
DTE	Data Terminal Equipment
GPRS	General Packet Radio Service
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

Abbreviations	Full spelling
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
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