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V100R001

AT Command Interface Specification

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1 Introduction

1.1 Scope

This document describes AT command interface specifications that is supported by Huawei Mobile Broadband product ME209u-526 module.

Please read the Release Notes released with the firmware before using ME209u-526 module and this document.

1.2 Overview

This document describes certain AT commands (implemented by terminal devices) of international standards, such as 3GPP and ITU-T, according to the requirements of terminal devices. In addition, this document describes the Huawei proprietary AT command interfaces that are implemented by terminal devices. These Huawei proprietary AT command interfaces help implement a certain function.

This document does not describe the interfaces that have been defined by standards or implemented by the MT but are not required by the Huawei terminal product. The description of AT command interfaces covers only the data packets of interfaces, the methods and processes for the TE and the MT to use interfaces, excluding the contents that are not directly related to interfaces. In addition, this document describes only the AT command interfaces falling within the range of Rm interfaces between the TE and MT, excluding the AT command interfaces falling within the range of Um interfaces between the MT and IWF.

AT commands are communication command protocols between TEs and MTs. If a new MT is to interconnect with an existing TE implemented based on this AT specification, the MT must comply with the specification. For example, to interconnect with the unified background of an existing PC, a new module must comply with this specification. A PC application or tool must comply with this specification to interconnect with existing terminal devices. If a TE or MT does not communicate by using AT commands, this specification does not apply.

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1.3 Document Conventions

Throughout the document, the module is referred to as ME, MS, TA or DCE. 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, DTE 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 PINs.

1.4 AT Command Syntax

1.4.1 AT Command Description

An AT command controls the rules for interaction between the TE such as PC and MT such as MS. Figure 1-1 shows the interaction between the TE and MT.

Figure 1-1 Interaction between the TE and MT

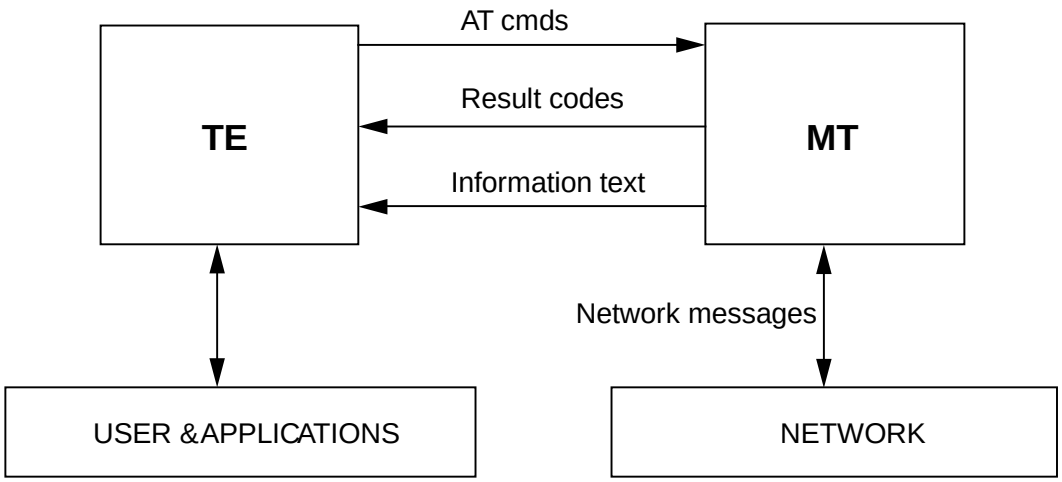
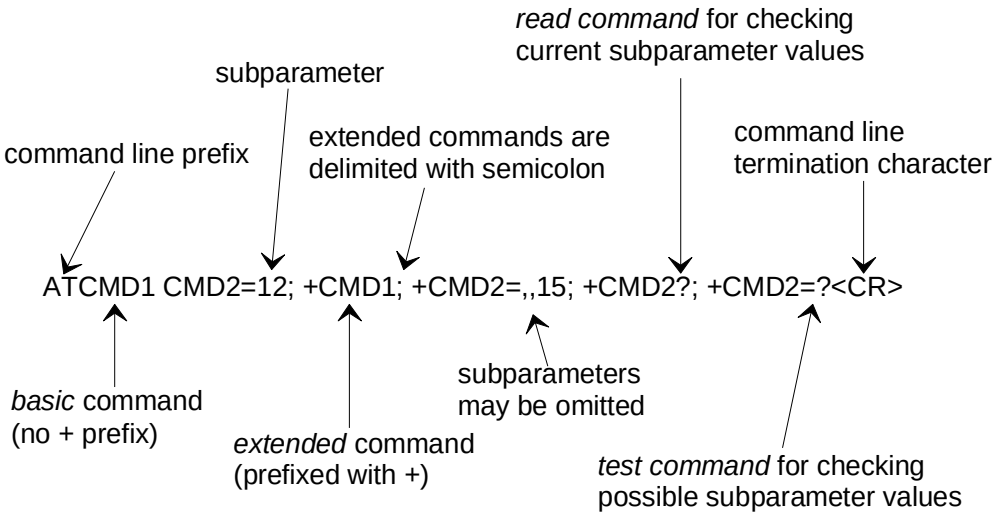


Figure 1-2 shows the basic organization format of the AT command line.

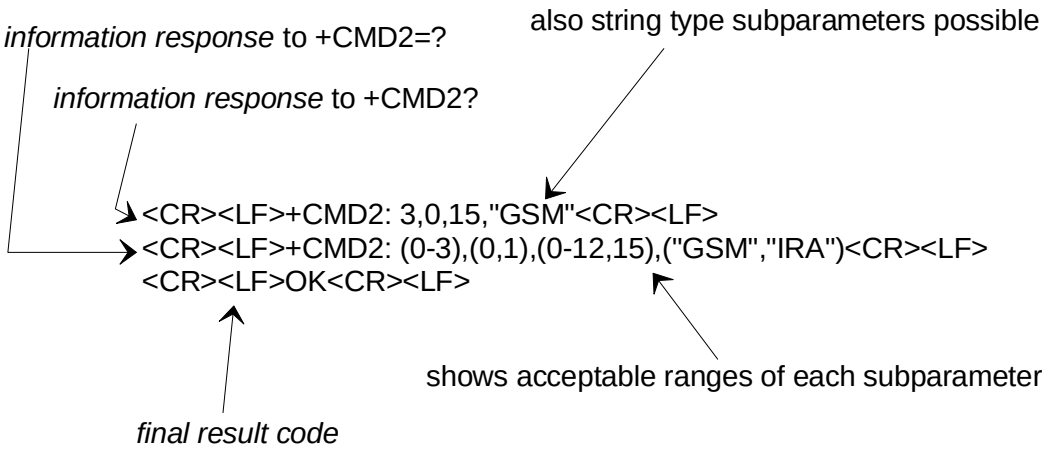
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Figure 1-2 Basic organization format of the AT command line



The returned value of the AT command consists of two parts: response message and result codes. Figure 1-3 shows an example of returned value of the AT command.

Figure 1-3 An example of returned value of the AT command



For the errors returned by all AT commands in this document, <CR><LF>ERROR<CR><LF> may be returned except errors defined by the AT command. Therefore, the error of <CR><LF>ERROR<CR><LF> will not be described in every command.

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1.4.2 AT Command Types

Table 1-1 Types of AT commands

AT command type	Sub-type	Syntax	Function
General command	Set command	• Contains one parameter: AT<name>[=<value>] • Contains multiple parameters: AT<name>=[<compound_value>]	A set command is executed to set parameters.
	Execution command	• Contains no parameter: AT<name> • Contains one parameter: AT<name>[=<value>] • Contains multiple parameters: AT<name>[=<compound_value>]	An execution command performs a specific action in addition to interacting with the local parameters of the MS.
	Read command	AT<name>?	A read command is executed to read the current value of each parameter related to the command.
	Test command	AT<name>=?	A test command is executed to return the available value range of each parameter supported by the command.
Basic command	Basic command	AT<command>[<number>]	In the command format, <command> indicates a single letter (A–Z) or the & symbol plus a single letter. In the command format, <number> indicates a decimal number with one digit or multiple digits. The digit 0 at the start of <number> can be ignored.
S register command	Read command	ATS<parameter number>?	Returns the ASCII code of characters currently saved in the S register. The ASCII code is expressed by a 3-digit decimal number. The digit 0 is added in the front of the number in case of insufficient digits.
	Set command	ATS<parameter number>=<value>	Replaces the characters saved in the S register with the characters related to the value of <value>.

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1.4.3 AT Command Parameter

You are not advised to use various parameter values that are not described in this document or not supported currently as described in this document.

The AT command parameters described in the following chapters are in two formats: <> and [], which are described as follows:

<...>: The parameter inside these angle brackets is mandatory. The <> does not exist in a command.

[...]: The parameter inside these square brackets is optional. The [] does not exist in a command or a response.

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

<LF>: Line feed character, which value is specified with command `S4`.

According to the AT command specifications for GSM and WCDMA in 3GPP TS 27.007, there is a component named TA between TE and MT. Physically, TA can be integrated with either TE or MT. In this document, TA is integrated with MT. In TIA/EIA IS 707-A, TA is not specified. To simplify the description in this document, TA is ignored. The client on a computer is treated as TE, and MT is treated as TA+MT.

NOTE

If all parameters are not specified, "=" is not required.

1.5 Abort Attributes of AT Commands

Some action commands that require time to execute may be aborted while in progress. Aborting of commands is accomplished by the transmission from the DTE to the DCE of any character. A single character shall be sufficient to abort the command in progress; however, characters transmitted during the first 125 milliseconds after transmission of the termination character shall be ignored (to allow for the DTE to append additional control characters such as line feed after the command line termination character). To insure that the aborting character is recognized by the DCE, it should be sent at the same rate as the preceding command line; the DCE may ignore characters sent at other rates. When such an aborting event is recognized by the DCE, it shall terminate the command in progress and return an appropriate result code to the DTE, as specified for the particular command.

The following commands can be aborted.

`AT+CLCK`

`AT+COPS` (except "`AT+COPS=?`")

`AT^IPINIT`

`AT^IPOPEN`

`AT^IPSEND`

`AT^IPSENDEX`

`AT^IPCLOSE`

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AT^HTTPCMD

AT^FTPCMD

AT^SSLO

AT^SSLTX

AT^SSLRX

1.6 Rules for Running AT Commands

1. Each interface should be functionally convergent.
2. Each command line contains only one AT command and ends with a carriage return character. For the URC instruction or response reported from MT to TE, only one AT command is allowed in a command line. In principle, users are not allowed to run S3/S4 format modification commands. This rule is applicable to the communication between the MT and TE programs.
3. For an AT command that cannot be interrupted, after sending the AT command, the TE must wait until the MT responds to the AT command before sending the second AT command.
4. 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 ME responds to the TE only after a long time of waiting, the response of command may be interrupted by URC. There are two kinds of interruption:
   - Case 1: A URC is presented when the TE is waiting for response after sending a command. This command will be kept in waiting state until the TE finishes receiving the URC, and then the response to this command is presented.
   - Case 2: A URC is presented when the TE is waiting for response after sending a command. The command continues to be executed. Therefore, response to the command may be mixed with the URC.
5. A string refers to a byte stream (excluding the quotation marks or commas) that is placed inside double quotation marks. Special note should be specified if the byte stream need not be enclosed in double quotation marks.
6. The current version does not support escape character. The code value of a data format in the UCS2 coding is reported as characters. For example, if the UCS2 code of a Chinese character is 0x553a, the 553a is reported.
7. A possible response sent by the MT to the TE consists of Information text and Result code, in which Information text is optional and Result code is mandatory. The format of a possible response is controlled by the ATV command. For details, see the description of the ATV Command. In this document, all possible responses listed in tables follow the ATV1 format.
8. The meaning of the command without any parameter should be described in the document. And it is not recommended to use the command not setting any parameter.
9. For the AT command that is controlled by PIN, if it is sent in PIN restricted mode, MT will response with `+CME ERROR: SIM PIN required`.

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10. For test command, if there is more than one question mark after the equal mark, the command can also be executed successfully. This is the design of Qualcomm. For example, `AT+CPIN=???` can be executed.

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2 General Commands

2.1 ATE–Echo Command

2.1.1 Command Syntax

ATE[<value>]
Possible Response(s)
<CR><LF>OK<CR><LF>

2.1.2 Interface Description

The ATE command sets whether the MT echoes the characters received from the TE or not.

NOTE
The dial-up network, especially the automatic processing software, automatically sends the ATE0 command to disable the echo mode.

2.1.3 Parameter Description

<value>:

0	The MT does not echo the characters received from the TE. (default value)
1	The MT echoes the characters received from the TE.

NOTE
If <value> is not specified, it is equivalent to set <value> to 1.

2.1.4 Property Description

Saving upon Power-off	PIN
N	N

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2.1.5 Example

Run: `ATE0`

Response: `OK`

2.2 ATS3–Command Line Termination Character

2.2.1 Command Syntax

`ATS3=<value>`
Possible Response(s)
<CR><LF>`OK`<CR><LF>
`ATS3?`
Possible Response(s)
<CR><LF>`<value>`<CR><LF><CR><LF>`OK`<CR><LF>

2.2.2 Interface Description

This command sets the command line termination character `S3`. `S3` saves the command line termination character in the ASCII code format. The character is sent by the TE to indicate the termination of a command line, which is identified and confirmed by the MT. The character is sent by the MT to compose the headers, tails, and end flags of the result code and response information.

When running `ATS3=<value>` to set `S3`, use the current `S3` as the termination character. The new `S3` will be returned immediately with the result code.

2.2.3 Parameter Description

`<value>`: the default value is 13.

0–127 Set `S3` in ASCII code

2.2.4 Property Description

Saving upon Power-off	PIN
N	N

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2.2.5 Example

Run: `ATS3=13`

Response: `OK`

2.3 ATS4–Response Format Character

2.3.1 Command Syntax

`ATS4=<value>`
Possible Response(s)
<CR><LF>`OK`<CR><LF>
`ATS4?`
Possible Response(s)
<CR><LF>`<value>`<CR><LF><CR><LF>`OK`<CR><LF>

2.3.2 Interface Description

This command sets the response format character `S4`. `S4` saves the response format character in the ASCII code format. The character is sent by the MT to compose the headers, tails, and end flags of the result code and response information.

If the `S4` character is changed by the command, the new `S4` will be returned immediately with the result code of the command.

2.3.3 Parameter Description

`<value>`: the default value is 10.

0–127 Set `S4` in ASCII code.

2.3.4 Property Description

Saving upon Power-off	PIN
N	N

2.3.5 Example

Run: `ATS4=10`

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Response: OK

2.4 ATV–Set the Response Format

2.4.1 Command Syntax

ATV[<value>]
Possible Response(s)
If setting <value> to 0 and sending successfully: 0<CR> If setting <value> to 1 and sending successfully: <CR><LF>OK<CR><LF>

2.4.2 Interface Description

This command sets the format of the result code and information field in response to an AT command, including the composition of the header and the tail and the form of the returned result code content. The returned result code content has two formats, namely, digit, and detailed string.

The following table describes the impact of the format setting on the format of the result code and the response information field. <CR> indicates the S3 character and <LF> indicates the S4 character.

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

2.4.3 Parameter Description

<value>:

0	The MT sends an abbreviated header and tail and adopts the result code in the digit format.
1	The MT sends a complete header and tail and adopts the result code in the detailed string format. (default value)

NOTE

If <value> is not specified, it is equivalent to set <value> to 1.

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2.4.4 Property Description

Saving upon Power-off	PIN
N	N

2.4.5 Example

Run: `ATV1`

Response: `OK`

2.5 ATI–Request Identification

2.5.1 Command Syntax

`ATI`[`<value>`]
Possible Response(s)
<CR><LF>`<list of MS ID info>`<CR><LF><CR><LF>`OK`<CR><LF>

2.5.2 Interface Description

The `ATI` command queries the ID information about the MS, including:

Manufacturer (`AT+GMI`)

Product model (`AT+GMM`)

Software version (`AT+GMR`)

ESN/IMEI (`AT+GSN`)

Capability list (`AT+GCAP`)

2.5.3 Parameter Description

`<value>`: queries the previously described MS ID information. The value ranges from 0 to 255 (these values are meaningless).

NOTE

If `<value>` is not specified, it is equivalent to set `<value>` to 0.

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2.5.4 Property Description

Saving upon Power-off	PIN
N	N

2.5.5 Example

Run: `ATI`

Response:
```
Manufacturer: Huawei Technologies Co., Ltd.
Model: ME209u-526
Revision: 11.110.07.04.00
IMEI: 356112010004540
+GCAP: +CGSM

OK
```

2.6 AT+GCAP–Request Transmission Capacity Domain Identification

2.6.1 Command Syntax

AT+GCAP
Possible Response(s)
<CR><LF>+GCAP: (list of supported MS transmit mode info)<CR><LF><CR><LF>OK<CR><LF>
AT+GCAP=?
Possible Response(s)
<CR><LF>OK<CR><LF>

2.6.2 Interface Description

This command lists transmission capacity domains currently supported by an MS.

2.6.3 Parameter Description

None

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2.6.4 Property Description

Saving upon Power-off	PIN
NA	N

2.6.5 Example

Run: `AT+GCAP`

Response:
```
+GCAP: +CGSM

OK
```

2.7 AT+CGMI/AT+GMI–Request Manufacturer Identification

2.7.1 Command Syntax

AT+CGMI
Possible Response(s)
<CR><LF><manufacturer><CR><LF><CR><LF>OK<CR><LF>
AT+CGMI=?
Possible Response(s)
<CR><LF>OK<CR><LF>

2.7.2 Interface Description

This command queries the MT's manufacturer information. Both `AT+GMI` and `AT+CGMI` have the same function and syntax.

2.7.3 Parameter Description

`<manufacturer>`: a string type value without double quotation marks that indicates the manufacturer information.

Unless otherwise specified, "`Huawei Technologies Co., Ltd.`" is returned.

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2.7.4 Property Description

Saving upon Power-off	PIN
NA	N

2.7.5 Example

Run: `AT+CGMI`

Response:
```
Huawei Technologies Co., Ltd.

OK
```

2.8 AT+CGMM/AT+GMM–Request Model Identification

2.8.1 Command Syntax

`AT+CGMM`
Possible Response(s)
<CR><LF>`<production_name>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CGMM=?`
Possible Response(s)
<CR><LF>`OK`<CR><LF>

2.8.2 Interface Description

This command queries the MT's model identification. Both `AT+CGMM` and `AT+GMM` have the same function and syntax.

The model ID's value can be one or more lines of text, determined by the MT's manufacturer. The model ID identifies the product model and can contain the product name and information that the manufacturer want to provide. The number of characters, including line terminators, in the response to this command cannot exceed 2048. The sequence `0`<CR> or `OK`<CR> is not allowed in the response.

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2.8.3 Parameter Description

<production_name>: a string type value without double quotation marks that indicates product name.

2.8.4 Property Description

Saving upon Power-off	PIN
NA	N

2.8.5 Example

Product name: ME209u-526

Run: AT+CGMM

Response: ME209u-526

OK

2.9 AT+CGMR/AT+GMR–Request Software Version

2.9.1 Command Syntax

AT+CGMR
Possible Response(s)
<CR><LF><version><CR><LF><CR><LF>OK<CR><LF>
AT+CGMR=?
Possible Response(s)
<CR><LF>OK<CR><LF>

2.9.2 Interface Description

The execution command causes the ME to return its software version. Both AT+GMR and AT+CGMR have the same function and syntax.

2.9.3 Parameter Description

<version>: indicates software version. It is a string with up to 31 characters, without double quotation marks. The sequence 0<CR> or OK<CR> is not allowed in the response.

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2.9.4 Property Description

Saving upon Power-off	PIN
NA	N

2.9.5 Example

Run: `AT+CGMR`

Response: `11.103.35.00.00`

`OK`

2.10 AT+CGSN/AT+GSN–Request Product Serial Number Identification

2.10.1 Command Syntax

`AT+CGSN`
Possible Response(s)
<CR><LF>`<sn>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CGSN=?`
Possible Response(s)
<CR><LF>`OK`<CR><LF>

2.10.2 Interface Description

This command queries the MT's IMEI. Both `AT+GSN` and `AT+CGSN` have the same function and syntax.

2.10.3 Parameter Description

`<sn>`: indicates the MT's IMEI. The returned IMEI is a string without double quotation marks, consisting of 15 digits described in the following table.

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8 digits	6 digits	1 digits
TAC	SNR	Spare

TAC : the type approval code assigned to the MT

SNR : the MT's serial number

Spare: spare digit

2.10.4 Property Description

Saving upon Power-off	PIN
NA	N

2.10.5 Example

If the TAC is "35154800", the SNR is "022544", and the spare digit is 4, then:

Run: `AT+CGSN`

Response: `351548000225444`

`OK`

2.11 AT+CSCS–Select TE Character Set

2.11.1 Command Syntax

`AT+CSCS[=<chset>]`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CSCS?`
Possible Response(s)
<CR><LF>`+CSCS: <chset>`<CR><LF><CR><LF>`OK`<CR><LF>
`AT+CSCS=?`
Possible Response(s)

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<CR><LF>+CSCS: (list of supported <chset>s)<CR><LF><CR><LF>OK<CR><LF>

2.11.2 Interface Description

The set command notifies TA of the TE's current character set so that TA can correctly convert TE's and MT's character sets. If TA uses an 8-bit interface but TE uses a 7-bit character set, the most significant bit of a character sent by the TE is set to 0.

2.11.3 Parameter Description

<chset>: at present, the default character set used by MS is "IRA". If AT+CSCS does not contain any parameter, that means set the current character as the default character.

"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)
"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

If MT is using GSM 7 bit default alphabet, its characters should be padded with 8th bit (zero) before converting them to hexadecimal numbers (i.e. no SMS-style packing of 7-bit alphabet).

2.11.4 Property Description

Saving upon Power-off	PIN
N	N

2.11.5 Example

Run: AT+CSCS="IRA"

Response: OK

Run: AT+CSCS?

Response: +CSCS: "IRA"

OK

Run: AT+CSCS=?

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Response: `+CSCS: ("IRA","GSM","UCS2")`

`OK`

2.12 AT+CIMI–Request IMSI

2.12.1 Command Syntax

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

2.12.2 Interface Description

This command queries the USIM or SIM card's IMSI.

2.12.3 Parameter Description

`<IMSI>`: indicates the IMSI stored on the USIM or SIM card. It is a string without double quotation marks, consisting of decimal digits, as described in the following table.

Up to 15 Digits		
3 Digits	**2 or 3 Digits**	
MCC	MNC	MSIN

2.12.4 Property Description

Saving upon Power-off	**PIN**
NA	Y

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2.12.5 Example

If the MCC is 123, the MNC is 45, and the MSIN is 1234567890, then:

Run: `AT+CIMI`

Response: `123451234567890`

`OK`

2.13 ATZ–Restore Factory Settings

2.13.1 Command Syntax

`ATZ[<value>]`
Possible Response(s)
<CR><LF>`OK`<CR><LF>

2.13.2 Interface Description

This command restores the parameters of the AT command to their factory default values, but will not change the DCE's baud rate.

After the command is executed, all data connections and calls will be disconnected, which is different from the `AT&F` command.

For the restored parameters of the AT command, see Table 2-1 . The `AT&W` command can store user values. If user values are not set, the parameters are restored to the factory default values.

2.13.3 Parameter Description

`<value>`:

0 Set all AT commands' parameters to their factory default values.

NOTE

If `<value>` is not specified, it is equivalent to set `<value>` to 0.

2.13.4 Property Description

Saving upon Power-off	PIN
NA	N

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2.13.5 Example

Run: ATZ0

Response: OK

2.14 AT&F–Restore Default AT Command Settings

2.14.1 Command Syntax

AT&F[<value>]
Possible Response(s)
<CR><LF>OK<CR><LF>

2.14.2 Interface Description

This command restores the parameters of the AT command in Table 2-1 to their default values.

Table 2-1 The commands that can be set to factory configuration

Command
E
V
Q
S3
S4

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

2.14.3 Parameter Description

<value>:

0	Restore the parameters of all the AT commands described in Table 2-1 to their default settings.
Other values	Used by the manufacturer for function expansion (not supported currently)

NOTE
If <value> is not specified, it is equivalent to set <value> to 0.

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2.14.4 Property Description

Saving upon Power-off	PIN
NA	N

2.14.5 Example

Run: `AT&F0`

Response: `OK`

2.15 A/–Repeat Previous Command Line

2.15.1 Command Syntax

A/
Possible Response(s)
The response depends on the previous command line.

2.15.2 Interface Description

This command repeats previous command line. <CR> is not needed.

2.15.3 Parameter Description

NA

2.15.4 Property Description

Saving upon Power-off	PIN
NA	N

2.15.5 Example

If the last command is `AT+CGSN`:

Run: `AT+CGSN`

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Response: 351782030028946

OK

Run: A/

Response: 351782030028946

OK

2.16 ATQ–Set Result Code Presentation Mode

2.16.1 Command Syntax

ATQ[<value>]
Possible Response(s)
<CR><LF>OK<CR><LF>

2.16.2 Interface Description

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

2.16.3 Parameter Description

<value>:

0	DCE transmits result code. (default value)
1	Result codes are suppressed and not transmitted.

NOTE

If <value> is not specified, it is equivalent to set <value> to 0.

2.16.4 Property Description

Saving upon Power-off	PIN
N	N

2.16.5 Example

Run: ATQ0

Response: OK

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2.17 AT&W–Store User Settings

2.17.1 Command Syntax

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

2.17.2 Interface Description

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

The commands that can be stored are followed in Table 2-1 .

2.17.3 Parameter Description

None

2.17.4 Property Description

Saving upon Power-off	PIN
NA	N

2.17.5 Example

Run: AT&W

Response: OK

2.18 AT&V–Query Current Configuration

2.18.1 Command Syntax

AT&V
Possible Response(s)
<CR><LF>(list of stored setting)<CR><LF><CR><LF>OK<CR><LF>

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In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

2.18.2 Interface Description

This command queries the current configuration.

The commands and parameters which can be queried are followed in AT&F.

2.18.3 Parameter Description

None

2.18.4 Property Description

Saving upon Power-off	PIN
NA	N

2.18.5 Example

Run: AT&V

Response:
```
&C: 1; &D: 2; &S: 0; E: 1; Q: 0; V: 1; X: 1; S0: 0;
S3: 13; S4: 10;
S5: 8; S7: 0; S10: 14; +ICF: 3,3; +IFC: 0,0

OK
```

2.19 AT+CMEE–Report Mobile Termination Error

2.19.1 Command Syntax

AT+CMEE=<n>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+CMEE?
Possible Response(s)
<CR><LF>+CMEE: <n><CR><LF><CR><LF>OK<CR><LF>

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AT+CMEE=?
Possible Response(s)
<CR><LF>+CMEE: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

2.19.2 Interface Description

The set command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the MT. When enabled, MT related errors cause the +CME ERROR: <err> final result code instead of the regular ERROR final result code. Regular ERROR is returned when the error is not MT-related.

2.19.3 Parameter Description

<n>: an integer type value indicates the format of the error result code.

0	Disable the +CME ERROR: <err> result code and use ERROR instead.
1	Enable the +CME ERROR: <err> result code and use numeric <err> values. (default value)
2	Enable the +CME ERROR: <err> result code and use verbose <err> values.

NOTE

If <n> is not specified, it is equivalent to set <n> to 2.

<err>: see General CME Error List.

2.19.4 Property Description

Saving upon Power-off	PIN
N	N

2.19.5 Example

Run: AT+CMEE=2

Response: OK

Run: AT+CMEE?

Response: +CMEE: 2

OK

Run: AT+CMEE=?

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Response: `+CMEE: (0,1,2)`

`OK`

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3 Network Service Related Commands

3.1 AT+COPS–Select Operator

3.1.1 Command Syntax

AT+COPS=[<mode>[,<format>[,<oper>[,<AcT>]]]]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+COPS?
Possible Response(s)
<CR><LF>+COPS: <mode>[,<format>,<oper>[,<AcT>]]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+COPS=?
Possible Response(s)
<CR><LF>+COPS: [list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper>[,<AcT>])s][,,(list of supported <mode>s),(list of supported <format>s)]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

3.1.2 Interface Description

This command queries the network state and registers network selection mode currently by the MS.

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The execution command selects the network automatically or manually.

The read command queries the current network selection mode. If the registration is successful, the current operator information will be returned.

The test command returns the list of (up to 20) operators existent in the current network.

NOTE

When <mode>=1, the command is aborted, and it will return OK for aborting.

3.1.3 Parameter Description

<mode>: network selection mode

0	Automatic (<oper> field is ignored).
1	Manual (<oper> field shall be present, and <AcT> optionally).
2	Deregister from network.
3	Set only <format> (for read command AT+COPS?), do not attempt registration/deregistration (<oper> and <AcT> 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>: integer type indicates format of the operator information <oper>

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 upto 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 subclause 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 or three BCD digit network code, which is administration specific; returned <oper> shall not be in BCD format, but in IRA characters converted from BCD.

<stat>: network state

0	Unknown
1	Available
2	Current
3	Forbidden

<AcT>: indicates access technology selected

0	GSM (not supported)

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1	GSM Compact (not supported)
2	UTRAN (not supported)
3	GSM w/EGPRS (not supported)
4	UTRAN w/HSDPA (not supported)
5	UTRAN w/HSUPA (not supported)
6	UTRAN w/HSDPA and HSUPA (not supported)
7	E-UTRAN

3.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

NOTE
The setting of <mode> is saved upon power-off.

3.1.5 Example

- Query the present status of ME's network registration:

Run: `AT+COPS=?`

Response:
```
+COPS:
(3,"CHN-UNICOM","UNICOM","46001",7),(3,"CHINA
MOBILE","CMCC","46000",7),,(0,1,3,4),(0,1,2)

OK
```

- Automatically search of network:

Run: `AT+COPS=0`

Response: `OK`

NOTE
In the execution command, if <mode> equals to 0, it makes other parameters invalid.

- Manually search of network:

Run: `AT+COPS=1,2,"46000",7`

Response: `OK`

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NOTE

- +CME ERROR: <err> will be returned when logging in to a nonexistent network or a network that cannot be logged in to (unless in the situation that services are restricted or services are restricted for the current zone).
- The current network state can be queried using the AT+CREG? or AT+CGREG? command.

- If the selected operator was not allowed, the ME is now deregistered. The read command will return only the mode, and no operator:

Run: AT+COPS?

Response: +COPS: 1

OK

Please use the AT+CREG? command to verify the registration status.

NOTE

ERROR will be returned in the situations above.

- Query the information of the network currently logged in:

Run: AT+COPS?

Response: +COPS: 1,2,"46000",7

OK

3.2 AT+CREG–Register Network

3.2.1 Command Syntax

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

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3.2.2 Interface Description

The set command controls the presentation of an unsolicited result code +CREG.

The read command returns the current registration status <stat>. Location information elements <lac>, <ci> and <AcT> are returned only when <n>=2.

3.2.3 Parameter Description

<n>:

0	Disable network registration unsolicited result code +CREG. (default value)
1	Enable network registration unsolicited result code +CREG: <stat>.
2	Enable network registration and location information unsolicited result code +CREG: <stat>[,<lac>,<ci>[,<AcT>]].

<stat>:

0	Not registered, MS is not currently searching for a new operator to register with.
1	Registered, home network.
2	Not registered, but MS is currently searching for a new operator to register with.
3	Registration denied.
4	Unknown.
5	Registered, roaming.

<lac>: a string type value that indicates two byte location area code or tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).

<ci>: a string type value that indicates four byte serving cell ID in hexadecimal format.

<AcT>: an integer type value that indicates access technology of the serving cell.

0	GSM (not supported)
1	GSM Compact (not supported)
2	UTRAN (not supported)
3	GSM w/EGPRS (not supported)
4	UTRAN w/HSDPA (not supported)
5	UTRAN w/HSUPA (not supported)
6	UTRAN w/HSDPA and HSUPA (not supported)
7	E-UTRAN

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3.2.4 Property Description

Saving upon Power-off	PIN
N	Y

3.2.5 Example

- Enable the initiative report when network registration status change:

Run: `AT+CREG=1`

Response: `OK`

- Query the status of the current network registration:

Run: `AT+CREG?`

Response:
```
+CREG: 1,1

OK
```

- Query the list of supported <n>s using the test command:

Run: `AT+CREG=?`

Response:
```
+CREG: (0-2)

OK
```

- If the location area code is 0x2513, the cell ID is 0xE01F4, and the network mode is LTE:

Run: `AT+CREG?`

Response:
```
+CREG: 2,1,"2513","E01F4",7

OK
```

3.3 AT+CLCK–Facility Lock

3.3.1 Command Syntax

AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]]
Possible Response(s)
When <mode>=2 and the command is executed successfully: <CR><LF>+CLCK: <status><CR><LF><CR><LF>OK<CR><LF>

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When <mode>≠2 and the command is executed successfully: <CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CLCK=?
Possible Response(s)
<CR><LF>+CLCK: (list of supported <fac>s)<CR><LF><CR><LF>OK<CR><LF>

3.3.2 Interface Description

The execution command locks, unlocks or interrogates an MT or a network facility <fac>.

The test command returns the facilities supported.

3.3.3 Parameter Description

<fac>: specifies the target of this command.

"SC"	SIM card (if this parameter is set, MT will request the password during startup)
"AB"	All barring services (applicable only for <mode>=0)
"AC"	All incoming barring services (applicable only for <mode>=0)
"AG"	All outgoing barring services (applicable only for <mode>=0)
"AI"	Bar all incoming calls
"AO"	Bar all outgoing calls
"IR"	BIC-Roam (bar incoming calls when roaming outside the home country)
"OI"	Bar outgoing international calls
"OX"	Bar outgoing international calls except to home country

NOTE
The passwords for "SC" is stored on the SIM card; other passwords are set on the network side.

<mode>: an integer type value that indicates operating mode.

0	Unlock
1	Lock
2	Queries status

<status>: an integer type value that indicates current status.

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0	Not active
1	Active

<passwd>: a string type value that shall be enclosed in quotation marks when specified in the command and be the same as the password specified using the AT+CPWD command.

- When <mode>=0 or 1, <passwd> is mandatory.
- When <mode>=2, <passwd> is not required. The characters in <passwd> must range from '0' to '9'.

<classx>:

1	Voice (not supported currently)
2	Data
4	Fax (not supported currently)
8	Short message

3.3.4 Property Description

Saving upon Power-off	PIN
Y	Y

NOTE
If the number of consecutive incorrect PIN entry attempts exceeds the remaining number of allowed PIN entry attempts, the PUK will be requested.

3.3.5 Example

- Query the lock status of SIM:

Run: `AT+CLCK="SC",2`

Response:
```
+CLCK: 0

OK
```

- Set the lock status of SIM:

Run: `AT+CLCK="SC",1,"1234"`

Response: `OK`

- Query the list of supported <fac>s:

Run: `AT+CLCK=?`

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Response: `+CLCK: ("AB","AC","AG","AI","AO","IR","OI","OX","SC")`

`OK`

3.4 AT+CPWD–Change Password

3.4.1 Command Syntax

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

3.4.2 Interface Description

The set command sets a new password for the facility lock function.

The test command returns a list of pairs which present the available facilities and the maximum length of their password.

3.4.3 Parameter Description

`<fac>`: specifies the target of this command.

"P2"	SIM PIN2
"SC"	SIM card (if this parameter is set, MT will request the password during startup)
"AB"	All barring services (applicable only for `<mode>`=0)
"AC"	All incoming barring services
"AG"	All incoming barring services
"AI"	Bar all incoming calls

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"AO"	Bar all outgoing calls
"IR"	BIC-Roam (Bar incoming calls when roaming outside the home country)
"OI"	Bar outgoing international calls
"OX"	Bar outgoing international calls except to home country

<oldpwd>, <newpwd>: string type values that indicate old password and new password whose maximum lengths are specified by <pwdlength>. The characters allowed in <oldpwd> and <newpwd> must range from '0' to '9'.

<pwdlength>: an integer type value that indicates maximum length of the password for the facility.

3.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

NOTE
When the password is changed, if the number of consecutive incorrect PIN entry attempts exceeds the remaining number of allowed PIN entry attempts, the PUK will be requested.

3.4.5 Example

- Modify PIN2 of SIM:

Run: `AT+CPWD="P2","5678","8765"`

Response: `OK`

- Query the list of supported (<fac>,<pwdlength>)s:

Run: `AT+CPWD=?`

Response:
```
+CPWD:
("AB",4),("AC",4),("AG",4),("AI",4),("AO",4),("IR"
,4),("OI",4),("OX",4),("SC",8),("P2",8)

OK
```

3.5 AT+CNUM–Subscriber Number

3.5.1 Command Syntax

AT+CNUM
Possible Response(s)

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

3.5.2 Interface Description

The execution command returns the MSISDNs related to the subscriber (this information can be stored in the EF_{MSISDN} folder on the SIM/USIM).

- For a SIM card, the information is stored in the EF_{MSISDN} under $DF_{Telecom}$.
- For a USIM card, the information is stored in the EF_{MSISDN} under ADF_{USIM}.
- If the subscriber has different MSISDNs for different services, each MSISDN is returned in a separate line.

3.5.3 Parameter Description

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

<numberx>: indicates string type phone number of format specified by <typex>.

<typex>: indicates type of the phone number; address octet in integer format.

- When <numberx> contains the plus sign ('+'), the value of <typex> is 145, indicating that the phone number is an international number.
- When <numberx> does not contain the plus sign ('+'), the value of <typex> is 129, indicating that the phone number is a national number.

<speed>: refer 3GPP TS 27.007-b10 subclause 6.7. (not supported currently)

<service>: an integer type value (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

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5	Fax
All other values below 128	Reserved

<itc>: an integer type value (information transfer capability). (not supported currently)

0	3.1 kHz
1	UDI

3.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.5.5 Example

- Write two numbers of the MT to the USIM card:

```
Run:        AT+CPBS="ON"
Response:   OK
Run:        AT+CPBW=1,"+8613987654321",145,"CC"
Response:   OK
Run:        AT+CPBW=2,"123",129,"USER"
Response:   OK
Run:        AT+CNUM
Response:   +CNUM: "CC","+8613987654321",145
            +CNUM: "USER","123",129

            OK
```

- Clear the numbers:

```
Run:        AT+CPBS="ON"
Response:   OK
Run:        AT+CPBW=1
Response:   OK
Run:        AT+CPBW=2
Response:   OK
Run:        AT+CNUM
```


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Response: OK

3.6 AT+CIREG–Register with the IMS

3.6.1 Command Syntax

AT+CIREG=<n>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+CIREG?
Possible Response(s)
<CR><LF>+CIREG: <n>,<reg_info>[,<ext_info>]<CR><LF><CR><LF>OK<CR><LF>
AT+CIREG=?
Possible Response(s)
<CR><LF>+CIREG: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

3.6.2 Interface Description

This command enables or disables execution of the +CIREGU command. (For details about the +CIREGU command, see section 3.7 .) This command can also query the IMS registration status. The optional parameter [,<ext_info>] cannot be queried for the moment.

3.6.3 Parameter description

<n>: an integer type value that specifies whether execution of the +CIREGU command is enabled.

0	Disable execution of the +CIREGU command (default value)
1	Enable execution of the +CIREGU command

<reg_info>: an integer type value that indicates the IMS registration status.

0	Unregistered
1	Registered

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3.6.4 Property Description

Saving upon Power-off	PIN
NA	N

3.6.5 Example

If the module is registered with the IMS, running AT+CIREG? will return the following response:

Run: AT+CIREG?

Response: +CIREG: 1,1

OK

3.7 +CIREGU–Report the IMS Registration Status

3.7.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CIREGU: <reg_info>[,<ext_info>]<CR><LF>

3.7.2 Interface Description

When enabled using +CIREG, this command reports the module's IMS registration status to the TE. The optional parameter [,<ext_info>] cannot be reported for the moment.

3.7.3 Parameter description

<reg_info>: an integer type value that indicates the IMS registration status.

0 Unregistered

1 Registered

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3.7.4 Property Description

Saving upon Power-off	PIN
NA	NA

3.7.5 Example

If execution of +CIREGU is enabled, and the module becomes registered with the IMS, the following is reported:

Response: `+CIREGU: 1`

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4 Serial Interface Control Commands

4.1 AT+IPR–Set Fixed Data Rate

4.1.1 Command Syntax

AT+IPR[=<rate>]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+IPR?
Possible Response(s)
<CR><LF>+IPR: <rate><CR><LF><CR><LF>OK<CR><LF>
AT+IPR=?
Possible Response(s)
<CR><LF>+IPR: (list of supported autodetectable <rate>s)[,(list of supported fixed-only <rates>)]<CR><LF><CR><LF>OK<CR><LF>

4.1.2 Interface Description

This numeric extended-format parameter specifies the data rate at which the DCE will accept commands, in addition to 1200 bit/s or 9600 bit/s. It may be used to select operation at rates at which the DCE is not capable of automatically detecting the data rate being used by the DTE. The specified rate takes effect following the issuance of any result code(s) associated with the current command line.

The <rate> specified does not apply in online data state if direct mode of operation is selected.

- If the command is sent from the USB interface, OK is returned. However, the command is invalidated.
- If the command is sent from the UART port or 2-pin serial port, the command is processed on the port and does not affect other ports. The command is validated.

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4.1.3 Parameter Description

The <rate> value specified shall be the rate in bits per second at which the DTE-DCE interface should operate, e.g. 19200 or 115200. The rates supported by a particular DCE are manufacturer-specific; however, the AT+IPR parameter should permit the setting of any rate supported by the DCE during online operation.

It is recommended that the default for this parameter is 115200.

NOTE

If <rate> is not specified, it is equivalent to set <rate> to 115200.

4.1.4 Property Description

Saving upon Power-off	PIN
Y	N

4.1.5 Example

- Set the baudrate as 115200:

Run: AT+IPR=115200

Response: OK

- Query current baudrate:

Run: AT+IPR?

Response: +IPR: 115200

OK

- List of supported fixed-only rates:

Run: AT+IPR=?

Response:
```
+IPR:
(),(600,1200,2400,4800,9600,19200,38400,57600,115200,230400,460800,921600,1000000,1500000,2500000,3000000,3500000,4000000)

OK
```


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4.2 AT+IFC–Control Local Flow

4.2.1 Command Syntax

AT+IFC[=<DCE_by_DTE>[,<DTE_by_DCE>]]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+IFC?
Possible Response(s)
<CR><LF>+IFC: <DCE_by_DTE>,<DTE_by_DCE><CR><LF><CR><LF>OK<CR><LF>
AT+IFC=?
Possible Response(s)
<CR><LF>+IFC: (list of supported <DCE_by_DTE>s),(list of supported <DTE_by_DCE>s)<CR><LF><CR><LF>OK<CR><LF>

4.2.2 Interface Description

This extended-format compound parameter controls the operation of local flow control between the DTE and DCE during the data state when V.42 error control is being used, or when fallback to non-error control mode is specified to include buffering and flow control. It accepts two numeric subparameters:

- If the command is sent from the USB interface or 2-pin serial port, OK is returned. However, the command is invalidated.
- If the command is sent from the UART port, the command is validated.

4.2.3 Parameter Description

<DCE_by_DTE>: specifies the method to be used by the DTE to control the flow of received data from the DCE.

0	None (default value)
1	DC1/DC3 on circuit 103; do not pass DC1/DC3 characters to the remote DCE. (reserved, not supported currently)
2	Circuit 133. (ready for receiving)
3	DC1/DC3 on circuit 103 with DC1/DC3 characters being passed through to the remote DCE in addition to being acted upon for local flow control. (reserved, not supported currently)

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4–127	Reserved for future standardization.
Other values	Reserved for manufacturer-specific use.

<DTE_by_DCE>: specifies the method to be used by the DCE to control the flow of transmitted data from the DTE.

0	None (default value)
1	DC1/DC3 on circuit 104 (reserved, not supported currently)
2	Circuit 106 (clear to send/ready for sending)
3–127	Reserved for future standardization
Other values	Reserved for manufacturer-specific use.

NOTE

- DC1 is IA5 1/1; DC3 is IA5 1/3.
- Both AT+IFC=0,2 and AT+IFC=2,0 are not supported.
- If<DCE_by_DTE> is not specified, it is equivalent to set <DCE_by_DTE> to 0.
- If <DTE_by_DCE> is not specified, it is equivalent to set <DTE_by_DCE> to 0.

4.2.4 Property Description

Saving upon Power-off	PIN
N	N

4.2.5 Example

- None flow control:

```
Run:        AT+IFC=0,0
Response:   OK
```

- Query current control state:

```
Run:        AT+IFC?
Response:   +IFC: 0,0

            OK
```

- List supported parameters:

```
Run:        AT+IFC=?
Response:   +IFC: (0,2),(0,2)

            OK
```


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- Enable flow control:

  Run: `AT+IFC=2,2`

  Response: `OK`

4.3 AT+CMUX–Multiplexing Mode

4.3.1 Command Syntax

`AT+CMUX=<mode>[,<subset>[,<port_speed>[,<N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]]]`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CMUX?`
Possible Response(s)
<CR><LF>`+CMUX: <mode>,[<subset>],<port_speed>,<N1>,<T1>,<N2>,<T2>,<T3>[,<k>]`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CMUX=?`
<CR><LF>`+CMUX: (`list of supported `<mode>`s`),(`list of supported `<subset>`s`),(`list of supported `<port_speed>`s`),(`list of supported `<N1>`s`),(`list of supported `<T1>`s`),(`list of supported `<N2>`s`),(`list of supported `<T2>`s`),(`list of supported `<T3>`s`),(`list of supported `<k>`s`)<CR><LF><CR><LF>`OK`<CR><LF>

4.3.2 Interface Description

This command enables the multiplexing protocol control channel (refer to 3GPP TS 27.010). The AT command sets parameters for the control channel. If the parameters are left out, the default value is used.

The read command queries the current mode and the settings.

The test command returns the supported modes and parameters.

It is necessary to use `AT+IPR` to set fixed data rate before enabling the multiplexing protocol control channel. It shall return a `+CME ERROR: <err>` response if the

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MT/TA/TE should autobaud to the AT+CMUX command up to and including an interface speed of 9600 bit/s.

If an AT+CMUX command is issued whilst in any multiplexer mode then that AT+CMUX command shall be ignored and the MT/TA shall return a +CME ERROR: <err> response.

4.3.3 Parameter Description

<mode>: an integer type (multiplexer Transparency Mechanism)

0	Basic option
1	Advanced option (not supported currently)

<subset>: an integer type. This parameter defines the way in which the multiplexer control channel is set up. A virtual channel may subsequently be set up differently but in the absence of any negotiation for the settings of a virtual channel, the virtual channel shall be set up according to the control channel <subset> setting.

0	UIH frames used only
1	UI frames used only (not supported currently)
2	I frames used only (not supported currently)

<port_speed>: an integer type (transmission rate)

1	9600 bit/s
2	19200 bit/s
3	38400 bit/s
4	57600 bit/s
5	115200 bit/s (default value)
6	230400 bits/s
7	460800 bits/s
8	921600 bits/s
9	1,000,000 bit/s
10	1,500,000 bit/s
11	2,500,000 bit/s
12	3,000,000 bit/s
13	3,500,000 bit/s
14	4,000,000 bit/s

<N1>: an integer type (maximum frame size). The value ranges from 31 to 1540, where the 31 is default for Basic option. (see <operation>)

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<T1>: an integer type (acknowledgement timer in units of ten milliseconds). The value ranges from 10 to 250, where 10 is default value. (100 ms)

<N2>: an integer type (maximum number of re-transmissions). The value ranges from 0 to 10, where 3 is default value.

<T2>: an integer type (response timer for the multiplexer control channel in units of ten milliseconds). The value ranges from 10 to 250, where 90 is default value. (900 ms)

NOTE
T2 must be longer than T1.

<T3>: an integer type (wake up response timer in seconds). The value ranges from 1 to 255, where 10 is default value. (not supported currently)

<k>: an integer type (window size, for Advanced operation with Error Recovery options). The value ranges from 1 to 7, where 2 is default value. (not supported currently)

4.3.4 Property Description

Saving upon Power-off	PIN
N	N

4.3.5 Example

- Enable Multiplexing mode:

Run: `AT+CMUX=0,0,5,31,10,3,90,10,2`

Response: `OK`

- Query current multiplexing mode state:

Run: `AT+CMUX?`

Response:
```
+CMUX: 0,0,5,31,10,3,90,10,2

OK
```

- List of supported parameters:

Run: `AT+CMUX=?`

Response:
```
+CMUX:
(0),(0),(1-14),(31-1540),(10-250),(0-10),(10-250),
(1-255),(1-7)

OK
```


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5 Mobile Termination Control and Status Commands

5.1 AT+CFUN–Set Operation Mode

5.1.1 Command Syntax

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

5.1.2 Interface Description

The execution command sets the MT mode or restarts the MT.

The read command queries the current mode.

The test command returns the supported parameter values.

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5.1.3 Parameter Description

<fun>:

0	Minimum functionality (disable RF but reserve SIM card power supply, previous mode must not be offline).
1	Set as online mode (previous mode must not be offline). (default value)
4	Set as offline mode (previous mode must not be FTM).
5	Set as FTM mode (previous mode must be online).
6	Restart MT (previous mode must be offline).
7	Disable RF (previous mode must not be offline).
8	Power off

<rst>: whether to restart MT before setting.

0	Do not restart MT before setting. (default value)
1	Restart the MT before setting (<fun> is set to 1).

NOTE

If <fun> is not specified, it is equivalent to set <fun> to 1.

5.1.4 Property Description

Saving upon Power-off	PIN
NA	N

5.1.5 Example

- Query the MT's current mode:

Run: `AT+CFUN?`

Response:
```
+CFUN: 1

OK
```

- The MT's current mode is 1 (online mode), we will set it to mode 5 (FTM) without restarting the module:

Run: `AT+CFUN=5,0`

Response: `OK`

- Query which mode MT supports:

Run: `AT+CFUN=?`

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Response: `+CFUN: (0-1,4-8),(0-1)`

`OK`

5.2 AT+CPIN–Enter PIN

5.2.1 Command Syntax

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

5.2.2 Interface Description

The set command verifies and unblocks PIN and PIN2.

The read command returns a string indicating whether a password is required or not.

- If the current password required is PIN or PIN2, run `AT+CPIN=<pin>` to verify PIN or PIN2.
- If the current password required is PUK or PUK2, run `AT+CPIN=<pin>[,<newpin>]` to unblock the PIN. In "`AT+CPIN=<pin>[,<newpin>]`", `<pin>` is the SIM PUK or SIM PUK2, and `<newpin>` is the new PIN or PIN2.
- If the set command is executed when PIN is not requested, `+CME ERROR: <err>` is returned.

NOTE

Verifying PIN or PUK while a call or other services are ongoing may cause the call or services to be terminated.

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5.2.3 Parameter Description

<pin>, <newpin>: string type values of the 4–8 digits. The character allowed in <pin> and <newpin> must range from '0' to '9', otherwise, an error message is returned.

<code>: a string type, without quotation marks.

READY	MT is not pending for any password.
SIM PIN	MT is waiting for UICC/SIM PIN to be given.
SIM PUK	MT is waiting for UICC/SIM PUK to be given to unblock the blocked SIM PIN.
SIM PIN2	MT is waiting for SIM PIN2 to be given.
SIM PUK2	MT is waiting for UICC/SIM PUK2 to be given to unblock the blocked SIM PIN2.

5.2.4 Property Description

Saving upon Power-off	PIN
NA	N

5.2.5 Example

- Run the read command:

Run: `AT+CPIN?`

Response:
```
+CPIN: SIM PUK2

OK
```

NOTE
The MT is blocked, and we need PUK2 code to unblock it.

- Unblock the MT's PUK2 and set the new PIN2 code as "5678" (this SIM's PUK2 code is "87654321"):

Run: `AT+CPIN="87654321","5678"`

Response: `OK`

- Try the read command again:

Run: `AT+CPIN?`

Response:
```
+CPIN: READY

OK
```

- Run the test command:

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Run: AT+CPIN=?

Response: OK

5.3 AT+CRSM–Restricted SIM Access

5.3.1 Command Syntax

AT+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]
Possible Response(s)
<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>
AT+CRSM=?
Possible Response(s)
<CR><LF>OK<CR><LF>

5.3.2 Interface Description

Using this command, TE applications have limited access to the SIM card.

The set command accesses the SIM card through restricted permissions.

5.3.3 Parameter Description

<command>: indicates command passed on by the MT to the SIM.

176	READ BINARY
178	READ RECORD
192	GET RESPONSE
214	UPDATE BINARY
220	UPDATE RECORD
242	STATUS

<fileid>: an integer type value that indicates identifier of an EF file on SIM; mandatory for every command except STATUS.

<P1>, <P2>, <P3>: integer type values; these parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in GSM 11.11.

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<data>: indicates information in hexadecimal format

<pathid>: a string type value that contains the path of an elementary file on the SIM/UICC in hexadecimal format (for example, "7F205F70"), and shall only be used in the mode "select by path from MF" as defined in ETSI TS 102.221.

<sw1>, <sw2>: integer type values that indicate information from the SIM about the execution of the actual command.

<response>: a string type value that indicates response of a successful completion of the command previously issued. For UPDATE BINARY and UPDATE RECORD, no response is returned.

5.3.4 Property Description

Saving upon Power-off	PIN
NA	N

5.3.5 Example

- Read the current state of SIM folder:

Run: `AT+CRSM=242`

Response:
```
+CRSM:
108,41,"62278202782183023F00A50D8001718302E573C104
800F55FF8A01058B032F0601C606900100830101"

OK
```

NOTE

- SW1=108
- SW2=41
- SIM content="62278202782183023F00A50D8001718302E573C104800F55FF8A01058B032F0601C606900100830101"
- These values are described in GSM 11.11.

- Run the test command:

Run: `AT+CRSM=?`

Response: `OK`

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5.4 AT+CCLK–Return Current Time of the Module

5.4.1 Command Syntax

AT+CCLK=<time>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CCLK?
Possible Response(s)
<CR><LF>+CCLK: <time><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CCLK=?
Possible Response(s)
<CR><LF>OK<CR><LF>

5.4.2 Interface Description

The set command sets the real–time clock of the MT. If setting fails in an MT error, +CME ERROR: <err> is returned. Refer to subclause 9.2 in 3GPP TS 27.007 for <err> values.

The read command returns the current setting of the clock.

5.4.3 Parameter Description

<time>: a 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 -96...+96). E.g. 6th of May 2013, 22:10:00 GMT+2 hours equals to "2013/05/06,22:10:00+08".

NOTE

If MT does not support time zone information, and then the three last characters of <time> are not returned by AT+CCLK?. For yyyy, the valid years set is 2000-2100.

5.4.4 Property Description

Saving upon Power-off	PIN
NA	N

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5.4.5 Example

Run: `AT+CCLK="2013/01/06,01:14:09"`

Response: `OK`

Run: `AT+CCLK?`

Response: `+CCLK: "2013/01/06,01:14:34"`

`OK`

Run: `AT+CCLK=?`

Response: `OK`

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6 UMTS Packet Domain Commands

6.1 AT+CGDCONT–Define PDP Context

See the AT+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.

6.1.1 Command Syntax

AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>]]]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+CGDCONT?
Possible Response(s)
<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>
AT+CGDCONT=?
Possible Response(s)
<CR><LF>+CGDCONT: (list of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s)[<CR><LF>+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>

6.1.2 Interface 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.

The 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 the set

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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 the set command, AT+CGDCONT=<cid> causes the values for context number <cid> to become undefined.

NOTE

Because the LTE module needs a default PDP context (profile 16) to register on the LTE network, the default PDP context should not be removed. And the corresponding <cid> is 16, so you cannot execute AT+CGDCONT=16.

The read command queries 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.

The 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.

6.1.3 Parameter Description

<cid>:

1–16	Index of a PDP context. Other PDP-related commands can use this index to use the defined PDP context.

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

"IP"	Internet Protocol
"PPP"	Point to Point Protocol
"IPV6"	IPV6 Protocol
"IPV4V6"	IPV4V6 Dual Stack

<APN>: a string parameter that specifies the access point for accessing 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, the read command returns"" or "0.0.0.0".

<d_comp>: a numeric parameter that controls PDP data compression.

0	Off
1	On
2	V.42bis

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3 V.44 (not supported currently)

<h_comp>: a numeric parameter that controls PDP header compression.

0 Off

1 On

2 RFC1144 (applicable for SNDCP only)

3 RFC2507

4 RFC3095 (applicable for PDCP only)

NOTE

- If <h_comp> is not specified, it is equivalent to set <h_comp> to 0.
- If <d_comp> is not specified, it is equivalent to set <d_comp> to 0.

6.1.4 Property Description

Saving upon Power-off	PIN
Y	N

6.1.5 Example

Run: AT+CGDCONT=?

Response:
```
+CGDCONT: (1-16),"IP",,,(0-2),(0-4)
+CGDCONT: (1-16),"PPP",,,(0-2),(0-4)
+CGDCONT: (1-16),"IPV6",,,(0-2),(0-4)
+CGDCONT: (1-16),"IPV4V6",,,(0-2),(0-4)

OK
```

Run: AT+CGDCONT?

Response:
```
+CGDCONT: 1,"IP","vcol.com","0.0.0.0",0,0
+CGDCONT: 16,"IP","xyz.com","0.0.0.0",0,0

OK
```

NOTE

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

Run: AT+CGDCONT=15,"IP","abc.com"

Response: OK

NOTE

This command saves one PDP context to the MT and the <cid> value is 15.

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Run: AT+CGDCONT?

Response:
```
+CGDCONT: 1,"IP","vcol.com","0.0.0.0",0,0
+CGDCONT: 15,"IP","abc.com","0.0.0.0",0,0
+CGDCONT: 16,"IP","xyz.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.

Run: AT+CGDCONT=15

Response: OK

NOTE
This command removes the PDP context with <cid>=15.

Run: AT+CGDCONT?

Response:
```
+CGDCONT: 1,"IP","vcol.com","0.0.0.0",0,0
+CGDCONT: 16,"IP","xyz.com","0.0.0.0",0,0

OK
```

NOTE
The response shows that the PDP context with <cid>=15 has been removed.

6.2 AT+CGACT–Activate or Deactivate PDP Context

6.2.1 Command Syntax

AT+CGACT=[<state>[,<cid>[,<cid>[,…]]]]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CGACT?
Possible Response(s)
<CR><LF>+CGACT: <cid>,<state>[<CR><LF>+CGACT: <cid>,<state>[...]]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

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

6.2.2 Interface Description

The execution command activates or deactivates the specified PDP context(s). If <cid> is not specified, all PDP contexts are activated or deactivated.

The read command queries the defined PDP Activation state.

The test command returns the supported values of <state>.

6.2.3 Parameter Description

<state>: an integer type value that indicates the state of PDP context activation.

0	Deactivated
1	Activated

<cid>: the index of a PDP context; specifies a particular PDP context definition, see AT+CGDCONT–Define PDP Context.

6.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.2.5 Example

- Query the value range of PDP Activation state:

Run: AT+CGACT=?

Response: +CGACT: (0,1)

OK

- Query the current PDP Activation state:

Run: AT+CGACT?

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Response: `+CGACT: 1,0`
`+CGACT: 16,1`

`OK`

- Activate or deactivate PDP contexts:

Run: `AT+CGACT=1,1`

Response: `OK`

Run: `AT+CGACT=0,1`

Response: `OK`

6.3 AT+CGATT–Attach or Detach PS Domain

6.3.1 Command Syntax

`AT+CGATT=[<state>]`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CGATT?`
Possible Response(s)
<CR><LF>`+CGATT: <state>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CGATT=?`
Possible Response(s)
<CR><LF>`+CGATT: (`list of supported `<state>`s)<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>

6.3.2 Interface Description

The set command attaches the MT to, or detaches the MT from the PS domain service. After the command has been completed, the MT remains in ITU-T V.25 ter

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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: <err> response is returned. Extended error responses are enabled by the AT+CMEE command.

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

The read command queries the current PS domain service state.

The test command returns information about the supported PS domain service states

6.3.3 Parameter Description

<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 set command.

6.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.3.5 Example

- Query the value range of PS domain service states:

```
Run:        AT+CGATT=?
Response:   +CGATT: (0,1)

            OK
```

- Query the current PS domain service state:

```
Run:        AT+CGATT?
Response:   +CGATT: 0

            OK
```

- Attach or Detach PS domain:

```
Run:        AT+CGATT=1
Response:   OK
Run:        AT+CGATT=0
Response:   OK
```


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6.4 AT+CGREG–PS Domain Registration Status

6.4.1 Command Syntax

AT+CGREG[=<n>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CGREG?
Possible Response(s)
<CR><LF>+CGREG: <n>,<stat>[,<lac>,<ci>[,<AcT>,<rac>]]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CGREG=?
Possible Response(s)
<CR><LF>+CGREG: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

6.4.2 Interface Description

The set command controls the presentation of an unsolicited result code +CGREG.

- when <n>=1 and there is a change in the MT's network registration status, +CGREG: <stat> is presented.
- When <n>=2 and there is a change in the network cell, +CGREG: <stat>[,<lac>,<ci>,[,<AcT>,<rac>]] is presented. In this case <AcT>, <lac>, <rac> and <ci> are sent only if available.

The read command queries the current registration state <stat>. Location information elements <lac> and <ci> are returned only when <n>=2.

The test command returns the <n>'s values supported by the UE.

6.4.3 Parameter Description

<n>:

0	Disable unsolicited result code +CGREG. (default value)

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1	Enable unsolicited result code +CGREG: <stat>.
2	Enable network registration and location information unsolicited result code +CGREG: <stat>[,<lac>,<ci>[,<AcT>,<rac>]].

NOTE

If <n> is not specified, it is equivalent to set <n> to 0.

<stat>:

0	Not registered, MT is not currently searching for a new operator to register with.
1	Registered, home network
2	Not registered, but MT is currently searching a new operator to register with.
3	Registration denied
4	Unknown
5	Registered, roaming

<lac>: a string type value that indicates four-character location area code in hexadecimal format (for example, "00C3" equals 195 in decimal).

<ci>: a string type value that indicates four-character cell ID in hexadecimal format.

<AcT>: a numeric parameter that indicates the access technology of the serving cell.

0	GSM (not supported currently)
1	GSM Compact (not supported currently)
2	UTRAN (not supported currently)
3	GSM w/EGPRS (not supported currently)
4	UTRAN w/HSDPA (not supported currently)
5	UTRAN w/HSUPA (not supported currently)
6	UTRAN w/HSDPA and HSUPA (not supported currently)
7	E-UTRAN

<rac>: a string type value that indicates one byte routing area code in hexadecimal format.

6.4.4 Property Description

Saving upon Power-off	PIN
N	Y

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6.4.5 Example

Run: `AT+CGREG?`

Response: `+CGREG: 0,1`

`OK`

Run: `AT+CGREG=?`

Response: `+CGREG: (0-2)`

`OK`

6.5 AT+CGSMS–SMS Bearer Domain

6.5.1 Command Syntax

`AT+CGSMS=<service>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CGSMS?`
Possible Response(s)
<CR><LF>`+CGSMS: <service>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CGSMS=?`
Possible Response(s)
<CR><LF>`+CGSMS: (`list of supported `<service>`s`)`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>

6.5.2 Interface Description

The set command sets the SMS bearer domain, that is, the selection of the CS/PS domain.

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The read command queries the current SMS bearer domain.

The test command returns the supported parameter values.

6.5.3 Parameter Description

<service>:

0	PS domain
1	CS domain
2	PS domain preferred
3	CS domain preferred (default value)

NOTE

The value of <service> is specified depending on the network registration status.

6.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.5.5 Example

- Query the value range of SMS bearer domain:

```
Run:        AT+CGSMS=?
Response:   +CGSMS: (0-3)

            OK
```

- Query the current domain type which SMS used:

```
Run:        AT+CGSMS?
Response:   +CGSMS: 3

            OK
```

- Set the SMS bearer domain type:

```
Run:        AT+CGSMS=0
Response:   OK
Run:        AT+CGSMS=1
Response:   OK
Run:        AT+CGSMS=2
Response:   OK
```


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7 Normal Commands for SMS

7.1 AT+CPMS–Select Message Storage

7.1.1 Command Syntax

AT+CPMS=<mem1>[,<mem2>[,<mem3>]]
Possible Response(s)
<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>
AT+CPMS?
Possible Response(s)
<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>
AT+CPMS=?
Possible Response(s)
<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> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

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7.1.2 Interface Description

The set command selects memory storages <mem1>, <mem2> and <mem3> to be used for reading, writing, etc. The set command also sets the usage of the currently selected memory storages.

The read command queries the names and the usage of the selected memory storages.

The test command returns lists of memory storages supported by the MT.

7.1.3 Parameter Description

<mem1>: a string type value that specifies the memory storage used for reading and deleting messages.

"SM"	(U)SIM card
"ME"	NV (not supported currently)
"BM"	Broadcast message storage (not supported currently)
"MT"	Any of the storages associated with ME (not supported currently)
"TA"	TA message storage (not supported currently)
"SR"	Status report storage (not supported currently)

The value of <mem1> is related to the specification supported by the MT. You cannot set <mem1> to a memory storage that is not supported. Otherwise, an error message is returned.

<mem2>: a string type value that specifies the memory storage used for writing and sending messages. Available values of this field are the same as those of the <mem1> field.

<mem3>: a string type value that specifies the memory storage used for receiving messages. Available values of this field are the same as those of the <mem1> field.

<total1>: an integer type value that indicates the capacity of <mem1> for storing messages.

<total2>: an integer type value that indicates the capacity of <mem2> for storing messages.

<total3>: an integer type value that indicates the capacity of <mem3> for storing messages.

<used1>: an integer type value that indicates the number of messages currently saved in the memory storage specified by <mem1>.

<used2>: an integer type value that indicates the number of messages currently saved in the memory storage specified by <mem2>.

<used3>: an integer type value that indicates the number of messages currently saved in the memory storage specified by <mem3>.

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NOTE

The settings of <mem3> are not saved when the MT is powered off. The values of <mem1> and <mem2> are consistent with that of <mem3> when the MT is powered on again.

7.1.4 Property Description

Saving upon Power-off	PIN
N	Y

7.1.5 Example

- Query the types of supported storage using the test command:

```
Run:        AT+CPMS=?
Response:   +CPMS: ("SM"),("SM"),("SM")

            OK
```

- Query the current storage type, used storage space and maximum storage capacity:

```
Run:        AT+CPMS?
Response:   +CPMS: "SM",2,50,"SM",2,50,"SM",2,50

            OK
```

- Set the storage type using the test command:

```
Run:        AT+CPMS="SM","SM","SM"
Response:   +CPMS: 0,50,0,50,0,50

            OK
```

7.2 AT+CMGF–Set Message Format

7.2.1 Command Syntax

AT+CMGF[=<mode>]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+CMGF?
Possible Response(s)
<CR><LF>+CMGF: <mode><CR><LF><CR><LF>OK<CR><LF>

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AT+CMGF=?
Possible Response(s)
<CR><LF>+CMGF: (list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF>

7.2.2 Interface Description

The set command sets the message format. The format is specified by <mode>, which can be either PDU mode or text mode.

The read command queries the currently selected mode.

The test command returns available values of <mode>.

7.2.3 Parameter Description

<mode>:

0	PDU mode (default value)
1	Text mode

NOTE

If <mode> is not specified, it is equivalent to set <mode> to 0.

7.2.4 Property Description

Saving upon Power-off	PIN
N	N

7.2.5 Example

Run: AT+CMGF=0

Response: OK

Run: AT+CMGF?

Response: +CMGF: 0

OK

NOTE

For details about the structure of a PDU packet, refer to the 3GPP TS 23.040.

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7.3 AT+CNMI–New Message Indications to TE

7.3.1 Command Syntax

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

7.3.2 Interface Description

The set command selects the procedure of receiving new messages from the network.

The read command queries the current parameter values.

The test command returns the supported parameter values.

NOTE

- In 3GPP, the values set in this command are reset to 0 after the MT is restarted. In this case, no messages are sent to the TE. AT+CNMI=0,0,0,0,0 is not recommended.
- In 3GPP, AT+CNMI is equivalent to AT+CNMI=0,0,0,0,0.
- The command only supports 3GPP short messages.

7.3.3 Parameter Description

<mode>: controls how new message indications are sent.

0	Buffer SMS-DELIVER indications in the ME. If the ME buffer is full, then the oldest indication is overwritten by the latest indication. (default value)
1	Directly send SMS-DELIVER indications to the TE. When a SMS-DELIVER indication cannot be sent (for example, when in online data mode), it will be discarded.

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2 Directly send SMS-DELIVER indications and message status reports to the TE. When a SMS-DELIVER indication and message status report cannot be sent (for example, when in online data mode), they are buffered in the ME and sent to the TE when they can be sent.

NOTE

SMS-DELIVER indications are buffered in the MT's volatile memory. If the MT is powered off before the indications are sent, messages may be lost. Therefore, when <mode> is set to 0 or 2, messages are not recommended to be directly sent to the TE (that is, <mt> is not recommended to be set to 2 or 3).

<mt>: sets the rules for saving messages and sending SMS-DELIVER indications. There are four modes for storing new messages and sending new message indications.

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

1 Stores SMS-DELIVER indications on the MT and sends storage location indication to the TE.

```
+CMTI: <mem>,<index>
```

2 Does not store SMS-DELIVER indications on the MT but directly sends them to the TE.

- If PDU mode enabled (AT+CMGF=0):

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

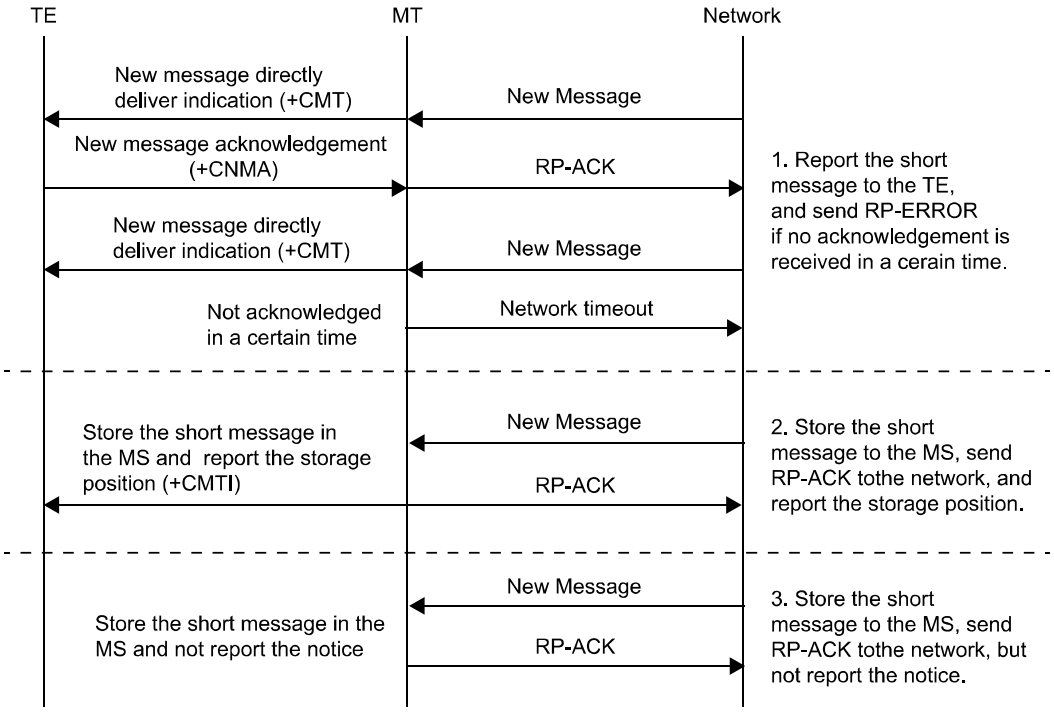
- If text mode enabled (AT+CMGF=1):

```
+CMT:
<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>
,<tosca>,<length>]<CR><LF><data>
```

3 Stores SMS-DELIVER indications on the MT, but does not send SMS-DELIVER indications to the TE.

The following figure illustrates the interaction between the TE and the MT for the previous three modes.

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The following table describes the <mt> values and the corresponding indications.

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

NOTE

- The SMS class is defined by the TP-DCS domain of the SMS. For details, see the description of <DCS> in AT+CMGS–Send Message (PDU Mode).
- +CMT&+CNMA indicates that the TE is required to send the confirmation (+CNMA).

<bm>: sets the rules for saving CBMs and sending CBM indications.

0 No CBM indications are routed to the TE. (default value)

1 If CBM is stored into ME/TA, indication that the memory location is routed to the TE using unsolicited result code:

+CBMI: <mem>,<index> (not supported currently)

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2 New CBMs are routed directly to the TE using unsolicited result code:

- If PDU mode enabled (AT+CMGF=0):

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

- If text mode enabled (AT+CMGF=1):

  +CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>

- If ME supports data coding groups which define special routing also for messages other than class 3 (e.g. (U)SIM specific messages), ME may choose not to route messages of such data coding schemes into TE (indication of a stored CBM may be given as defined in <bm>=1).

3 Class 3 CBMs are routed directly to TE using unsolicited result codes defined in <bm>=2. If CBM storage is supported, messages of other classes result in indication as defined in <bm>=1. (not supported currently)

Table 7-1 <bm> parameter

<bm>	Receiving procedure for different message data coding schemes (refer 3GPP TS 23.038)
0	All schemes: as in 3GPP TS 23.038; if CBM storage is supported, store message to "BM" (or some manufacturer or data coding scheme specific memory).
1	All schemes: as <bm>=0 but send indication if message stored successfully.
2	All schemes: route message to TE unless ME has detected a special routing to somewhere else (e.g. to (U)SIM; an indication may be sent if message stored successfully).
3	Class 3: route message to TE others: as <bm>=1 (if CBM memory storage is supported)

<ds>: sets whether to send message status reports.

0 Do not send message status reports. (default value)

1 Do not store message status reports to the MT and directly send the reports to the TE.

- If PDU mode enabled (AT+CMGF=0):

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

- If text mode enabled (AT+CMGF=1):

  +CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>

2 Store message status reports to the MT and send the storage location to the TE using +CDSI.

+CDSI: <mem>,<index>

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<bfr>:

0	TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> ranges from 0 to2 is entered (OK response shall be given before flushing the codes). (default value)
1	TA buffer of unsolicited result codes defined within this command is cleared when <mode>=0–2 is entered.

7.3.4 Property Description

Saving upon Power-off	PIN
N	N

7.3.5 Example

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

  Class 1 messages are stored to the SIM, and then storage locations are reported (+CMTI: "SM",1). Message status reports are directly sent (+CDS).

  If SMS-DELIVER indications cannot be sent (for example, when in online data state), they will be discarded.
- AT+CNMI=1,1,0,2,0

  Class 1 messages are stored to the SIM, and then storage locations are reported (+CMTI: "SM",1). Message status reports are stored to the MS, and then storage locations are reported (+CDSI: "SM",2).

  If SMS-DELIVER indications cannot be sent (for example, when in online data state), they will be discarded.(The SMS messages and SMS-DELIVER indications are stored in the MS and can be read using the AT+CMGL command; however, the TE cannot receive the indications.)
- Other commonly-used settings include:

  AT+CNMI=1,1,0,0,0: store the messages, and then send the storage locations to the TE; do not send the message status reports.

  AT+CNMI=1,2,0,0,0: do not store the messages but directly send them to the TE; do not send the message status reports.

7.4 AT+CNMA–New Message Acknowledgement (PDU Mode)

7.4.1 Command Syntax

If PDU mode enabled (AT+CMGF=0):

AT+CNMA[=<n>[,<length>[<CR>PDU is given<ctrl-Z/ESC>]]]
Possible Response(s)

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

7.4.2 Interface Description

The execution command acknowledges the reception of a new message that is routed directly to the TE. This acknowledgement command shall be used when AT+CSMS parameter <service> equals 1. For the use of this command, see AT+CNMI–New Message Indications to TE.

NOTE

- Set AT+CSMS=1 before AT+CNMI is set.
- The unsolicited report CDS is not supported to be confirmed by the command AT+CNMA currently.
- The command only supports 3GPP short messages.

In PDU mode, either positive (RP-ACK) or negative (RP-ERROR) acknowledgement can be sent to the network. The parameter <n> defines which acknowledgement to be send.

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 AT+CMGS–Send Message (PDU Mode), except that the format of <ackpdu> is used instead of <pdu>. PDU shall not be bounded by double quotation marks.

Before the previous message is acknowledged, the MT will not send another +CMT result code to the TE.

If the MT does not receive acknowledgement within required time (network timeout), the MT will send RP-ERROR to the network and automatically set both <mt> and <ds> values of AT+CNMI to zero to prevent SMS-DELIVER indications and message status reports from being sent to the TE. To enable the MT to send SMS-DELIVER indications and message status reports to the TE, <mt> and <ds> must be reset.

If the command is executed when no acknowledgement is expected, +CMS ERROR: <err> is returned.

The test command returns a list of supported <n> values. If the value supported is 0 only, sending of TPDU is not supported.

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7.4.3 Parameter Description

<n>:

0	Command operates similarly as defined for the text mode.
1	Send RP-ACK (or buffered result code received correctly).
2	Send RP-ERROR.

<ackpdu>: indicates 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	Indicates that the TP-UD has one header.
TP-PI	TP-Parameter-Indicator	M	o	Indicates the optional parameters.
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

NOTE

- Mandatory (M) or Optional (O).
- Integer (I), Bit (b), 2 bits (2b), octet (o).
- Depending on TP-DCS.

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

Bits 7 and 2–5 of the first byte are not used in SMS-DELIVER-REPORT. The sender should set them to zero. If any of those bits is not zero, it will be omitted by the recipient.

Description of the basic elements:

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<TP-MTI>: indicates TP-message type; bit 0 and bit 1 of 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 MT)
1	0	SMS-COMMAND (in the direction MT to SC)
0	1	SMS-SUBMIT (in the direction MT to SC)
0	1	SMS-SUBMIT-REPORT (in the direction SC to MT)
1	1	Reserved

<TP-UDHI>: indicates that the TP-UD has one header; bit 6 of the first byte.

0	The TP-UD field contains SMS message only.
1	There is a header at the beginning of the TP-UD field.

<TP-PI>: indicates the optional parameters. Setting the bit to 1 indicates that the corresponding parameter exits.

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>: indicates protocol ID. When sending a message, the TE sets <TP - PID> to the default value 00000000. When sending an email, the TE sets <TP - PID> to 00110010=0x32.

<TP-DCS>: indicates the TE adopts the TP-DSC mode to send a message.

Bit 7–bit 6 (TE uses this TP-DCS mode)	00: used by TE when sending a message.	Bit 5	0	TE sets bit 5 to zero, indicating the message is not compressed.
			1	If bit 5 is set to 1, the message is compressed. TE does not use this value.
		Bit 4	0	When TE sets bit 4 to 0, bit 1 and bit 0 are reserved and set to 00.
			1	When bit 4 is set to 1, bit 1 and bit 0 indicate the message type. A message's type is dependent on user settings. If the user specifies a message type (for example, class 1 or class 2), TE sets bit 4 to 1.
		Bit 3–2: message encoding	00	GSM 7-bit encoding scheme; default.
			01	8-bit encoding scheme

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		scheme	10	UCS2 encoding scheme. TE uses this value when the user inputs Chinese characters.
		Bit 1–0: message type; set by TE according to users' selection	00	Class 0. Messages are displayed on the user interface but not stored. A response is sent to the SC to acknowledge the reception of the message.
			01	Class 1. Messages are stored to the MT, or to the SIM card when the message storage on the MT is used up.
			10	Class 2. Messages are stored to the SIM card only. After a class 2 message is stored, the storage state will be sent to the SC. If the SIM card is full, a response is sent to the SC to notify it of the occurrence and cause of message storage failure.
			11	Class 3. Messages are stored to the TE. When the MT receives the message, it sends a response to the SC before routing the message to the TE.
Bit 7–bit 4 (TE does not use this TP-DCS mode)	1100 and 1101: GSM 7 bit encoding 1110: uncompressed UCS2 encoding scheme)	Bit 3	0	Disable the message waiting indication feature. At present, the message waiting indication feature is not supported for enhanced messages, email messages and voicemail messages.
			1	Enable the message waiting indication feature.
		Bit 2	0	Reserved
		Bit 1–0: message waiting type	00	Voice message waiting
			01	Fax message waiting
			10	Email message waiting
			11	Message of unknown type waiting
	1111: not used by TE	Bit 3	0	Reserved
		Bit 2	0	7-bit encoding
			1	8-bit encoding scheme
		Bit 1–0	00	Class 0. Messages are displayed on the user interface but not stored. A response is sent to the SC to acknowledge the reception of the message.
			01	Class 1. Messages are stored to the MT (NV memory) or the SIM card.
			10	Class 2. Messages are stored to the SIM card only. After a class 2 message is stored, the storage state will be sent to the SC.
			11	Class 3. Messages are stored to the TE. When the MT receives the message, it sends a response to the SC before routing the message to the TE.

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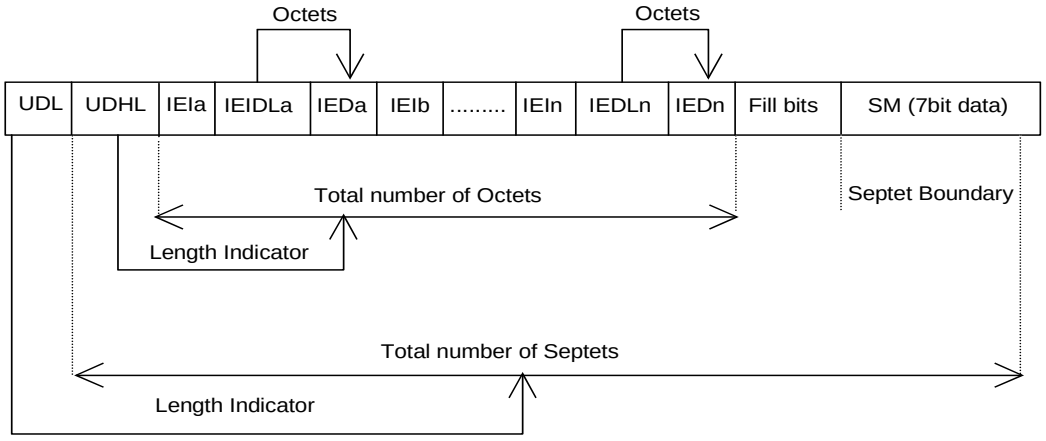
<TP-UDL>: indicates the number of bytes that the user data field occupies. If <TP-UDL> is 0, the user data field does not exist.

<TP-UD>: indicates the user data field may contain a user data header. If the header is contained (that is, the value of bit 6 in byte 0 is 1), the value of TP-UDL equals to the length of the User-Data-Header plus the length of the User-Data. The value of <TP-UDL> depends on the encoding scheme:

- If the default encoding scheme (7-bit encoding) is used, <TP-UDL> indicates the number of septets contained in the user data.
- If the 8-bit encoding scheme is used, <TP-UDL> indicates the number of octets contained in the user data.
- If the UCS2 encoding scheme is used, <TP-UDL> also indicates the number of octets contained in the user data.
- If 7-bit, 8-bit or UCS2 compression encoding is used, <TP-UDL> indicates the number of octets contained in the compressed user data.

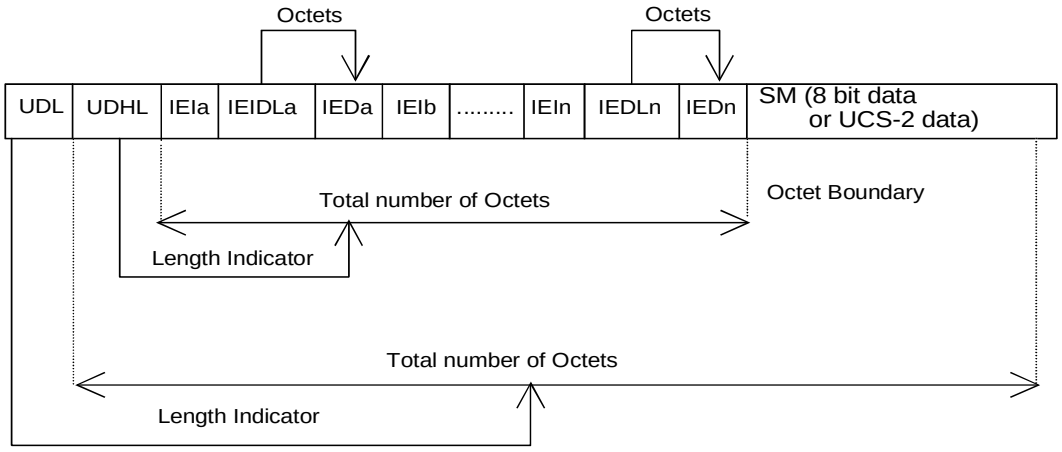
Figure 7-1 and Figure 7-2 illustrate the formats of the user data encoded using different schemes.

Figure 7-1 User data encoded using the default 7-bit encoding scheme



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Figure 7-2 User data encoded using the 8-bit or UCS2 encoding scheme



In Figure 7-1 and Figure 7-2 , IEI is short for Information Element Identifier.

7.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.4.5 Example

- Firstly, set AT commands orderly as follows:

Run: `AT+CSMS=1`

Response:
```
+CSMS: 1,1,1

OK
```

Run: `AT+CNMI=1,2,0,1`

Response: `OK`

- After a new message is routed directly to the TE, `AT+CNMA` should be set within required time to send positive acknowledgement to the network.

Response:
```
+CMT: ,24
0891683108608805F9240D91683109731147F4000031305012
43600004F4F29C0E
```

Run: `AT+CNMA`

Response: `OK`

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7.5 AT+CNMA–New Message Acknowledgement (Text Mode)

7.5.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CNMA
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CNMA=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

7.5.2 Interface Description

The execution command acknowledges the reception of a new message that is routed directly to the TE. This acknowledgement command shall be used when AT+CSMS parameter <service> equals 1. For the use of this command, see AT+CNMI–New Message Indications to TE.

NOTE

- Set AT+CSMS=1 before AT+CNMI is set.
- The unsolicited report CDS is not supported to be confirmed by the command AT+CNMA currently.
- The command only supports 3GPP short messages.

7.5.3 Parameter Description

None

7.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

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7.5.5 Example

- Firstly, set AT commands orderly as follows:

Run: `AT+CSMS=1`

Response: `+CSMS: 1,1,1`

`OK`

Run: `AT+CNMI=1,2,0,2,0`

Response: `OK`

- After a new message is routed directly to the TE, `AT+CNMA` should be set within required time to send positive acknowledgement to the network.

Response: `+CMT: "+8613903711736",,"13/02/25,15:19:38+00"`
`HELLO`

Run: `AT+CNMA`

Response: `OK`

7.6 +CMTI–New SMS-DELIVER Indication

7.6.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CMTI: <mem>,<index><CR><LF>

7.6.2 Interface Description

This command indicates that a new message is received.

7.6.3 Parameter Description

<mem>:

"BM"	Broadcast message storage (not supported currently)
"ME"	ME message storage (not supported currently)
"MT"	ME-related memory (not supported currently)
"SM"	(U)SIM message storage
"TA"	TA SMS storage (not supported currently)
"SR"	Status report storage (not supported currently)

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<index>: an integer type value that indicates the location in the storage.

7.6.4 Property Description

Saving upon Power-off	PIN
NA	NA

7.6.5 Example

If the SMS received and MS stores the message on the SIM card or ME, and presents the new message indication, a message similar to the following is displayed:

Response:	+CMTI: "SM",4	Presents the storage and location without solicitation.

7.7 +CDSI–New SMS Status Report Indication

7.7.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CDSI: <mem>,<index><CR><LF>

7.7.2 Interface Description

This command notifies the receiving of a new SMS status report and the memory location where the report is stored.

7.7.3 Parameter Description

<mem>:

"SM"	SIM/USIM SMS memory
"ME"	NV SMS memory (only supported by IMS 3GPP2)
"SR"	Status report storage (not supported currently)

<index>: an integer type value that indicates location in the memory.

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7.7.4 Property Description

Saving upon Power-off	PIN
NA	NA

7.7.5 Example

If message status reports received and MS store message status reports to the MT and send the storage location to the TE, a message similar to the following is displayed:

Response: `+CDSI: "SM",17`

7.8 AT+CMGD–Delete Message

7.8.1 Command Syntax

AT+CMGD=<index>[,<delflag>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMGD=?
Possible Response(s)
<CR><LF>+CMGD: (list of supported <index>s)[,(list of supported <delflag>s)]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

7.8.2 Interface Description

The set command deletes the message at location <index> in the storage <mem1>.

For details about <mem1>, see AT+CPMS–Select Message Storage. If <delflag> is set to a value other than 0, the MT ignores <index> and executes the command as specified by <delflag>. If the deletion fails, +CMS ERROR: <err> is returned.

The test command returns storage locations that have messages and supported <deflag> values.

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7.8.3 Parameter Description

<index>: indicates the storage location where the message is stored.

<delflag>:

0	Delete the message stored at the location specified by <index>. (default value)
1	Delete all the read messages saved in the preferred storage, and keep the unread, sent, and unsent ones.
2	Delete all the read and sent messages saved in the preferred storage, and keep the unread and unsent ones.
3	Delete all the read, sent, and unsent messages saved in the preferred storage, and keep the unread ones.
4	Delete all messages saved in the preferred storage, including the unread ones.

7.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.8.5 Example

- Delete the message stored in index 1 using the execution command:

Run: `AT+CMGD=1`

Response: `OK`

- Delete all the message in the current storage using the execution command:

Run: `AT+CMGD=1,4`

Response: `OK`

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8 SMS Service Interface

8.1 +CMT–New Message Directly Deliver Indication (PDU Mode)

8.1.1 Command Syntax

If PDU mode enabled (AT+CMGF=0):

URC
Possible Response(s)
<CR><LF>+CMT: [<reserved>],<length><CR><LF><pdu><CR><LF>

8.1.2 Interface Description

This command indicates that the new message is not saved but directly sent to the TE.

8.1.3 Parameter Description

<reserved>: reserved.

<length>: an integer type value that indicates the number of bytes of PDU data.

<pdu>: indicates protocol data unit. For details about the PDU format, see AT+CMGS–Send Message (PDU Mode).

8.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

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8.1.5 Example

If the SMS received and directly presents the message instead of storing it, a message similar to the following is displayed:

Response:	+CMT: ,24 0891683108608805F9240D916831 09731128F5000041106151833300 0462B1580C	Presents an indication, without solicitation, when the message storage is full.

8.2 +CMT–New Message Directly Deliver Indication (Text Mode)

8.2.1 Command Syntax

If text mode enabled (AT+CMGF=1):

URC
Possible Response(s)
<CR><LF>+CMT: <oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>, <length>]<CR><LF><data><CR><LF>

8.2.2 Interface Description

This command indicates that the new message is not saved but directly sent to the TE.

8.2.3 Parameter Description

For details about other parameters, refer to GSM 07.05.

8.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.2.5 Example

If the SMS received directly presents the message instead of storing it, a message similar to the following is displayed:

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Response:	+CMT: "+8613312345678",,"12/05/05,18:10:36+00" huawei ^SMMEMFULL: "SM"	Presents an indication, without solicitation, when the message storage is full.

8.3 +CDS–SMS Status Report Indication Directly Displayed (PDU Mode)

8.3.1 Command Syntax

If PDU mode enabled (AT+CMGF=0):

URC
Possible Response(s)
<CR><LF>+CDS: <length><CR><LF><pdu><CR><LF>

8.3.2 Interface Description

This command presents SMS status report to the TE upon reception without saving.

8.3.3 Parameter Description

<length>: an integer type value that indicates length of PDU data.

<pdu>: indicates protocol data unit.

The format of a PDU is as follows:

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

For the specific format of <SCA>, see AT+CMGS–Send Message (PDU Mode).

The structure of TPDU data is as follows:

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

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Abbr.	Reference	P1)	R2)
TP-MR	TP-Message-Reference	M	I
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	

NOTE

- Mandatory (M) or Optional (O).
- Integer (I), bit (b), 2 bits (2b), Octet (o), 7 octets (7o), 2-12 octets (2-12o).

8.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.3.5 Example

If message status reports received and MS do not store message status reports to the MT and directly send the reports to the TE, a message similar to the following is displayed:

Response:
```
+CDS: 26
0891683108608805F906F80D91683109731128F54110615183
33004110615183630000
```

8.4 +CDS–SMS Status Report Indication Directly Displayed (Text Mode)

8.4.1 Command Syntax

If text mode enabled (`AT+CMGF=1`):

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URC
Possible Response(s)
<CR><LF>+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st><CR><LF>

8.4.2 Interface Description

This command presents SMS status report to the TE upon reception without saving.

8.4.3 Parameter Description

For details about other parameters, refer to GSM 07.05.

8.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.4.5 Example

If MS does not store message status reports received to the MT and directly sends the reports to the TE, a message similar to the following is displayed:

Response:
```
+CDS:
6,116,"+8613903710742",145,"12/03/13,12:10:35+00"
,"12/03/13,12:10:39+00",0
```

8.5 AT+CSCA–Service Center Address

8.5.1 Command Syntax

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

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In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CSCA=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.5.2 Interface Description

The set command sets the SMSC address. For SMS messages in PDU mode, this command can be used only when the <sc_len> parameter in the PDU is set to 0 (for details about the PDU format, see AT+CMGS–Send Message (PDU Mode).

8.5.3 Parameter Description

<sca>: a string type value that specifies the SMSC address. '*', '#', '+' and '0'–'9' are allowed in the SMSC address. The maximum length of the SMSC address is 20 characters (excluding '+').

<tosca>: an integer type value that specifies the address type. If the value of <tosca> is 145, the address is an international phone number. For details about the values of <tosca>, see the value definitions of <type_addr> in AT+CMGS–Send Message (PDU Mode).

If the command does not contain <tosca>, the value of <tosca> remains unchanged.

NOTE

If the command does not contain <tosca>, the value of <tosca> is 145 when the character '+' is present; the value is 129 when the character '+' is not present. This command is controlled by AT+CSCS.

8.5.4 Property Description

Saving upon Power-off	PIN
Y	Y

8.5.5 Example

Sets the service center number using the test command:

Run: AT+CSCA="8613800688509",145

Response: OK

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8.6 AT+CSMS–Select Messaging Service

8.6.1 Command Syntax

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

8.6.2 Interface Description

The set command selects messaging service <service>. It returns the types of messages supported by the ME: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages.

The read command queries supported message types along the current service setting.

The test command returns a list of all services supported by the ME.

8.6.3 Parameter Description

<service>: indicates a messaging service type.

0	3GPP TS 23.040, 3GPP TS 23.041 (messaging AT command syntax is compatible with GSM 07.05 Phase 2.) (default value)
1	3GPP TS 23.040, 3GPP TS 23.041 (messaging AT command syntax is compatible with GSM 07.05 Phase 2+. Note that <service>=1 is required for AT+CNMA.)

<mt>, <mo>, <bm>: integer type values that respectively indicate whether the MT supports mobile terminated messages, mobile originated messages and broadcast type messages.

0	Type not supported
1	Type supported (default value)

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8.6.4 Property Description

Saving upon Power-off	PIN
N	N

8.6.5 Example

Set messaging AT command syntax is compatible with GSM 07.05 Phase 2+:

Run: `AT+CSMS=1`

Response: `+CSMS: 1,1,1`

`OK`

8.7 AT+CSMP–Set Text Mode Parameters (Text Mode)

8.7.1 Command Syntax

If text mode enabled (`AT+CMGF=1`):

`AT+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]]`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MS-related error: <CR><LF>`+CMS ERROR: <err>`<CR><LF>
`AT+CSMP?`
Possible Response(s)
<CR><LF>`+CSMP: <fo>,<vp>,<pid>,<dcs>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT+CSMP=?`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>

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8.7.2 Interface Description

The set command selects values (excluding the default value) for additional parameters (such as the validity period) needed when the message is sent to the network or saved to a storage. This settings made by the set command takes effect only when the message is in text mode.

The read command queries the supported parameters.

8.7.3 Parameter Description

<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.

<vp>: depending on SMS-SUBMIT <fo> setting: 3GPP TS 23.040 TP-Validity-Period either in integer format (default value is 167), in time-string format (refer <dt>), or if EVPF is supported, in enhanced format (hexadecimal coded string with double quotes).

<pid>: 3GPP TS 23.040 TP-Protocol-Identifier in integer format (default value is 0).

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

8.7.4 Property Description

Saving upon Power-off	PIN
N	Y

8.7.5 Example

- Set the data coding scheme to UCS2 using the test command:

Run: `AT+CSMP=,,0,8`

Response: `OK`

- Set the data coding scheme to GSM 7bit using the test command:

Run: `AT+CSMP=,,,0`

Response: `OK`

8.8 AT+CMGL–List Messages (PDU Mode)

8.8.1 Command Syntax

If PDU mode enabled (`AT+CMGF=0`):

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AT+CMGL[=<stat>]
Possible Response(s)
If the command is executed successfully: [<CR><LF>+CMGL: <index>,<stat>,[<reserved>],<length><CR><LF><pdu>[<CR><LF>+CMGL: <index>,<stat>,[<reserved>],<length><CR><LF><pdu>[...]]<CR><LF>]<CR><LF>OK<CR><LF> Otherwise: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMGL=?
Possible Response(s)
<CR><LF>+CMGL: (list of supported <stat>s) <CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.8.2 Interface Description

The execution command returns messages with status value <stat> from message storage <mem1> to the TE. If the status of the message is "received unread", status in the storage changes to "received read" after the execution command is executed successfully.

The test command returns a list of supported <stat> values.

8.8.3 Parameter Description

<stat>: indicates message status.

0	Received unread messages
1	Received read messages
2	Stored unsent messages
3	Stored sent messages
4	All messages

NOTE

If <stat> is not specified, it is equivalent to set <stat> to 0.

<index>: an integer type value that indicates the storage location of the message.

<reserved>: reserved.

<length>: an integer type value that indicates the number of bytes of TPDU data.

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<pdu>: protocol data unit in the following format:

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

For the definitions of <SCA>, <sc_len>, <type_addr>, <number> in the previous table, see AT+CMGS–Send Message (PDU Mode).

For the TPDU format of messages to be sent, see AT+CMGS–Send Message (PDU Mode). The TPDU format for received messages is described in the following table.

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

<MTI>: see the definition in AT+CMGS–Send Message (PDU Mode).

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

0 No

1 Yes

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

0 No

1 Yes

<UDHI>: see the definition in AT+CMGS–Send Message (PDU Mode).

<RP>: see the definition in AT+CMGS–Send Message (PDU Mode).

<OA>: indicates originating address. Its definition is the same as <sca>. There are a total of 2–12 octets. Therefore, the longest address in the <oa> field contains 20 digits.

<PID>: indicates protocol identifier. See the definition in AT+CMGS–Send Message (PDU Mode).

<DCS>: indicates use data coding scheme. See the definition in AT+CMGS–Send Message (PDU Mode).

<SCTS>: indicates time stamp of the SMSC, consisting of year, month, date, hour, minute, second and time difference. Time difference is the difference between the local time and the Greenwich standard time.

<UDL>: indicates user data length. See the definition in AT+CMGS–Send Message (PDU Mode).

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<UD>: indicates user data whose length is determined by <UDL>.

8.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.8.5 Example

List all the received unread messages using the execution command:

Run: AT+CMGL=0

Response:
```
+CMGL: 1,0,,25
0891683108608805F9040D91683109730147F200002150716
172350005F4F29C4E03

OK
```

8.9 AT+CMGL–List Messages (Text Mode)

8.9.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CMGL[=<stat>]
Possible Response(s)
If command successful and SMS-SUBMITs and/or SMS-DELIVERs: <CR><LF>+CMGL: <index>,<stat>,<oa/da>,[<reserved>],[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[<CR><LF><CR><LF>+CMGL: <index>,<stat>,<da/oa>,[<alpha>],[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[...]]<CR><LF><CR><LF>OK<CR><LF> If command successful and SMS-COMMANDs: <CR><LF>+CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[<CR><LF><CR><LF>+CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[...]]<CR><LF><CR><LF>OK<CR><LF>

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If command successful and SMS-COMMANDs: <CR><LF>+CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF><CR><LF>+CMGL: <index>,<stat>,<fo>,<ct>[...]]<CR><LF><CR><LF>OK<CR><LF> If command successful and CBM storage: <CR><LF>+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[<CR><LF><CR><LF>+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[...]]<CR><LF><CR><LF>OK<CR><LF> Otherwise: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMGL=?
Possible Response(s)
<CR><LF>+CMGL: (list of supported <stat>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.9.2 Interface Description

The execution command returns messages with status value <stat> from message storage <mem1> to the TE. If the status of the message is "received unread", status in the storage changes to "received read" after the execution command is executed successfully.

The test command returns a list of supported <stat> values.

8.9.3 Parameter Description

<stat>: a string type value that indicates the message status.

"REC UNREAD"	Received unread message
"REC READ"	Received read message
"STO UNSENT"	Stored unsent message
"STO SENT"	Stored sent message
"ALL"	All messages

<index>: an integer type value that indicates the storage location of the message.

<reserved>: reserved.

<length>: an integer type value that indicates the number of bytes of TPDU data.

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For details about other parameters, refer to GSM 07.05.

NOTE

- The <oa/da>, <tooa/toda>, and <data> fields are controlled by AT+CSCS.
- If <stat> is not specified, it is equivalent to set <stat> to "REC UNREAD".

8.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.9.5 Example

List all the messages in the current storage using the execution command:

Run: `AT+CMGL="ALL"`

Response:

```
+CMGL: 2,"REC
READ","+8613903710742",,"12/05/17,16:12:30+00"
test1

+CMGL: 3,"REC
READ","+8613903710742",,"12/05/17,16:13:08+00"
test2

OK
```

8.10 AT+CMGR–Read Message (PDU Mode)

8.10.1 Command Syntax

If PDU mode enabled (AT+CMGF=0):

AT+CMGR=<index>
Possible Response(s)
<CR><LF>+CMGR: <stat>,[<reserved>],<length><CR><LF><pdu><CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMGR=?
Possible Response(s)

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

In case of an MT-related error:

<CR><LF>+CME ERROR: <err><CR><LF>

8.10.2 Interface Description

The execution command returns the message with location value <index> from message storage <mem1>. If the status of the message is "received unread", status in the storage changes to "received read" after the execution command is executed successfully.

8.10.3 Parameter Description

<index>: an integer type value that indicates the location in the storage.

<stat>: indicates message status.

0	Received unread messages
1	Received read messages
2	Stored unsent messages
3	Stored sent messages

<reserved>: reserved.

<length>: an integer type value that indicates the number of bytes of PDU data.

<pdu>: indicates protocol data unit. For details about the PDU format, see AT+CMGS–Send Message (PDU Mode).

8.10.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.10.5 Example

Read the message stored in index 1:

Run: AT+CMGR=1

Response:
```
+CMGR: 1,,25
0891683108608805F9040D91683109730147F200002150716
172350005F4F29C4E03

OK
```


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8.11 AT+CMGR–Read an SMS Message (Text Mode)

8.11.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CMGR=<index>
Possible Response(s)
If command successful and SMS-DELIVER: <CR><LF>+CMGR: <stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data><CR><LF><CR><LF>OK<CR><LF> If command successful and SMS-SUBMIT: <CR><LF>+CMGR: <stat>,<da>,[<alpha>][,<toda>,<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>]<CR><LF><data><CR><LF><CR><LF>OK<CR><LF> If command successful and SMS-STATUS-REPORT: <CR><LF>+CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st><CR><LF><CR><LF>OK<CR><LF> If command successful and SMS-COMMAND: <CR><LF>+CMGR: <stat>,<fo>,<ct>[,<pid>,[<mn>],[<da>],[<toda>],<length><CR><LF><cdata>]<CR><LF><CR><LF>OK<CR><LF> If command successful and CBM storage: <CR><LF>+CMGR: <stat>,<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data><CR><LF><CR><LF>OK<CR><LF> Otherwise: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMGR=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.11.2 Interface Description

The execution command returns the message stored in <index> location from <mem1>. If the SMS status is received and unread, the status is converted to received and read after the command is executed.

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8.11.3 Parameter Description

<index>: an integer type value that indicates location in the memory.

<stat>: indicates SMS type.

"REC UNREAD"	Received and unread SMS
"REC READ"	Received and read SMS
"STO UNSENT"	Stored and unsent SMS
"STO SENT"	Stored and sent SMS

<length>: an integer type value that indicates length of PDU data.

For details about other parameters, refer to GSM 07.05.

NOTE

The <oa/da>, <tooa/toda>, and <data> fields are controlled by AT+CSCS.

8.11.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.11.5 Example

Read the message stored in index 4:

Run:

```
AT+CMGR=4
```

Response:

```
+CMGR: "REC
UNREAD","+8613312345678",,"12/05/17,16:13:08+00"h
uawei


OK
```

8.12 AT+CMGW–Write Message to Memory (PDU Mode)

8.12.1 Command Syntax

If PDU mode enabled (AT+CMGF=0):

AT+CMGW=<length>[,<stat>]<CR>PDU is given<ctrl-Z/ESC>
Possible Response(s)
<CR><LF>+CMGW: <index><CR><LF><CR><LF>OK<CR><LF>

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In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMGW=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.12.2 Interface Description

The execution command stores a message to the memory storage <mem2> selected using the AT+CPMS command.

8.12.3 Parameter Description

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

<ctrl-Z>: indicates the end of a PDU. The characters are "0x1A".

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

<stat>: indicates the storage status of the message.

0	Received unread messages
1	Received read messages
2	Stored unsent messages (default value)
3	Stored sent messages

<index>: a decimal number that indicates the message location in the storage. Its value ranges from 0 to (the storage's maximum capacity – 1).

For details about the PDU format, see AT+CMGS–Send Message (PDU Mode).

8.12.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.12.5 Example

Run: AT+CMGF=0

Response: OK

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Run:	AT+CMGW=56
Response:	>
Run:	07813108608805F911000B813109732008F70000FF30547419 347EBBE965371DF13683DAE5F93C7C2E83EE693A1A0427D741 ED37B90C3ABFCB7310BA2C2F8342<Ctrl-Z>
Response:	+CMGW: 10 OK

8.13 AT+CMGW–Write Message to Memory (Text Mode)

8.13.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CMGW[=<oa/da>[,<tooa/toda>[,<stat>]]]<CR>text is entered <ctrl-Z/ESC>
Possible Response(s)
<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>
AT+CMGW=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.13.2 Interface Description

The execution command stores a message to the memory storage <mem2> selected using the AT+CPMS command.

8.13.3 Parameter Description

<oa/da>: indicates sender/recipient phone number. Characters allowed in this field are '0'–'9', '*', and '#'. The maximum length of this field is 20 characters. Characters are the values set by AT+CSCS (3GPP TS 27.005 subclause 3.1)

<tooa/toda>: indicates type of address; an octet in integer format. This parameter is valid when the address is 8 bits long. The default value of this parameter is 0.

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The four high-order bits indicate the number type:

0	Unknown
1	International

The four low-order bits indicate the number plan:

0	Unknown
1	Telephony

<stat>: a string type value that indicates the message status.

"REC UNREAD"	Received unread message
"REC READ"	Received read message
"STO UNSENT"	Stored unsent message (default value)
"STO SENT"	Stored sent message

8.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.13.5 Example

Run: `AT+CMGW="9501231234"`

Response:
```
>This is the message body<Ctrl-Z>
+CMGW: 7

OK
```

8.14 AT+CMGS–Send Message (PDU Mode)

8.14.1 Command Syntax

If PDU mode enabled (AT+CMGF=0):

AT+CMGS=<length><CR>PDU is given<ctrl-Z/ESC>
Possible Response(s)
<CR><LF>+CMGS: <mr>[,<ackpdu>]<CR><LF><CR><LF>OK<CR><LF>

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In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMGS=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.14.2 Interface Description

The execution command sends a message to the network in the following procedure:

First, the TE sends AT+CMGS=<length><CR> to the MT.

After the MT responds to the TE with <CR><LF><greater_than><space>(IRA 13, 10, 62, 32), the TE sends the PDU packets ending with <ctrl-Z>(IRA26).

8.14.3 Parameter Description

<length>: indicates number of actually sent TPDU characters/2 in decimal format ranging from 0 to 9, and maximum length is 178.

<mr>: indicates message ID; a decimal number ranging from 0 to 255.

<ackpdu>: when <value> of AT+CSMS is 1 and supported by the network, this field will be returned. Except that there is no <SCA>, the format of <ackpdu> is the same as that of the PDU. This field is not supported currently.

<ctrl-Z>: indicates the end of a PDU. The characters are "0x1A".

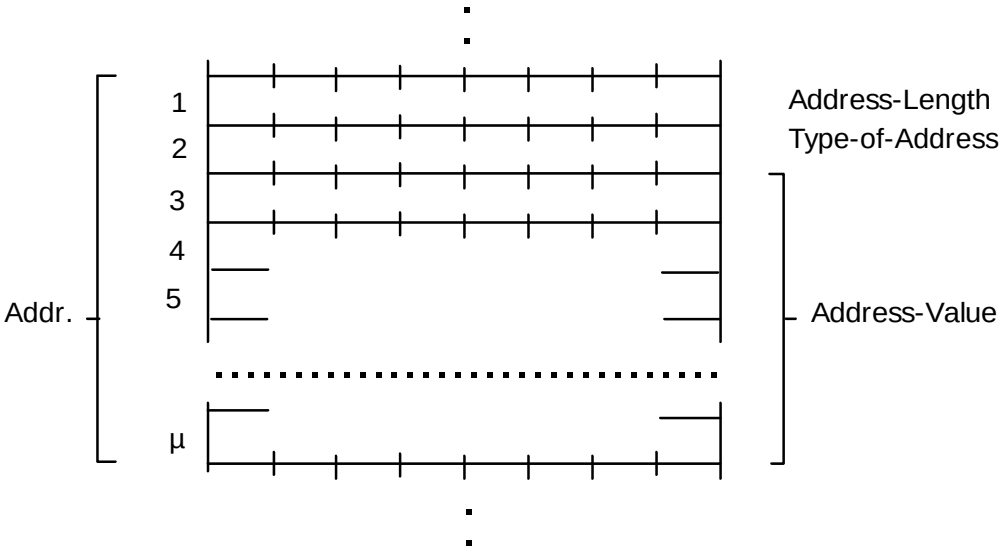
<ESC>: cancels the sending of the message. The characters are "0x1B".

The format of a PDU is as follows: (The characters allowed in a PDU are '0'–'9', 'A'–'F', and 'a'–'f'. Two characters forms one octet. For example, '23'=0x23, '2a'=0x2a, all are hexadecimal.)

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

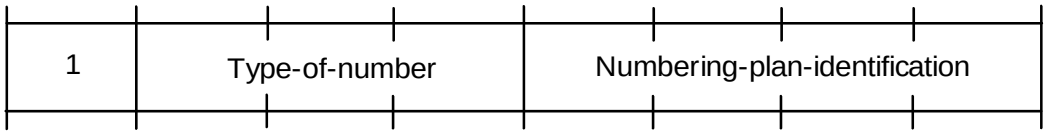
<SCA>: indicates SCA. Its structure is illustrated in the following figure.

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<sc_len>: indicates length of <SCA>. It is composed of two characters. It indicates the number of characters occupied by <type_addr> and <numbers>/2.

<type_addr>: indicates number address type; consisting of two characters in the following format:



Values of Type-of-Number (bit 6–4) are defined as follows:

0 0 0	This value is written when the user does not know the destination address type. In this case, the address type is determined by the network.
0 0 1	This value is selected if the user knows that it is an international number, or the user believes that it falls in the national range.
0 1 0	National number. No prefix or suffix is added. This value is selected when the user sends a message to a national number.
0 1 1	A special number in this network. It is used for management or service. The user cannot select this value.
1 0 1	GSM number using the default 7-bit encoding scheme.
1 1 0	Short number. It is not in use currently.
1 1 1	Reserved. It is not in use currently.

Values of Numbering-plan-identification (bits 3–0) are defined as follows:

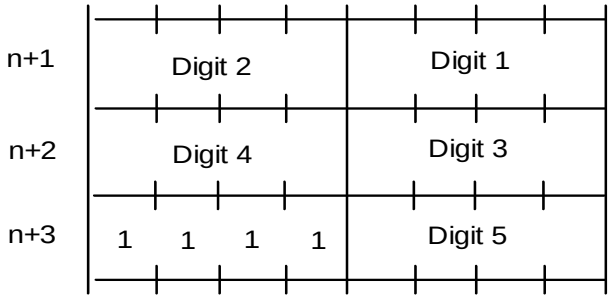
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NOTE

bits 3–0 are valid only when bits 6–4 are 000, 001, or 010.

0 0 0 0	The number is determined by the numbering plan at the network.
0 0 0 1	ISDN/telephone numbering plan.
0 0 1 1	Data numbering plan. It is not in use currently.
0 1 0 0	Telex numbering plan. It is not in use currently.
1 0 0 0	National numbering plan. It is not in use currently.
1 0 0 1	Private numbering plan. It is not in use currently.
1 0 1 0	ERMES numbering plan. It is not in use currently.

<numbers>: indicates address number. One byte stores two digits. Bits 3–0 store the first digit, and bits 7–4 store the second digit. As an example, the following figure illustrates the encoding sequence of half bytes.



NOTE

If the number's length is an odd value, the four high-order bits of this octet is filled with 1111.

'*': 1010 '#': 1011

'a': 1100 'b': 1101 'c': 1110

For example: If <SCA> is 13902900, then <number> is 31099200.

If the length of <SCA> is an odd value, for example, 139029001, then <numbers> is 31099200F1.

If the number type is 'A1', then <SCA> is 05a131099200.

If the number type indicates that it is an international number 'A1', but the number 13902900 is a national number in China, it is necessary to add 86 before the number. In this case, <SCA> is 06a16831099200.

The TPDU format is described in the following table.

1 Octet						1 Oct	2 Oct ~ 12 Oct	1 Oct	1 Oct	1 Oct	1 Oct	0~140 Oct
RP	UDHI	SRR	VPF	RD	MTI	MR	DA	PID	DCS	VP	UDL	UD

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1 Octet								1 Oct	2 Oct ~ 12 Oct	1 Oct	1 Oct	1 Oct	1 Oct	0~140 Oct
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	-	-	-	-	-	-	-

<MTI>: indicates message type.

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

<RD>: indicates whether the SC needs to receive a message that is still stored in the SC and has the MR and DA identical with those of the messages sent previously from the same OA.

0 Yes

1 No

<VPF>: indicates the validity and format of the VP field.

Bit1	Bit0	
0	0	The VP field is invalid.
1	0	The VP field is valid, and the format is "relative".
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 whether the reply to a message uses the same settings as those for the sent message.

0 No

1 Yes. The message reply uses the same SC number and path for sending the message.

<UDHI>: indicates user data header indication.

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0 The user data segment contains message content only.

1 The user data segment contains message content and a data header.

<SRR>: indicates status report request indication.

0 No status report is required when a message is sent successfully.

1 A status report is required when a message is sent successfully.

<MR>: indicates message ID ranging from 0 to 255.

<DA>: indicates destination address. Its definition is the same as <SCA>. There are a total of 2–12 octets. Therefore, the longest address in the <DA> field contains 20 digits.

<PID>: indicates protocol identifier.

PID							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0

Bit7	**Bit6**	**(At present, Bit 7=0 and Bit 6=0.)**
0	0	Allocate bits 0–5.
1	0	Allocate bits 0–5.
0	1	reserved
1	1	Allocate bits 0–5 for special purpose of the SC.

The values of bit 5 are defined as follows:

0 No interworking, but SME–to–SME protocol

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

Bit 4…bit 0: telematic devices type indication

If bit4…bit 0 are 10010, it indicates email. Other values are not supported currently.

<DCS>: indicates user data coding scheme.

Bits 7…4			**Bits 3…0**
00xx	Bit 5	0: Message is not compressed.	Bit 1 Bit 0 message type indication. 0 0 Class 0, displayed on the user interface but not stored. A response is sent to the SC to acknowledge the reception of the message. 0 1 Class 1, stored to NV (or SIM card if the NV is full) 1 0 Class 2. Messages are stored to the SIM card only. After a class 2 message is stored, the storage state will be
		1: Message is compressed. This is not supported currently.	

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Bits 7…4			Bits 3…0
	Bit 4	0: indicates that bit 1 and bit 0 are reserved.	sent to the SC. If the SIM card is full, a response is sent to the SC to notify it of the occurrence and cause of message storage failure. 1 1 Class3, stored to the TE. When the MT receives the message, it sends a response to the SC before routing the message to the TE. Bit 3 Bit 2 message type indication 0 0 GSM 7-bit encoding scheme; default. 0 1 8-bit encoding scheme 1 0 UCS2 encoding scheme. TE uses this value when the user inputs Chinese characters. 1 1 reserved
		1: indicates that bit 1 and bit 0 serve as the message type indication.	
0100 … 1011	reserved		
1100	The message content is discarded. The message waiting indication is presented, and the user data is encoded using the GSM 7-bit encoding scheme.		The settings of bits 3…0 are the same as those when bits 7…4=1101.
1101	The message is stored. The message waiting indication is presented, and the user data is encoded using the GSM 7-bit encoding scheme.		Bit 3 enables or disables message waiting indication. 0 disables message waiting indication 1 enables message waiting indication Bit 2 reserved. The value is 0. Bit 1 Bit 0 message type indication. 0 0 voice message waiting 0 1 fax message waiting 1 0 email message waiting 1 1 message of unknown type waiting
1110	The message is stored. The message waiting indication appears, and the user data is encoded using uncompressed UCS2 encoding scheme.		The settings of bits 3…0 are the same as those when bits 7…4=1101.
1111	Data coding/message class		Bit 3 reserved. The value is 0. Bit 2 message encoding scheme. Its values are defined as follows: 0 GSM 7-bit encoding scheme; default. 1 8-bit encoding scheme Bit 1 Bit 0 message type indication. 0 0 Class 0, displayed on the user interface but not stored. A response is sent to the SC to acknowledge the

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Bits 7…4		Bits 3…0
		reception of the message. 0 1 Class 1, stored to NV (or SIM card if the NV is full) 1 0 Class 2. Messages are stored to the SIM card only. After a class 2 message is stored, the storage state will be sent to the SC. If the SIM card is full, a response is sent to the SC to notify it of the occurrence and cause of message storage failure. 1 1 Class3, stored to the TE. When the MT receives the message, it sends a response to the SC before routing the message to the TE.

<VP>: indicates the validity period, which starts from the time when the message is received by the SC. If <VPF>=00, this field is omitted. The following table lists the validity periods.

VP Value	Validity Period
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>: indicates user data length, depending on the specific encoding scheme.

Default 7-bit encoding scheme: <UDL> indicates the total number of septets.

8-bit encoding scheme: <UDL> indicates the total number of octets.

UCS2 encoding scheme: <UDL> indicates the total number of octets.

Compressed 7-bit, 8-bit or UCS2 encoding scheme: <UDL> indicates the total number of octets after compression.

For messages encoded using a compressed encoding scheme, the length of <UD> should not be greater than 160 septets. For messages encoded using an uncompressed encoding scheme, the length of <UD> should not be greater than 140 octets.

<UD>: indicates user data. Its data validity depends on <UDL>.

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

<alpha>: a string type value that indicates alphanumeric representation of <da> or <oa> corresponding to the entry found in MT phonebook; implementation of this feature is manufacturer specific; used character set should be the one selected with

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command Select TE Character Set +CSCS (see definition of this command in 3GPP TS 27.007).

<scts>: indicates time stamp of the SMSC, consisting of year, month, date, hour, minute, second and time difference. Time difference is the difference between the local time and the Greenwich standard time.

<tooa>: 3GPP TS 24.011 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>).

<tosca>: an integer type value that specifies the address type. If the value of <tosca> is 145, the address is an international phone number. For details about the values of <tosca>, see the value definitions of <type_addr> in AT+CMGS–Send Message (PDU Mode).

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

<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.

8.14.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.14.5 Example

The SMS center number is 13902900. The target number is 13901000453. The content is 0x53 0x4E 0x4E 0x3A (the UCS2 codes for the Chinese characters "华为").

If the AT+CSCA contains <SCA>, you can perform as follows:

- Do not fill in <SCA> when you send the SMS. (The value of <SCA> was set with the AT+CSCA command.)

  ```
  AT+CMGS=17
  >81000B813109010054F3001804534E4E3A \x1A
  ```

  Where, 81 is the value of <RP-MTI>, 00 is the value of <MR>, 0B is the value of <DA-len>, 81 is the value of <DA-type>, 3109010054F3 is the value of

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<DA-numbers>, 00 is the value of <PID>, 18 is the value of <DCS>, 04 is the value of <UDL>, 534E4E3A is the value of <UD>, and \x1A is the value of <ctrl-Z>.

- Fill in <SCA> when you send the SMS. (The value of <SCA> is obtained from the PDU packet.)

  AT+CMGS=17

  >05a13109920081000B813109010054F3001804534E4E3A \x1A

  Or

  AT+CMGS=17

  >0081000B813109010054F3001804534E4E3A \x1A (In this case, the value of <sc_len> is 0. The value of <SCA> was set with the AT+CSCA command.)

If the AT+CSCA command does not contain <SCA>, you must perform as follows:

- Fill in <SCA> when you send the SMS. (The value of <SCA> is obtained from the PDU packet.)

  AT+CMGS=17

  >05a13109920081000B813109010054F3001804534E4E3A \x1A

8.15 AT+CMGS–Send Message (Text Mode)

8.15.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CMGS=<da>[,<toda>]<CR>text is entered<ctrl-Z/ESC>
Possible Response(s)
<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>
AT+CMGS=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.15.2 Interface Description

The execution command sends a message to the network in the following procedure:

First, the TE sends AT+CMGS=<da>[,<toda>]<CR> to the MT.

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After the MT responds to the TE with <CR><LF><greater_than><space>(IRA 13, 10, 62, 32), the TE sends the message content ending with <ctrl-Z>(IRA26)

8.15.3 Parameter Description

<da>: indicates phone number of the message recipient. Characters allowed in this field are '0'–'9', '*' and '#'. The maximum length of this field is 20 characters. Characters are the values set by AT+CSCS (3GPP TS 27.005 subclause 3.1).

<toda>: indicates type of destination address; an octet in integer format. This parameter is valid when the address is 8 bits long. The default value of this parameter is 0.

The four high-order bits indicate the number type:

0	Unknown
1	International

The four low-order bits indicate the number plan:

0	Unknown
1	Telephony

<mr>: indicates message ID; a decimal number ranging from 0 to 255.

<ctrl-Z>: indicates the ending of the message body. The characters corresponding to <ctrl-Z> are "0x1A".

<ESC>: cancels the sending of the message. The characters corresponding to <ESC> are "0x1B".

8.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.15.5 Example

- Set the message format to text format.

  Run: AT+CMGF=1

  Response: OK

- Set the data coding scheme to UCS2.

  Run: AT+CSMP=,,0,8

  Response: OK

- Set the service center number.

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Run: `AT+CSCA="8613800688509",145`

Response: `OK`

- Set the TE's character set to UCS2 encoding.

Run: `AT+CSCS="UCS2"`

Response: `OK`

- End the message to the destination address "13312345678" that must be enclosed in double quotation marks.

Run:	`AT+CMGS="00310033003300310032003300340035003600370038"`	The message content is the UCS2 codes for the Chinese characters "华为".
	`>534E4E3A`	Press <ctrl-z> (0x1A) to stop entering message content and send the message.
	`\0x1A`	
Response:	`+CMGS: 6`	The message is successfully sent.
	`OK`	

8.16 AT+CMSS–Send Message from Storage (PDU Mode)

8.16.1 Command Syntax

If PDU mode enabled (`AT+CMGF=0`):

`AT+CMSS=<index>[,<da>[,<toda>]]`
Possible Response(s)
If sending successful: <CR><LF>`+CMSS: <mr>[,<ackpdu>]`<CR><LF><CR><LF>`OK`<CR><LF> If sending fails: <CR><LF>`+CMS ERROR: <err>`<CR><LF>
`AT+CMSS=?`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>

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8.16.2 Interface Description

The execution command sends message with location value <index> from 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) <ackpdu> 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. This command should be aborted.

<da> is limited by AT+CSCS.

8.16.3 Parameter Description

<index>: an integer type; value in the range of location numbers supported by the associated memory.

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

<toda>: 3GPP TS 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is '+' (IRA 43), the default value is 145, otherwise the default value is 129).

For the response parameter description of this command, see AT+CMGS–Send Message (PDU Mode).

8.16.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.16.5 Example

Send a stored short message in PDU mode.

Run: AT+CMGF=0

Response: OK

Run: AT+CMSS=8 A short message at the location whose index is 8.

Response: +CMSS: 21

OK

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8.17 AT+CMSS–Send Message from Storage (Text Mode)

8.17.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CMSS=<index>[,<da>[,<toda>]]
Possible Response(s)
If sending successfully: <CR><LF>+CMSS: <mr>[,<scts>]<CR><LF><CR><LF>OK<CR><LF> If sending fails: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMSS=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.17.2 Interface Description

The execution 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 AT+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. This command should be aborted.

<da> is controlled by AT+CSCS.

8.17.3 Parameter Description

<scts>: indicates time stamp of the SMSC, consisting of year, month, date, hour, minute, second and time difference. Time difference is the difference between the local time and the Greenwich standard time.

For other parameters description of this command, see AT+CMGS–Send Message (Text Mode).

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8.17.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.17.5 Example

Send a stored short message in text mode.

Run: `AT+CMGF=1`

Response: `OK`

Run: `AT+CMSS=8` A short message at the location whose index is 8.

Response:
```
+CMSS: 21

OK
```


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9 Huawei Proprietary Interface: Mobile Termination Control and Status Interface

9.1 AT^CURC–Set Presentation of Unsolicited Results

9.1.1 Command Syntax

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

9.1.2 Interface Description

The set command selects the control mode for the presentation of unsolicited results.

The read command queries the current control mode for the presentation of unsolicited results.

The test command returns the supported control modes for the presentation of unsolicited results.

9.1.3 Parameter Description

<mode>: indicates control mode for the presentation of unsolicited results.

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0	Disable the presentation of the unsolicited indications in Table 9-1 .
1	Enable the presentation of the unsolicited indications. (default value)

Table 9-1 List for the presentation of unsolicited results when `AT^CURC=0`

COMMAND
^MODE
^RSSI
^CSNR
^DSFLOWRPT
^EARST
^ACTIVEBAND
^RSSILVL
^HRSSILVL
^HDRRSSI
^CRSSI
^ANLEVEL
^BOOT

9.1.4 Property Description

Saving upon Power-off	PIN
N	N

9.1.5 Example

- Set `<mode>` to 0:

Run: `AT^CURC=0`

Response: `OK`

- Set `<mode>` to 1:

Run: `AT^CURC=1`

Response: `OK`

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9.2 ^SYSSTART–Unsolicitedly Report Module Startup

9.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SYSSTART<CR><LF>

9.2.2 Interface Description

This unsolicited indication notifies the TE when the ME is powered on or reset.

9.2.3 Parameter Description

None

9.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.2.5 Example

Notify the TE when the ME is powered on or reset:

Response: ^SYSSTART

9.3 AT^WAKEUPCFG–Configure Module's Remote Wakeup Function by Host

9.3.1 Command Syntax

AT^WAKEUPCFG=<n>[,<channel>[,<source>]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^WAKEUPCFG?
Possible Response(s)

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<CR><LF>^WAKEUPCFG: <n>,<channel>,<source><CR><LF><CR><LF>OK<CR><LF>
AT^WAKEUPCFG=?
Possible Response(s)
<CR><LF>^WAKEUPCFG: (list of supported <n>s),(list of supported <channel>s),(list of supported <source>s)<CR><LF><CR><LF>OK<CR><LF>

9.3.2 Interface Description

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

NOTE

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.

9.3.3 Parameter Description

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

0	Disable the module's Remote Wake-up feature.
1	Enable 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	Disable the channel controlled by the bit.
1	Enable the channel controlled by the bit.

Bit[2-7]	Bit[1]	Bit[0]
Undefined	USB	Wake up PIN

0x01	PIN Wake-up
0x02	USB Remote Wakeup
0x04–0x80	Reserved

The default value of this parameter is 0x03 (Wake up PIN + USB).

<source>: sets Remote Wake-up sources.

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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	Disable the source controlled by the bit.
1	Enable the source controlled by the bit.

Bit[5-15]	Bit[4]	Bit[3]	Bit[2]	Bit[1]	Bit[0]
Undefined	GPS	UR	DATA	SMS	VOICE

0x0001	Voice (Voice-related, including RING/^ORIG/^CONF/^CONN/^CEND/+CLIP/+CCWA/+CSSI/+CSSU/^ECLSTAT)
0x0002	SMS (SMS-related, including +CMT/+CMTI/+CBM/+CBMI/+CDS/+CDSI)
0x0004	Data (TCP/IP data)
0x0008	UR (unsolicited report)
0x0010	GPS (NEMA data and ^POSEND/+XCELLINFO)
0x0020–0x8000	reserved

The default value of this parameter is 0x000F(VOICE+SMS+DATA+UR).

NOTE
The module doesn't support VOICE.

9.3.4 Property Description

Saving upon Power-off	PIN
Y	N

9.3.5 Example

- The set command if only support USB Remote Wakeup:

Run: `AT^WAKEUPCFG=1,2,7`

Response: `OK`

- Read command:

Run: `AT^WAKEUPCFG?`

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Response: `^WAKEUPCFG: 1,2,7`

`OK`

- Test command:

Run: `AT^WAKEUPCFG=?`

Response: `^WAKEUPCFG: (0-1),(0-3),(0-31)`

`OK`

9.4 AT^ICCID–Query the ICCID

9.4.1 Command Syntax

AT^ICCID?
Possible Response(s)
<CR><LF>^ICCID: <iccid><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^ICCID=?
Possible Response(s)
<CR><LF>OK<CR><LF>

9.4.2 Interface Description

This command queries the ICCID of a SIM card no matter the PIN is entered or not.

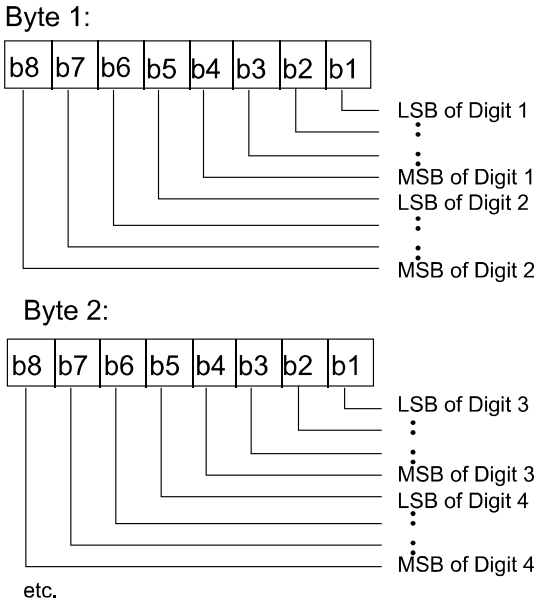
9.4.3 Parameter Description

<iccid>: a string type value that indicates ICCID, containing up to 20 characters.

NOTE

The ICCID uniquely identifies an IC card. The ICCID is saved in the EF_{ICCID} file and consists of 10 bytes. The following figure shows the relationship between the ICCID and information in the EF_{ICCID} file (for details, see the GSM 11.11 protocol).

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The bit sequence of the information obtained from the EF_{ICCID} file must be converted.

9.4.4 Property Description

Saving upon Power-off	PIN
NA	N

9.4.5 Example

Query the ICCID of the SIM card of which the EF_{ICCID} file contains the character string 98684006905725201069:

Run: `AT^ICCID?`

Response:
```
^ICCID: 898604600975520201 96

OK
```

9.5 AT^CPIN–Manage PIN

9.5.1 Command Syntax

AT^CPIN=<pin>[,<newpin>]
Possible Response(s)
<CR><LF>OK<CR><LF>

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In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^CPIN?
Possible Response(s)
<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>
AT^CPIN=?
Possible Response(s)
<CR><LF>OK<CR><LF>

9.5.2 Interface Description

The set command verifies and unblocks PIN and PIN2.

- If the current password required is PIN or PIN2, run AT^CPIN=<pin> to verify PIN or PIN2.
- If the current password required is PUK or PUK2, run "AT^CPIN=[<pin>][,<newpin>]" to unblock the PIN. In "AT^CPIN=[<pin>][,<newpin>]", <pin> is the SIM PUK or SIM PUK2, and <newpin> is the new PIN or PIN2.
- If the set command is executed when PIN is not requested, +CME ERROR: <err> is returned.

NOTE
Verifying PIN or PUK while a call or other services are ongoing may cause the call or services to be terminated.

The read command returns a string indicating whether a password is required and how many password entry attempts are remaining.

9.5.3 Parameter Description

<pin>, <newpin>: string type values of the 4–8 digits. The character allowed in <pin> and <newpin> must range from 0 to 9, otherwise, an error message is returned.

<code>: a string type value without quotation marks.

READY	MT is not pending for any password
SIM PIN	MT is waiting for UICC/SIM PIN to be given
SIM PUK	MT is waiting for UICC/SIM PUK to be given to unblock the blocked SIM PIN

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SIM PIN2	MT is waiting for SIM PIN2 to be given
SIM PUK2	MT is waiting for UICC/SIM PUK2 to be given to unblock the blocked SIM PIN2

<times>: indicates the remaining number of entry attempts. For PIN and PIN2, the maximum number of entry attempts is 3. For PUK and PUK2, the maximum number of entry attempts is 10.

NOTE

If there is a password request, the remaining number of entry attempts of the currently requested password is indicated by the <times> field. If no password is requested, <times> is left blank.

<puk_times>: indicates remaining number of PUK entry attempts. The maximum number of PUK entry attempts is 10.

<pin_times>: indicates remaining number of PIN entry attempts. The maximum number of PIN entry attempts is 3.

<puk2_times>: indicates remaining number of PUK2 entry attempts. The maximum number of PUK2 entry attempts is 10.

<pin2_times>: indicates remaining number of PIN2 entry attempts. The maximum number of PIN2 entry attempts is 3.

9.5.4 Property Description

Saving upon Power-off	PIN
N	N

9.5.5 Example

Run:	AT^CPIN?	
Response:	^CPIN: SIM PIN,3,10,3,10,3	Indicate a password is required.
	OK	

Verify and unblock PIN:

Run:	AT^CPIN="1234"	
Response:	OK	
Run:	AT^CPIN?	
Response:	^CPIN: READY,,10,3,10,3	Indicate a password is not required.
	OK	
Run:	AT^CPIN=?	

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Response: OK

9.6 AT^CARDMODE–Query SIM/USIM Card Type

9.6.1 Command Syntax

AT^CARDMODE
Possible Response(s)
<CR><LF>^CARDMODE: <sim_type><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

9.6.2 Interface Description

This command queries the type of the currently installed SIM/USIM card. If the SIM/USIM card does not exist, or an error occurs during the query, +CME ERROR: <err> is returned. For details about the CME errors, see General CME Error List.

9.6.3 Parameter Description

<sim_type>: indicates SIM/USIM card type.

0	No card found
1	SIM card
2	USIM card
3	CSIM card (only for dual-mode datacards)
4	UIM card (only for dual-mode datacards)

9.6.4 Property Description

Saving upon Power-off	PIN
NA	N

9.6.5 Example

Run: AT^CARDMODE

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Response: `^CARDMODE: 2`

`OK`

9.7 AT^MSO–Shutdown Command

9.7.1 Command Syntax

`AT^MSO`[=<value>]
Possible Response(s)
<CR><LF>`OK`<CR><LF>
`AT^MSO=?`
Possible Response(s)
<CR><LF>`^MSO: (`list of supported <value>s`)` <CR><LF><CR><LF>`OK`<CR><LF>

9.7.2 Interface Description

This command powers off the MT. When the command is executed, the MT will wait for a few seconds which the `<value>` figured out, and then logs out of the network, saves subscriber data, and finally shuts down.

If the command is `AT^MSO` only, the MT will not wait. These actions can be cancelled when it is waiting.

NOTE
On ME209u-526, after the command is received, the module will firstly deregister, and then shut down.

9.7.3 Parameter Description

`<value>`: an integer type value that indicates the time in the unit of 1 second which the MT will wait. When the `<value>` is 65535, and the MT is waiting, it will cancel the `AT^MSO` actions.

9.7.4 Property Description

Saving upon Power-off	PIN
NA	N

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9.7.5 Example

Run: AT^MSO

Response: OK

Run: AT^MSO=15

Response: OK

Run: AT^MSO=?

Response: ^MSO: (0-60,65535)

OK

9.8 AT^IOCTRL-Control the GPIO

9.8.1 Command Syntax

AT^IOCTRL=<sel>,<options>,<value>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^IOCTRL?
Possible Response(s)
<CR><LF>^IOCTRL: <options>,<value><CR><LF><CR><LF>OK<CR><LF>
AT^IOCTRL=?
Possible Response(s)
<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>

9.8.2 Interface Description

This command controls the GPIO's actions.

The set command sets the GPIO to high voltage or low voltage.

The read command queries the GPIO current state.

The test command returns supported values as a compound value.

This command controls five GPIO pins. Set each parameter of the command (from left to right) corresponding to the LGA pins as follows:

GPIO PIN: 5 4 3 2 1

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LGA PIN:	105	55	51	109	113

9.8.3 Parameter Description

<sel>: enables GPIOs.

…00000	Disable any GPIO.
…00001	Enable GPIO1.
…00010	Enable GPIO2
…	Enable or disable some GPIO
…11111	Enable all GPIO

<options>: sets the GPIO's mode.

…00000	All GPIOs are in input mode. (default value)
…00001	GPIO1 is in output mode, others are in input mode.
…00010	GPIO2 is in output mode, others are in input mode
…	Set some GPIO's mode
…11111	All GPIOs are in output mode

NOTE

Only when the GPIO is enabled, setting the GPIO's mode can take effect.

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

…00000	Set all GPIOs to LOW. (default value)
…00001	Set GPIO1 to HIGH, others to LOW.
…00010	Set GPIO2 to HIGH, others to LOW.
…	Set some GPIO's value
…11111	Set all GPIOs to HIGH.

All GPIOs are input mode, and the value is 0 by default.

9.8.4 Property Description

Saving upon Power-off	PIN
N	N

9.8.5 Example

- Query the GPIO state:

Run: `AT^IOCTRL?`

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Response: `^IOCTRL: 00000,00000`

`OK`

- Set the GPIO state:

Run: `AT^IOCTRL=11111,11110,00110`

Response: `OK`

9.9 AT^ADCREADEX–Query the ADC Value

9.9.1 Command Syntax

`AT^ADCREADEX=<id>`
Possible Response(s)
<CR><LF>`^ADCREADEX: <adc_value>`<CR><LF><CR><LF>`OK`<CR><LF>
`AT^ADCREADEX=?`
Possible Response(s)
<CR><LF>`^ADCREADEX: (`list of supported `<id>`s`)`<CR><LF><CR><LF>`OK`<CR><LF>

9.9.2 Interface Description

This command queries the ADC value of the ADC pin. The obtained value is the raw data without unit conversion. The number of ADC pins varies with products.

9.9.3 Parameter Description

`<id>`: indicates the query ID.

1	The ADC value of ADC1 pin
2	The ADC value of ADC2 pin

`<adc_value>`: an integer value indicated the ADC value, the unit is in millivolt.

9.9.4 Property Description

Saving upon Power-off	PIN
N	N

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9.9.5 Example

- Query the ADC value of the input voltage:

Run: `AT^ADCREADEX=1`

Response:
```
^ADCREADEX: 460

OK
```

- The test command:

Run: `AT^ADCREADEX=?`

Response:
```
^ADCREADEX: (1-2)

OK
```

9.10 AT^LEDCTRL–Control LED GPIO PIN

9.10.1 Command Syntax

AT^LEDCTRL=<mode>[,<stat>,<index>[,<ON_duration1>,<OFF_duration1>[,<ON_duration2>,<OFF_duration2>]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^LEDCTRL?
Possible Response(s)
<CR><LF>^LEDCTRL: <mode>[,<stat>,<index>[,<ON_duration1>,<OFF_duration1>[,<ON_duration2>,<OFF_duration2>]][<CR><LF>^LEDCTRL: <mode>,<stat>,<index>[,<ON_duration1>,<OFF_duration1>[,<ON_duration2>,<OFF_duration2>]][...]]]<CR><LF><CR><LF>OK<CR><LF>
AT^LEDCTRL=?
Possible Response(s)
<CR><LF>^LEDCTRL: (list of supported <mode>s),(list of supported <stat>s),(list of supported <index>s),(list of supported <ON_duration1>s),(list of supported <OFF_duration1>s),(list of supported <ON_duration2>s),(list of supported <OFF_duration2>s)<CR><LF><CR><LF>OK<CR><LF>

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9.10.2 Interface Description

The set command controls the blinking mode for modules.

- When the <mode> is set to 0, the blinking function of modules is disabled;
- when the <mode> is set to 1, Huawei's default blinking mode is used;
- Users can set the blinking mode for modules in different service states using this command.

The read command queries the blinking mode of the current module.

The test command returns the supported parameters.

9.10.3 Parameter Description

<mode>: indicates blinking mode.

0	Do not blink. (default value)
1	Use Huawei's default blinking mode.
2	Use the customized blinking mode.

<stat>: indicates service status. It is a 32-bit hexadecimal number. One binary digit corresponds to a service state. The values are listed in the following table.

Parameter Value	Service Status
00000001	Airplane mode
00000002	Power-on and initiation
00000004	Registration failure and no service
00000008	Network disconnection during connecting
00000010	Registration success in GSM mode (not supported currently)
00000020	Radio bearer establishment success in GSM/GPRS/EDGE mode (not supported currently)
00000040	Data transmission in GSM/GPRS/EDGE mode (not supported currently)
00000080	Registration success in WCDMA mode (not supported currently)
00000100	Radio bearer establishment success in WCDMA mode (not supported currently)
00000200	Data transmission in WCDMA mode (not supported currently)
00000400	Radio bearer establishment success in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode (not supported currently)
00000800	Data transmission in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode (not supported currently)

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Parameter Value	Service Status
00001000	Registration success in LTE mode
00002000	Dial-up success in LTE mode
00004000	Data transmission in LTE mode
3FFFFFFF	All service states

<index>: indicates GPIO pin of the LED indicator. The length is 8 bits and the valid value ranges from 1 to 7.

The least significant 3 bits (Bit [2-0]) indicate the GPIO pin configuration of the LED indicator.

0 Deactivate the corresponding GPIO pin of the LED indicator and the pin was pulled down during a blinking period.

1 Activate the corresponding GPIO pin of the LED indicator and the pin was pulled up or down based on the configured blinking mode during a blinking period.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Reserved	Reserved	Reserved	Reserved	Pin 3	Pin 2	Pin 1

<ON_duration1>: an integer type value that indicates the duration for first pulling up the GPIO pin of the LED indicator specified by the <index> during a blinking period. The value ranges from 1 to 100 (unit: 100 ms).

<OFF_duration1>: an integer type value that indicates the duration for first pulling down the GPIO pin of the LED indicator specified by the <index> during a blinking period. The value ranges from 1 to 100 (unit: 100 ms).

<ON_duration2>: an integer type value that indicates the duration for second pulling up the GPIO pin of the LED indicator specified by the <index> during a blinking period. The value ranges from 1 to 100 (unit: 100 ms).

<OFF_duration2>: an integer type value that indicates the duration for second pulling down the GPIO pin of the LED indicator specified by the <index> during a blinking period. The value ranges from 1 to 100 (unit: 100 ms).

NOTE
When two switchovers between on and off states are not required during a blinking period, <ON_duration2> and <OFF_duration2> are set to null.

9.10.4 Property Description

Saving upon Power-off	PIN
Y	N

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9.10.5 Example

- Configure the blinking mode in airplane state. Set the indicator to be on for 100 ms and then off for 1900 ms and activate the GPIO pin 1 of the LED indicator.

Run: `AT^LEDCTRL=2,00000001,1,1,19`

Response: `OK`

- Query the current blinking mode. The indicator is steady off in airplane, power-on and initiation, no service, and network disconnection states, and on for 100 ms and then off for 1900 ms in a service period in other states.

Run: `AT^LEDCTRL?`

Response:
```
^LEDCTRL: 2,00000001,1,1,19

OK
```

- Query the parameter range supported by the `AT^LEDCTRL` command.

Run: `AT^LEDCTRL=?`

Response:
```
^LEDCTRL:
(0-2),0000700f,(0-1),(1-100),(1-100),(1-100),(1-100)

OK
```

NOTE

If the user sets the blinking mode in a service state to be steady off, the returned index value is 1 by default when querying the blinking configuration in the service state.

9.11 AT^SLEEPCFG–Configure Module's Sleep Function by Host

9.11.1 Command Syntax

`AT^SLEEPCFG=<para>,<value>`
Possible Response(s)
<CR><LF>`OK`<CR><LF>
`AT^SLEEPCFG?`
Possible Response(s)
<CR><LF>`^SLEEPCFG: <para>,<value>`[<CR><LF>`^SLEEPCFG: <para1>,<value1>`[<CR><LF>`^SLEEPCFG: <para2>,<value2>`…]]<CR><LF><CR><LF>`OK`<CR><LF>

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AT^SLEEPCFG=?
Possible Response(s)
<CR><LF>^SLEEPCFG: (list of supported <para>s)<CR><LF><CR><LF>OK<CR><LF>

9.11.2 Interface Description

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

The set command sets the sleep configuration parameters.

The read command queries the settings of the sleep configuration parameters.

The test command returns all supported sleep configuration parameters.

9.11.3 Parameter Description

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

0	Delay time of SMS report when the module wakes up the host by PIN channel.
1	Delay settings to allow uart to sleep when uart have no data.

<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 0 ms.
- If <para> is set to 1, the available values for <value> are an integer ranging from 1 to 3600.The unit is second and the default value is 10.

Resetting or updating the module will not affect the value.

9.11.4 Property Description

Saving upon Power-off	PIN
Y	N

9.11.5 Example

- Configure the delay time of SMS report to 3000 ms:

  Run: AT^SLEEPCFG=0,3000

  Response: OK

- Keep the data services connection when pulling down WAKEUP_IN#:

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Run: `AT^SLEEPCFG=0,1`

Response: `OK`

- Query command:

Run: `AT^SLEEPCFG?`

Response:
```
^SLEEPCFG: 0,0
^SLEEPCFG: 1,10

OK
```

- Test command:

Run: `AT^SLEEPCFG=?`

Response:
```
^SLEEPCFG: (0-1)

OK
```


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10 Huawei Proprietary Interface: SMS Service Interface

10.1 ^SMMEMFULL–Message Memory Full

10.1.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SMMEMFULL: <mem_type><CR><LF>

10.1.2 Interface Description

When the message storage is full, this unsolicited indication is sent.

10.1.3 Parameter Description

<mem_type>: a string type value that indicates the type of the storage that is full.

"SM" (U)SIM card

"ME" NV memory (only supported by IMS 3GPP2)

10.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

10.1.5 Example

When the message storage is full, this unsolicited indication is sent:

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Response: `^SMMEMFULL: "SM"`

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11 Huawei Proprietary Interface: IMS Short Message (3GPP2)

11.1 AT^HCPMS–Select Message Storage

11.1.1 Command Syntax

AT^HCPMS=<mem1>[,<mem2>[,<mem3>]]
Possible Response(s)
<CR><LF>^HCPMS: <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>
AT^HCPMS?
Possible Response(s)
<CR><LF>^HCPMS: <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>
AT^HCPMS=?
Possible Response(s)
<CR><LF>^HCPMS: (list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

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11.1.2 Interface Description

The set command selects memory storages <mem1>, <mem2> and <mem3> to be used for reading, writing, etc. The set command also sets the usage of the currently selected memory storages.

The read command queries the names and the usage of the selected memory storages.

The test command returns lists of memory storages supported by the MT.

11.1.3 Parameter Description

<mem1>: a string type value that specifies the memory storage used for reading and deleting messages.

"SM"	(U)SIM card
"ME"	NV
"BM"	Broadcast message storage (not supported currently)
"MT"	Any of the storages associated with ME (not supported currently)
"TA"	TA message storage (not supported currently)
"SR"	Status report storage (not supported currently)

The value of <mem1> is related to the specification supported by the MT. You cannot set <mem1> to a memory storage that is not supported. Otherwise, an error message is returned.

<mem2>: a string type value that specifies the memory storage used for writing and sending messages. Available values of this field are the same as those of the <mem1> field.

<mem3>: a string type value that specifies the memory storage used for receiving messages. Available values of this field are the same as those of the <mem1> field.

<total1>: an integer type value that indicates the capacity of <mem1> for storing messages.

<total2>: an integer type value that indicates the capacity of <mem2> for storing messages.

<total3>: an integer type value that indicates the capacity of <mem3> for storing messages.

<used1>: an integer type value that indicates the number of messages currently saved in the memory storage specified by <mem1>.

<used2>: an integer type value that indicates the number of messages currently saved in the memory storage specified by <mem2>.

<used3>: an integer type value that indicates the number of messages currently saved in the memory storage specified by <mem3>.

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NOTE

- The settings of <mem3> are not saved when the MT is powered off. The values of <mem1> and <mem2> are consistent with that of <mem3> when the MT is powered on again.
- If the USIM card has no memory storage for 3GPP2 short messages, the module does not support the memory storage type of “SM”.

11.1.4 Property Description

Saving upon Power-off	PIN
N	Y

11.1.5 Example

- Query the current storage type, used storage space and maximum storage capacity:

Run: `AT^HCPMS?`

Response:
```
^HCPMS: "SM",2,50,"SM",2,50,"SM",2,50

OK
```

- Set the storage type using the test command:

Run: `AT^HCPMS="SM","SM","SM"`

Response:
```
^HCPMS: 0,50,0,50,0,50

OK
```

11.2 AT^HCMGF–Set Message Format

11.2.1 Command Syntax

AT^HCMGF[=<mode>]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^HCMGF?
Possible Response(s)
<CR><LF>^HCMGF: <mode><CR><LF><CR><LF>OK<CR><LF>
AT^HCMGF=?
Possible Response(s)

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<CR><LF>^HCMGF: (list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

11.2.2 Interface Description

The set command sets the message format. The format is specified by <mode>, which can be either PDU mode or text mode.

The read command queries the currently selected mode.

The test command returns available values of <mode>.

11.2.3 Parameter Description

<mode>:

0	PDU mode (default value)
1	Text mode

NOTE

If <mode> is not specified, it is equivalent to set <mode> to 0.

11.2.4 Property Description

Saving upon Power-off	PIN
N	N

11.2.5 Example

Run: AT^HCMGF=0

Response: OK

Run: AT^HCMGF?

Response: ^HCMGF: 0

OK

11.3 AT^HSMSSS–Set Short Message Parameters (Text Mode)

11.3.1 Command Syntax

If text mode enabled (AT^HCMGF=1):

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AT^HSMSSS=<ack>,<prt>,<fmt>,<prv>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT^HSMSSS?
Possible Response(s)
<CR><LF>^HSMSSS: <ack>,<prt>,<fmt>,<prv><CR><LF><CR><LF>OK<CR><LF>
AT^HSMSSS=?
Possible Response(s)
<CR><LF>^HSMSSS: (list of supported <ack>s),(list of supported <prt>s),(list of supported <fmt>s),(list of supported <prv>s)<CR><LF><CR><LF>OK<CR><LF>

11.3.2 Interface Description

The set command sets parameters for sending short messages, including whether to acknowledge, priority, encoding format, and confidentiality.

11.3.3 Parameter Description

<ack>: specifies whether a short message status report is required.

0	The short message status report is not required. (default value)
1	The short message status report is required.

<prt>: specifies the priority of a short message.

0	Normal (default value)
1	Interactive
2	Urgent
3	Emergency

<fmt>: specifies the encoding format of a short message.

0	GSM 7 bit (not supported currently)
1	ASCII encoding (when the encoding range is not greater than 7F) (default value)
2	IA5 (not supported currently)

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3	Octet (not supported currently)
4	Latin (not supported currently)
5	Latin_Hebrew (not supported currently)
6	Unicode encoding (when the encoding range is greater than 7F)

<prv>: specifies the confidentiality level.

0	Normal (default value)
1	Restricted
2	Confidential
3	Secret

11.3.4 Property Description

Saving upon Power-off	PIN
N	Y

11.3.5 Example

Run: `AT^HSMSSS=0,0,1,0`

Response: `OK`

11.4 ^HCMTI–Report the Arrival of CDMA Messages

11.4.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^HCMTI: <mem>,<index><CR><LF>

11.4.2 Interface Description

This command reports the arrival of a CDMA message.

11.4.3 Parameter description

<mem>: indicates the message storage.

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"ME"	ME message storage
"SM"	(U)SIM message storage

<index>: an integer type value that indicates the location in the storage.

11.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.4.5 Example

If the SMS received and MS stores the message in the SIM card, and presents the new message indication, the following is reported:

Response:	^HCMTI: "SM",11	Presents the storage and location without solicitation.

11.5 AT^HCMGD–Delete Message

11.5.1 Command Syntax

AT^HCMGD=<index>[,<delflag>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT^HCMGD=?
Possible Response(s)
<CR><LF>^HCMGD: (list of supported <index>s)[,(list of supported <delflag>s)]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

11.5.2 Interface Description

The set command deletes the message at location <index> in the storage <mem1>.

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For details about <mem1>, see AT^HCPMS–Select Message Storage. If <delflag> is set to a value other than 0, the MT ignores <index> and executes the command as specified by <delflag>. If the deletion fails, +CMS ERROR: <err> is returned.

The test command returns storage locations that have messages and supported <deflag> values.

11.5.3 Parameter Description

<index>: indicates the storage location where the message is stored.

<delflag>:

0	Delete the message stored at the location specified by <index>. (default value)
1	Delete all the read messages saved in the preferred storage, and keep the unread, sent, and unsent ones.
2	Delete all the read and sent messages saved in the preferred storage, and keep the unread and unsent ones.
3	Delete all the read, sent, and unsent messages saved in the preferred storage, and keep the unread ones.
4	Delete all messages saved in the preferred storage, including the unread ones.

11.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.5.5 Example

- Delete the message stored in index 1 using the execution command:

Run: AT^HCMGD=1

Response: OK

- Delete all the message in the current storage using the execution command:

Run: AT^HCMGD=1,4

Response: OK

11.6 AT^HCMGS–Send a Short Message(PDU Mode)

11.6.1 Command Syntax

If PDU mode enabled (AT^HCMGF=0):

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AT^HCMGS=<length><CR><Layer3 packet><ctrl-Z/ESC>
Possible Response(s)
<CR><LF>^HCMGS: <mr><CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT^HCMGS=?
Possible Response(s)
<CR><LF>OK<CR><LF>

11.6.2 Interface Description

This command sends a short message to the network. The short message is sent in two steps:

In PDU mode:

Firstly, AT^HCMGS=<length> end with <CR>,

TE waits for <CR><LF><greater_than><space>(IRA 13, 10, 62, 32) from the MT, and inputs the message content that end with <ctrl-Z> (IRA 26).

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

11.6.3 Parameter Description

<length>: specifies the length is bytes of <layer3 packet>.

<mr>: a decimal digit that specifies the identifier of a short message. The value ranges from 0 to 65535.

<ctrl-Z>: identifies the end of a short message. The character is '0x1A' ('0x001A' in the Unicode).

<ESC>: indicates that the sending of a short message is canceled. The character is '0x1B' ('0x001B' under the Unicode).

<Layer3 packet>: the character is '0'–'9', 'A'–'F', two characters form an Octet.

NOTE

Sending of a short message adopts the asynchronous command processing mode in the AT command. Currently, the asynchronous command processing process cannot process other AT commands. During the process, if the MT receives a short message-related command, such as the ^HCPMS, ^HCMGR, ^HCMGD command, it returns +CMS ERROR: 302. That is, the operation is not allowed. If the MT receives the ^HCMGS command, it returns ^HCMGSF: 0. If the MT receives another command unrelated to a short message, it returns +CME ERROR: 40. That is, the operation is not allowed.

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11.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.6.5 Example

Run: `AT^HCMGS=43`

Response: `>`

Run: `0000021002040702C4CC484A059C06010008180003200000010610 2E8CBB3630030613033016234 90A0100`

Response: `^HCMGS: 0`

`OK`

11.7 AT^HCMGS–Send a Short Message (Text Mode)

11.7.1 Command Syntax

If text mode enabled (`AT^HCMGF=1`):

`AT^HCMGS=<da>[,<toda>]<CR>`text is entered`<ctrl-Z/ESC>`
Possible Response(s)
<CR><LF>`^HCMGSS: <mr>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MS-related error: <CR><LF>`+CMS ERROR: <err>`<CR><LF>
`AT^HCMGS=?`
Possible Response(s)
<CR><LF>`OK`<CR><LF>

11.7.2 Interface Description

This command sends a short message to the network. The short message is sent in two steps:

In text mode:

The `AT^HCMGS=<da>[,<toda>]` command is sent with the end of (CR).

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The TE waits <CR><LF><greater_than><space>(IRA 13, 10, 62, 32) returned by the MT, and then inputs the message content. When the <fmt> of AT^HSMSSS is 1, then ending with <ctrl-Z>, otherwise, when the <fmt> of AT^HSMSSS is 6, then ending with 0x001A. The Unicode should be input as an integer, not two bytes separately (IRA 26).

In text mode, it only supports 0–0x00FF with UCS2.

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

11.7.3 Parameter Description

<da>: specifies the number of the recipient of a short message. It is a string with double quotation marks, consisting of a maximum of 20 characters. The value can be '0'–'9', '*', '#', and '+', that is, the '+' is a part of <da>. The '+' symbol can only be at the start of the number.

<toda>: specifies the address encoding format. It is a digit of one byte. The default value is 0. (not supported currently)

<mr>: a decimal digit that specifies the identifier of a short message. The value ranges from 0 to 65535.

<ctrl-Z>: identifies the end of a short message. The character is '0x1A' ('0x001A' in the Unicode).

<ESC>: indicates that the sending of a short message is canceled. The character is '0x1B' ('0x001B' under the Unicode).

NOTE

Sending of a short message adopts the asynchronous command processing mode in the AT command. Currently, the asynchronous command processing process cannot process other AT commands. During the process, if the MT receives a short message-related command, such as the ^HCPMS, ^HCMGR, ^HCMGD command, it returns +CMS ERROR: 302. That is, the operation is not allowed. If the MT receives the ^HCMGS command, it returns ^HCMGSF: 0. If the MT receives another command unrelated to a short message, it returns +CME ERROR: 40. That is, the operation is not allowed.

11.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.7.5 Example

Run: AT^HCMGS="13388168603"

Response: >

Run: asdfaf

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Response: `^HCMGSS: 1150`

`OK`

11.8 AT^HCMGR–Read a Short Message(PDU Mode)

11.8.1 Command Syntax

If PDU mode enabled (`AT^HCMGF=0`):

`AT^HCMGR=<index>[,<mode>]`
Possible Response(s)
<CR><LF>`^HCMGR: <stat>,[<reserved>],<length>`<CR><LF>`<layer3 packet>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MS-related error: <CR><LF>`+CMS ERROR: <err>`<CR><LF>
`AT^HCMGR=?`
Possible Response(s)
<CR><LF>`OK`<CR><LF>

11.8.2 Interface Description

The execution command returns short messages with the storage position of `<index>` from the storage medium specified by `<mem1>`. Whether to modify the short message status depends on the value of `<mode>`.

11.8.3 Parameter Description

`<index>`: an integer type value specifies the position in the storage medium.

`<mode>`: specifies the change mode of the short message status.

0	The short message status is changed to read. (default value)
1	The short message status is not changed

NOTE

If `<mode>` is not specified, it is equivalent to set `<mode>` to 0.

`<length>`: specifies the length of a received short message.

`<stat>`: specifies the type of a short message.

0	Received unread short messages

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1	Received read short messages
2	Stored unsent short messages
3	Stored sent short messages
4	All short messages (not supported currently)

<ctrl-Z>: indicates the end of the content of a short message. The character is '0x1A' when the encoding format is not Unicode encoding; the character is '0x001A' when the encoding format is Unicode encoding.

11.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.8.5 Example

Run: AT^HCMGR=4,1

Response:
```
^HCMGR: 1,,43
0000021002040702C4CC484A059C060100081800032000000106102E8CBB3630030613033016234 90A0100

OK
```

11.9 AT^HCMGR–Read a Short Message(Text Mode)

11.9.1 Command Syntax

If text mode enabled (AT^HCMGF=1):

AT^HCMGR=<index>[,<mode>]
Possible Response(s)
<CR><LF>^HCMGR: <callerID>,<year>,<month>,<day>,<hour>,<minute>,<second>,<lang>,<format>,<length>,<prt>,<prv>,<type>,<stat><CR><LF><msg><ctrl-Z><CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT^HCMGR=?
Possible Response(s)

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

11.9.2 Interface Description

The execution command returns short messages with the storage position of <index> from the storage medium specified by <mem1>. Whether to modify the short message status depends on the value of <mode>.

11.9.3 Parameter Description

<index>: an integer type value specifies the position in the storage medium.

<mode>: specifies the change mode of the short message status.

0	The short message status is changed to read. (default value)
1	The short message status is not changed

NOTE

If <mode> is not specified, it is equivalent to set <mode> to 0.

<callerID>: specifies the number of the short message sender.

<format>: specifies the encoding format of a short message.

0	GSM 7 bit (not supported currently)
1	ASCII encoding (when the encoding range is not greater than 7F)
2	IA5 (not supported currently)
3	Octet (not supported currently)
4	Latin (not supported currently)
5	Latin_Hebrew (not supported currently)
6	Unicode encoding (when the encoding range is greater than 7F)

<year>, <month>, <day>, <hour>, <minute>, <second>: specify the year, month, day, hour, minute, and second when a short message is received.

<length>: specifies the length of a received short message.

<lang>: specifies the language.

0	Unspecified
1	English
6	Chinese

<prt>: specifies the priority of a short message.

0	Normal
1	Interactive

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2 Urgent

3 Emergency

<prv>: specifies the confidentiality level.

0 Normal

1 Restricted

2 Confidential

3 Secret

<type>: specifies the type of a short message.

0 Normal

1 CPT (not supported currently)

2 Voice mail (not supported currently)

3 SMS report

<stat>: specifies the type of a short message.

0 Received unread short messages

1 Received read short messages

2 Stored unsent short messages

3 Stored sent short messages

4 All short messages (not supported currently)

<msg>: specifies the received short message.

<ctrl-Z>: indicates the end of the content of a short message. The character is '0x1A' when the encoding format is not UNICODE encoding; the character is '0x001A' when the encoding format is UNICODE encoding.

11.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.9.5 Example

Run: AT^HCMGR=11

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Response:
```
^HCMGR:
8613388168603,2014,11,18,17,41,11,0,1,5,0,0,0,1
sadfa

OK
```


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12 Huawei Proprietary Interface: Network Service Interfaces

12.1 AT^HWNATQRY–Query the Network Mode

12.1.1 Command Syntax

AT^HWNATQRY?
Possible Response(s)
<CR><LF>^HWNATQRY: <cur_mode><CR><LF><CR><LF>OK<CR><LF>
AT^HWNATQRY=?
Possible Response(s)
<CR><LF>^HWNATQRY: <sup_mode><CR><LF><CR><LF>OK<CR><LF>

12.1.2 Interface Description

For multi-mode products, different AT commands and background interfaces are available. The background uses this AT command to query the terminal's current network mode and all supported network modes.

The read command queries the terminal's current network mode, while the test command queries all network modes supported by the terminal.

The test command returns all network modes supported by the terminal.

12.1.3 Parameter Description

<cur_mode>: specifies current network mode. The value ranges from 00 to 99 (decimal).

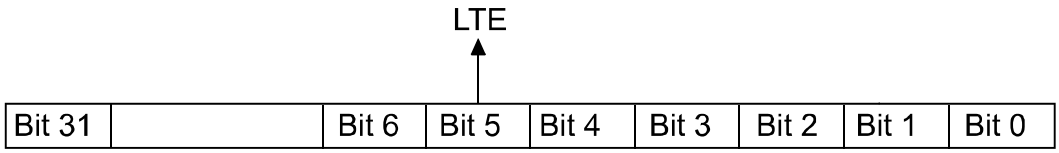
00	Reserved
01	GSM (not supported currently)

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02	CDMA (including 1x and EVDO) (not supported currently)
03	WCDMA (not supported currently)
04	TD-SCDMA (not supported currently)
05	WiMAX (not supported currently)
06	LTE
07	WiFi (not supported currently)
……	
99	

<sup_mode>: specifies supported network mode, 4 bytes. Every bit represents a network mode. If the value of the bit is 1, the mode is supported; if the value of the bit is 0, the mode is not supported. Multi-mode terminals support several network modes.

Bit0	GSM (not supported currently)
Bit1	CDMA (including 1x and EVDO) (not supported currently)
Bit2	WCDMA (not supported currently)
Bit3	TD-SCDMA (not supported currently)
Bit4	WiMAX (not supported currently)
Bit5	LTE
Bit6	WiFi (not supported currently)
……	
Bit31	



12.1.4 Property Description

Saving upon Power-off	PIN
NA	N

12.1.5 Example

Query the networks modes supported by the terminal.

Run: `AT^HWNATQRY=?`

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Response: `^HWNATQRY: 32`

`OK`

The returned value 32 indicates that the terminal supports LTE.

Bit31	……	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	ALL 0	0	1	0	0	0	0	0

12.2 ^HWNAT– Indicate Network Mode Change

12.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^HWNAT: <cur_mode><CR><LF>

12.2.2 Interface Description

When the terminal's network mode changes, the terminal uses this unsolicited report command to report the new network mode to the background.

12.2.3 Parameter Description

<cur_mode>: specifies current network mode. The value ranges from 00 to 99 (decimal).

00	Reserved
01	GSM (not supported currently)
02	CDMA (including 1x and EVDO) (not supported currently)
03	WCDMA (not supported currently)
04	TD-SCDMA (not supported currently)
05	WiMAX (not supported currently)
06	LTE
07	WiFi (not supported currently)
……	
99	

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12.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.2.5 Example

The terminal's network mode changes to LTE mode:

Response: `^HWNAT: 06`

12.3 AT^SYSINFOEX–Query Extended System Information

12.3.1 Command Syntax

AT^SYSINFOEX
Possible Response(s)
<CR><LF>^SYSINFOEX: <srv_status>,<srv_domain>,<roam_status>,<sim_state>,<lock_state>,<sysmode>,<sysmode_name>,<submode>,<submode_name><CR><LF><CR><LF>OK<CR><LF>

12.3.2 Interface Description

This command queries the current system information, such as the system service status, domain, roaming status, system mode, and SIM card state.

12.3.3 Parameter Description

<srv_status>: indicates the system service status.

0	No services
1	Restricted services
2	Valid services
3	Restricted regional services
4	Power saving or hibernate state

<srv_domain>: indicates the system service domain.

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0	No services
1	CS service only
2	PS service only
3	PS+CS services
4	Not registered to CS or PS; searching now
255	CDMA (not supported currently)

<roam_status>: indicates the roaming status.

0	Not roaming
1	Roaming

<sim_state>: indicates the state of the SIM card.

0	Invalid SIM card
1	Valid SIM card
2	Invalid SIM card in CS
3	Invalid SIM card in PS
4	Invalid SIM card in PS and CS
240	ROMSIM version
255	No SIM card is found

<lock_state>: indicates whether the SIM card is locked by the CardLock feature. (not support currently)

0	SIM card is not locked by the CardLock feature.
1	SIM card is locked by the CardLock feature.

<sysmode>: indicates the system mode.

0	NO SERVICE
1	GSM (not supported currently)
2	CDMA (not supported currently)
3	WCDMA (not supported currently)
4	TD-SCDMA (not supported currently)
5	WiMAX (not supported currently)
6	LTE

<sysmode_name>: a string type value that indicates the system mode name corresponding to <sysmode>. For example, if <sysmode>=6, <sysmode_name>="LTE".

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<submode>: indicates the system sub-mode.

0	NO SERVICE
1	GSM (not supported currently)
2	GPRS (not supported currently)
3	EDGE (not supported currently)
4–20	Reserved
21	IS95A (not supported currently)
22	IS95B (not supported currently)
23	CDMA2000 1X (not supported currently)
24	EVDO Rel0 (not supported currently)
25	EVDO RelA (not supported currently)
26	EVDO RelB (not supported currently)
27	Hybrid (CDMA2000 1X) (not supported currently)
28	Hybrid (EVDO Rel0) (not supported currently)
29	Hybrid (EVDO RelA) (not supported currently)
30	Hybrid (EVDO RelB) (not supported currently)
31	eHRPD Rel0 (not supported currently)
32	eHRPD RelA (not supported currently)
33	eHRPD RelB (not supported currently)
34	Hybrid (eHRPD Rel0) (not supported currently)
35	Hybrid(eHRPD RelA) (not supported currently)
36	Hybrid(eHRPD RelB) (not supported currently)
37-39	Reserved
41	WCDMA (not supported currently)
42	HSDPA (not supported currently)
43	HSUPA (not supported currently)
44	HSPA (not supported currently)
45	HSPA+ (not supported currently)
46	DC-HSPA+ (not supported currently)
47-60	Reserved
61	TD-SCDMA (not supported currently)
62	HSDPA (not supported currently)
63	HSUPA (not supported currently)

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64	HSPA (not supported currently)
65	HSPA+ (not supported currently)
66-80	Reserved
81	802.16e (not supported currently)
82-100	Reserved
101	LTE
Other value	Reserved

<submode_name>: indicates system sub-mode (its value can be extended).

This parameter returns the name of the current network sub-mode in character string. The value of <submode_name> is the character string corresponding to the value of <submode> in the command. For example, if the value of <submode> is 101, the value of <submode_name> is LTE.

12.3.4 Property Description

Saving upon Power-off	PIN
NA	N

12.3.5 Example

Run: `AT^SYSINFOEX`

Response:
```
^SYSINFOEX:
2,3,0,1,,6,"LTE",101,"LTE"

OK
```

Indicates that the UE is operating over a LTE network in LTE mode.

12.4 AT^SYSCFGEX–Configure Extended System

12.4.1 Command Syntax

AT^SYSCFGEX=<acqorder>,<band>,<roam>,<srvdomain>,<lteband>,<reserve1>,<reserve2>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

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AT^SYSCFGEX?
Possible Response(s)
<CR><LF>^SYSCFGEX: <acqorder>,<band>,<roam>,<srvdomain>,<lteband><CR><LF><CR><LF>OK<CR><LF>
AT^SYSCFGEX=?
Possible Response(s)
<CR><LF>^SYSCFGEX: (list of supported <acqorder>s),(list of supported (<band>,<band_name>)s),(list of supported <roam>s),(list of supported <srvdomain>s),(list of supported (<lteband>,<lteband_name>)s)<CR><LF><CR><LF>OK<CR><LF>

12.4.2 Interface Description

This command sets the system mode, network access order, frequency band, roaming support, domain, and other features.

12.4.3 Parameter Description

<acqorder>: a string type value that specifies the network access order. Its value can be 00, 99 or a combination of the following values:

"00"	Automatic
"01"	GSM (not supported currently)
"02"	WCDMA (not supported currently)
"03"	LTE
"04"	CDMA 1X (not supported currently)
"05"	TD-SCDMA (not supported currently)
"06"	Wimax (not supported currently)
"07"	CDMA EVDO (not supported currently)
"99"	Not change

For example:

- The 03 value indicates LTE only.
- In specialty, the "99" value is not combined with other values, indicating no change of the network access order.
- The "00" value is not combined with other values, indicating automatic network access order that is determined by the board.

<band>: a hexadecimal value that specifies the frequency band, which is related to the system mode and dependent on the board performance.

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3FFFFFFF (CM_BAND_PREF_ANY)	All Bands
40000000 (CM_BAND_PREF_NO_CHANGE)	Band not changed

<band_name>: a string type value that indicates the frequency band name.

<roam>: indicates whether roaming is supported.

0	Not supported
1	Supported
2	No change
3	Roam only (not supported currently)

<srvdomain>: indicates the domain setting.

0	CS_ONLY
1	PS_ONLY
2	CS_PS
3	ANY
4	No change

<lteband>: a hexadecimal value that specifies the LTE frequency band. The value of <lteband> can be one of the following values and their combinations (excluding 0x7FFFFFFFFFFFFFFF):

7FFFFFFFFFFFFFFF	(CM_BAND_PREF_ANY)	All Bands
8	(CM_BAND_PREF_LTE_EUTRAN_BAND4)	LTE BC4
1000	(CM_BAND_PREF_LTE_EUTRAN_BAND13)	LTE BC13
40000000	(CM_BAND_PREF_NO_CHANGE)	No band change

For MT that does not support LTE, <lteband> and <lteband_name> are left out in the response. In the set command, <lteband> is left out.

That is, in the response to AT^SYSCFGEX=?, <lteband> and <lteband_name> are left out

^SYSCFGEX: (list of supported <acqorder>s),(list of supported (<band>,<band_name>)s),(list of supported <roam>s),(list of supported <srvdomain>s),

OK

In the response to AT^SYSCFGEX?, <lteband> is left out.

^SYSCFGEX: <acqorder>,<band>,<roam>,<srvdomain>,

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```
OK
```

When the set command is executed, <lteband> is null or unchanged.

```
AT^SYSCFGEX=<acqorder>,<band>,<roam>,<srvdomain>,,<reserve1>,<reserve2>
```

<lteband_name>: a string type value that indicates the LTE frequency band name. It is displayed in LTE BCx format, in which, x indicates the actual Band Class. If multiple bands are simultaneously supported, it is separated by / (for example, LTE BC4/LTE BC13).

<reserve1>: reserved field 1

<reserve2>: reserved field 2

12.4.4 Property Description

Saving upon Power-off	PIN
NA	N

12.4.5 Example

Run:
```
AT^SYSCFGEX=?
```

Response:
```
^SYSCFGEX: ("00","03","99"),((0,""),(3fffffff,"All Bands")),(0-2),(0-4),((1008,"LTE BC4/LTE BC13"),(7fffffffffffffff,"All Bands"))

OK
```

Run:
```
AT^SYSCFGEX?
```

Response:
```
^SYSCFGEX: "00",3FFFFFFF,1,2,7FFFFFFFFFFFFFFF

OK
```

Run:
```
AT^SYSCFGEX="03",3FFFFFFF,1,2,7FFFFFFFFFFFFFFF,,
```

Response:
```
OK
```


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12.5 AT^EONS–Query the Service Provider Name and the EF_{SPN} Information of the SIM Card

12.5.1 Command Syntax

AT^EONS=<type>[,<plmn_id>[,<plmn_name_len>]]
Possible Response(s)
<CR><LF>^EONS: <type>,<plmn_id>,<plmn_name1>,<plmn_name2>[,<spn_cond>,<spn>]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^EONS=?
Possible Response(s)
<CR><LF>^EONS: (list of supported <type>s)<CR><LF><CR><LF>OK<CR><LF>

12.5.2 Interface Description

This command queries the service provider name and the information contained in the EF_{SPN} file of the SIM card.

<type> specifies the query type. Its value can be 1, 2, 3, 4, or 5 in 3GPP mode and only 1 in 3GPP2 mode.

- When <type> is set to 1, 2, 3, or 4:
  - The command format is AT^EONS=<type> or AT^EONS=<type>,<plmn_id>. If <plmn_id> is not included, information about the current registered network is returned.
  - In the response, <plmn_name1> indicates the long name, while <plmn_name2> indicates the short name. The value of <plmn_name1> or <plmn_name2> contains a maximum of 128 hexadecimal characters (32 valid characters). If a name exceeds the maximum length, the first 128 characters are retained. If <plmn_name1> or <plmn_name2> cannot be obtained, its value is left empty.
  - In the response, <spn_cond> and <spn> are handled as follows: If the SIM card for the current registered network has an EF_{SPN} file that is not empty, the content of the EF_{SPN} file is returned. Otherwise, nothing is returned.
- When <type> is set to 5:
  - The command format is AT^EONS=<type> or AT^EONS=<type>,,<plmn_name_len>. If <plmn_name_len> is not included, its default value is used.

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- In the response, the maximum number of hexadecimal characters that can be contained in the value of <plmn_name1> is the value of <plmn_name_len> divided by 4. An empty value is returned for <plmn_name2>.
- The response does not need to contain <spn_cond> or <spn>.

A UCS2 hexadecimal character string is converted using the big-endian encoding scheme. For example, character 'A' is represented by 0041.

12.5.3 Parameter Description

<type>: specifies operation type.

1 Automatic mode.

For 3GPP mode, the priority for <plmn_name1> and <plmn_name2> is as follows:

- Information saved in the EF_{PNN} file corresponding to the USIM EF_{OPL}
- Information released from the network side (MM/GMM/EMM information)
- Information saved in the internal network name list

2 Query the network name in the MM/GMM/EMM information.

3 Query the network name in the EF_{PNN} file corresponding to the USIM EF_{OPL}.

4 Query the information saved in the internal network name list.

5 Automatic length limit mode.

Processing logic for <plmn_name1>:

1. If a long name exists and its length does not exceed the limit set by <plmn_name_len>:

	(Non-Roaming or RPLMN Is Listed in EF_{SPDI}) and EF_{SPN} Is Valid	Roaming and RPLMN Is Not Listed in EF_{SPDI}) or EF_{SPN} Is Invalid
<plmn_name1> returns	SPN	Long name

2. If a short name exists and its length does not exceed the limit set by <plmn_name_len>:

	(Non-Roaming or RPLMN Is Listed in EF_{SPDI}) and EF_{SPN} Is Valid	Roaming and RPLMN Is Not Listed in EF_{SPDI}) or EF_{SPN} Is Invalid
<plmn_name1> returns	SPN	Short name

3. In other cases:

	(Non-Roaming or RPLMN	Roaming and RPLMN Is Not

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	Is Listed in EF_{SPDI}) and EF_{SPN} Is Valid	Listed in EF_{SPDI}) or EF_{SPN} Is Invalid
<plmn_name1> returns	SPN	"MCC MNC"

The priority for the long and short names (from high to low) is as follows:

1. Information saved in the EF_{PNN} file corresponding to the EF_{OPL}
2. Information released from the network side (MM/GMM/EMM information)
3. Information saved in the internal network name list

If the long and short names obtained from a preferred location are invalid, specifically, the name does not exist or its length exceeds the limit, the next preferred location is turned to.

<plmn_id>: specifies PLMN ID of the network, without double quotation marks. For detailed format, see the description of the numeric <oper> field in the AT+COPS command in the 3GPP TS 27.007 protocol.

<plmn_name_len>: an integer type value that specifies the maximum length of <plmn_name1>. When the field is not delivered, the default value is 20. Modules do not support the extension of the field.

<plmn_name1>: a string type value in the format of a UCS2 hexadecimal character string.

<plmn_name2>: a string type value in the format of a UCS2 hexadecimal character string. When the <type> parameter is set to 5, a null character string is reported in "" format.

<spn_cond>: an integer type value that ranges from 0 to 255. The value of the <spn_cond> parameter is the first byte in the EF_{SPN} file of the SIM card. For details in 3GPP, see the explanation of the <Display Condition> field in the definition of the EF_{SPN} file in the 3GPP TS 31.102 protocol.

<spn>: a string type value in the format of a UCS2 hexadecimal character string that indicates the content of the EF_{SPN} file.

12.5.4 Property Description

Saving upon Power-off	PIN
N	Y

12.5.5 Example

- If the currently registered 3GPP network is 46009. The long name of network 46009 is "HUAWEI TEST W09" and the short name is "HTW09" in the EF_{PNN} file of the current SIM card. The <Display Condition> field of the EF_{SPN} is set to 0x03 and the <Service Provider Name> field is set to "HUAWEI". The long

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and short names delivered by network 46009 are "HUAWEI TEST W09 NETWORK" and "HTW09NET" respectively.

Run: `AT^EONS=1`

Response:
```
^EONS:
1,46009,"004800550041005700450049002000540045005300540020005700300039","0048005400570030003900",3,"0048005500410057004500490020005400450053005400200057003000390039",3,"00480055004100570045004900200054004500530054002000570030003900390039"

OK
```

Run: `AT^EONS=2`

Response:
```
^EONS:
2,46009,"004800550041005700450049002000540045005300540020005700300039002000540045005300540020005700300039003900390020004E00450054",3,"00480055004100570045004900200054004500530054002000570030003900390039004E00450054"

OK
```

Run: `AT^EONS=2,46010`

Response:
```
^EONS: 2,46010,"","",3,"004800550041005700450049"

OK
```

Run: `AT^EONS=5`

Response:

```
^EONS:
5,46009,"004800550041005700450049","","

OK
```

When network 46009 is an HPLMN or belongs to an EHPLMN, or in EF_{SPDI}.

```
^EONS:
5,46009,"004800550041005700450049002000540045005300540020005700300039","

OK
```

When network 46009 is not in an HPLMN, EHPLMN, or EF_{SPDI}.

- If the currently registered 3GPP2 network is PLMN46009 and its SID is 10623. The long name of the network is "HUAWEI TEST W09 NETWORK" and the short name is "HTW09NET" in the EF_{PNN} file. While the EF_{SPN} is invalid.

Run: `AT^EONS=1`

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Response:	^EONS: 1,46009,"004800550041005700450049002000540045005300540020005700300039 0200054004500530054002000570030003 90020004E00450054005700 4F0052004B" ,"00480054005700300039004E00450054 " OK	When the MCC and MNC released by the network are 460 and 09, respectively, the following is returned:
	^EONS: 1,46009,"004800550041005700450049002000540045005300540020005700300039 0200054004500530054002000570030003 90020004E00450054005700 4F0052004B" ,"00480054005700300039004E00450054 " OK	When the network does not release any MCC or MNC and the network SID is 10623, the following is returned:

NOTE

- "HUAWEI TEST W09" (UCS2 hexadecimal character string): 004800550041005700450049002000540045005300540020005700300039
- "HTW09" UCS2 (UCS2 hexadecimal character string): 0048005400570030003 9
- "HUAWEI" UCS2 (UCS2 hexadecimal character string): 00480055004100570045004 9
- "HUAWEI TEST W09 NETWORK" (UCS2 hexadecimal character string): 004800550041005700450049002000540045005300540020005700300039002000 4E0045 00540057004F0052004B
- "HTW09NET" UCS2 (UCS2 hexadecimal character string): 00480054005700300039004E0045005

12.6 AT^HCSQ–Query and Report Signal Strength

12.6.1 Command Syntax

AT^HCSQ?
Possible Response(s)
<CR><LF>^HCSQ: <sysmode>[,<value1>[,<value2>[,<value3>[,<value4>[,<value5>]]]]]<CR><LF><CR><LF>OK<CR><LF>
AT^HCSQ=?
Possible Response(s)
<CR><LF>^HCSQ: list of supported <sysmode>s<CR><LF><CR><LF>OK<CR><LF>
URC
Possible Response(s)

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<CR><LF>^HCSQ:
<sysmode>[,<value1>[,<value2>[,<value3>[,<value4>[,<value5>]]]]]<CR><LF>

12.6.2 Interface Description

This command queries and reports the signal strength of the current service network. If the MT is registered with multiple networks in different service modes, you can query the signal strength of networks in each mode.

No matter whether the MT is registered with a network or not, you can run this command to query the signal strength or allow the MT to unsolicitedly report the detected signal strength if the MT camps on the network. If the MT is not using any service network or the service mode is uncertain, "NOSERVICE" will be returned as the query result.

The read command queries the current network signal strength detected by the MT.

The test command returns the list of service modes supported by the MT.

The URC command allows the MT to unsolicitedly report the current signal strength when the strength changes.

12.6.3 Parameter Description

<sysmode>: a string type value that indicates the service mode in which the MT will unsolicitedly report the signal strength.

"NOSERVICE"	NOSERVICE mode
"GSM"	GSM/GRPS/EDGE mode (not supported currently)
"WCDMA"	WCDMA/HSDPA/HSPA mode (not supported currently)
"LTE"	LTE mode
"CDMA"	CDMA mode (not supported currently)
"EVDO"	EV-DO/eHRPD mode (not supported currently)
"CDMA-EVDO"	CDMA/EV-DO (eHRPD) mode (not supported currently)

<value1>, <value2>, <value3>, <value4>, <value5>: the following table lists the signal strength type corresponding to each service mode.

<sysmode>	<value1>	<value2>	<value3>	<value4>	<value5>
"NOSERVICE"	-	-	-	-	-
"LTE"	lte_rssi	lte_rsrp	lte_sinr	lte_rsrq	-

<lte_rssi>: integer type values that indicate the received signal strength. These parameters are available for LTE mode respectively.

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0	rssi < –120 dBm
1	–120 dBm ≤ rssi <–119 dBm
2	–119 dBm ≤ rssi <–118 dBm
…	
94	–27 dBm ≤ rssi < –26 dBm
95	–26 dBm ≤ rssi < –25 dBm
96	–25 dBm ≤ rssi
255	unknown or undetectable

<lte_rsrp>: an integer type value that indicates the reference signal received power (RSRP). This parameter is available for LTE mode.

0	rsrp < –140 dBm
1	–140 dBm ≤ rsrp < – 139 dBm
2	–139 dBm ≤ rsrp < –138 dBm
…	
95	–46 dBm ≤ rsrp < –45 dBm
96	–45 dBm ≤ rsrp < –44 dBm
97	–44 dBm ≤ rsrp
255	unknown or undetectable

<lte_sinr>: an integer type value that indicates the signal to interference plus noise ratio (SINR). This parameter is available for LTE mode.

0	sinr < –20 dB
1	–20 dB ≤ sinr < –19.8 dB
2	–19.8 dB ≤ sinr < –19.6 dB
…	
249	29.6 dB ≤ sinr < 29.8 dB
250	29.8 dB ≤ sinr < 30 dB
251	30 dB ≤ sinr
255	unknown or undetectable

<lte_rsrq>: an integer type value that indicates the reference signal received quality (RSRQ) in dB.

0	rsrq < –19.5 dB
1	–19.5 dB ≤ rsrq < –19 dB
2	–19 dB ≤ rsrq < –18.5 dB

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…	
32	–4 dB ≤ rsrq < –3.5 dB
33	–3.5 dB ≤ rsrq < –3 dB
34	–3 dB ≤ rsrq
255	unknown or undetectable

12.6.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.6.5 Example

Run: `AT^HCSQ=?`

Response:
```
^HCSQ: "NOSERVICE","LTE"

OK
```

Run: `AT^HCSQ?`

Response:
```
^HCSQ: "LTE",24,19,113,18

OK
```

12.7 AT^IMEISV–Query the IMEISV

12.7.1 Command Syntax

AT^IMEISV?
Possible Response(s)
<CR><LF>^IMEISV: <imeisv><CR><LF><CR><LF>OK<CR><LF>

12.7.2 Interface Description

This command queries the IMEISV of the board.

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12.7.3 Parameter Description

<imeisv>: indicates IMEI and software version of a board. The returned value is a 16-character decimal value. The following table lists the value structure (for details, see the 3GPP TS 23.003 protocol).

16 digits IMEISV		
8 digits	6 digits	2 digits
TAC	SNR	SVN

12.7.4 Property Description

Saving upon Power-off	PIN
NA	N

12.7.5 Example

Query the IMEISV:

Run: `AT^IMEISV?`

Response:
```
^IMEISV: 3545240400110917

OK
```

NOTE

- 35452404001109: the first 14 characters of the board IMEI
- 17: SVN

12.8 ^SRVST–Service State Change Indication

12.8.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SRVST: <srv_status><CR><LF>

12.8.2 Interface Description

When the state of a service is changed, the MT uses this command to unsolicitedly send the new service state to the TE.

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12.8.3 Parameter Description

<srv_status>: indicates the system service status.

0	No services
1	Restricted services
2	Valid services
3	Restricted regional services
4	Power saving or hibernate state

12.8.4 Property Description

Saving upon Power-off	PIN
N	NA

12.8.5 Example

When AT+COPS command is sent to MT, the state of a service is changed, and the MT unsolicited sends this indication to the TE.

Run: `AT+COPS=1,2,"47299",7`

Response:
```
^HWNAT: 06

OK

^NWTIME: 14/05/22,12:07:27+32,00

^SRVST: 2
```

12.9 ^SIMST–SIM Card State Change Indication

12.9.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SIMST: <sim_state>[,<lock_state>]<CR><LF>

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12.9.2 Interface Description

When the state of the SIM card is changed, the MT uses this command to unsolicited send the new state to the TE. Meanwhile, the indication also indicates whether the SIM card is locked.

12.9.3 Parameter Description

<sim_state>: indicates the state of the SIM card.

0	Invalid SIM card, does not finish initialization.
1	Valid SIM card.
2	Invalid SIM card in CS domain.
3	Invalid SIM card in PS domain.
4	Invalid SIM card in PS domain and CS domain.
240	ROMSIM version.
255	No SIM card is found. This value may be returned if the SIM card is not inserted or it is locked by the CardLock feature. In this case, the actual state of the SIM card is determined by <lock_state>.

<lock_state>: indicates whether the SIM card is locked by the CardLock feature.

0	SIM card is not locked by the CardLock feature.
1	SIM card is locked by the CardLock feature.

12.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.9.5 Example

Run: `AT+CPIN=1234`

Response: `OK`

`^SIMST: 1`

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12.10 AT^NWTIME–Query Presentation of Network System Time

12.10.1 Command Syntax

AT^NWTIME?
Possible Response(s)
<CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF><CR><LF>OK<CR><LF>

12.10.2 Interface Description

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

12.10.3 Parameter Description

<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 0. Otherwise, corresponding daylight saving time is presented. Detailed values and descriptions are as follows (refer to table 10.5.97a/3GPP TS 24.008):

0	No adjustment for Daylight Saving Time
1	+1 hours adjustment for Daylight Saving Time
2	+2 hours adjustment for Daylight Saving Time
3	Reserved

12.10.4 Property Description

Saving upon Power-off	PIN
N	Y

12.10.5 Example

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

Run: AT^NWTIME?

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Response: `^NWTIME: 11/12/20,12:33:18+32,0`

`OK`

12.11 ^NWTIME–Unsolicitedly Report Network System Time

12.11.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF>

12.11.2 Interface Description

This command unsolicitedly reports network system time, time zone, and daylight saving time.

12.11.3 Parameter Description

<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 0. Otherwise, corresponding daylight saving time is presented. Detailed values and descriptions are as follows (refer to table 10.5.97a/3GPP TS 24.008):

0	No adjustment for Daylight Saving Time
1	+1 hours adjustment for Daylight Saving Time
2	+2 hours adjustment for Daylight Saving Time
3	Reserved

12.11.4 Property Description

Saving upon Power-off	PIN
NA	NA

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12.11.5 Example

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

Response: ^NWTIME: 11/12/20,12:31:34+32,0

12.12 AT^HIMSF–Query the Format of IMS Short Messages

12.12.1 Command Syntax

AT^HIMSF?
Possible Response(s)
<CR><LF>^HIMSF: <mo_ims_sms_fmt><CR><LF><CR><LF>OK<CR><LF>
AT^HIMSF=?
Possible Response(s)
<CR><LF>^HIMSF: (list of supported <mo_ims_sms_fmt>s)<CR><LF><CR><LF>OK<CR><LF>

12.12.2 Interface Description

This command queries the IMS registration status and the IMS messages format.

12.12.3 Parameter description

<mo_ims_sms_fmt>: an integer type value that indicates the format of IMS short messages.

0	3GPP message
1	3GPP2 message
2	Unknown

12.12.4 Property Description

Saving upon Power-off	PIN
NA	N

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12.12.5 Example

- If the module is registered with the IMS, and the format of IMS messages is 3GPP2, running `AT^HIMSF?` will return the following response:

Run: `AT^HIMSF?`

Response:
```
^HIMSF: 1

OK
```

- If the module is not registered with the IMS, running `AT^HIMSF?` will return the following response:

Run: `AT^HIMSF?`

Response:
```
^HIMSF: 2

OK
```


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13 Huawei Proprietary Interface: Built-in TCP/IP Protocol Stacks and AT Interfaces

Internet services refer to data services based on built-in TCP/IP protocol stacks of terminals. A user can deliver AT commands to terminals to establish an IP/PPP link for user data transmission. This chapter describes the AT commands related to the Internet services. Services related to built-in protocol stacks are limited to physical ports.

13.1 AT^IPINIT–Initialize Embedded TCP/IP Service

13.1.1 Command Syntax

AT^IPINIT=<APN>[,<user_name>[,<password>[,<ip_addr>[,<auth_type>]]]]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPINIT?
Possible Response(s)
If initialized: <CR><LF>^IPINIT: <state>,<ip_addr>,<APN>,<pri_dns_address>,<sec_dns_address><CR><LF><CR><LF>OK<CR><LF> If not initialized: <CR><LF>^IPINIT: 0<CR><LF><CR><LF>OK<CR><LF>
AT^IPINIT=?
Possible Response(s)

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<CR><LF>^IPINIT: (list of supported
<state>s)<CR><LF><CR><LF>OK<CR><LF>

13.1.2 Interface Description

This command has the same dialing function as a modem.

This command configures basic parameters for dialing and establishes connections with networks. A local IP is obtained after the command is run. Only after network connections are established by running the AT^IPINIT command, you can perform further operations such as opening the TCP links and transmitting UDP data.

13.1.3 Parameter Description

<APN>: a string type value with quotation marks that indicates the access point name, with a maximum of 100 characters, as shown in the example. (If only comma is specified or no character is specified, it indicates that APN is null)

<user_name>: a string type value with quotation marks, with a maximum of 31 characters, which can be left out.

<password>: a string type value with quotation marks, with a maximum of 31 characters, which can be left out.

<ip_addr>: a string type value with quotation marks, with a maximum of 40 characters. This parameter can be set to a static IPv4 address by a request, and 3GPP2 does not support and set this parameter. However, an actual IPv4 address may be obtained for this parameter.

<auth_type>: indicates the authentication mode. CHAP authentication is defaulted. This parameter is not supported by 3GPP2 and is determined by negotiation between a module and the network.

0	No authentication
1	PAP authentication
2	CHAP authentication

<state>: indicates initialization completion identifier.

0	The network is not initialized, or network connection fails to be established.
1	Network connection is successfully established.

<pri_dns_address>: a string type value with quotation marks that indicates the IP address of the preferred DNS server.

<sec_dns_address>: a string type value with quotation marks that indicates the IP address of the alternate DNS server.

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13.1.4 Property Description

Saving upon Power-off	PIN
N	Y

13.1.5 Example

Run: `AT^IPINIT="1234"`

Response: `OK`

Run: `AT^IPINIT?`

Response:
```
^IPINIT:
1,"192.168.70.59","1234","172.22.44.200","172.22.
44.201"

OK
```

Run: `AT^IPINIT=?`

Response:
```
^IPINIT: (0-1)

OK
```

13.2 AT^IPOPEN–Open TCP/UDP Link

13.2.1 Command Syntax

AT^IPOPEN=<link_id>,<type>,<remote_addr>,<remote_port>[,<local_port>[,<username>,<password>]]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPOPEN?
Possible Response(s)

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If link has been open: <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>,<MSS>[...]]<CR><LF><CR><LF>OK<CR><LF> If link hasn't been open: <CR><LF>OK<CR><LF>
AT^IPOPEN=?
Possible Response(s)
<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>

13.2.2 Interface Description

This command establishes links with single or multiple remote servers using wireless modes. TCP, UDP, FTP and HTTP are supported.

13.2.3 Parameter Description

<link_id>: indicates link ID.

1–5	The range of link ID

<type>: a string type value with quotation marks that indicates the type of the link.

"TCP"	Establishing a TCP link.
"UDP"	Establishing a UDP link.
"FTP"	Establishing a FTP link.
"HTTP"	Establishing a HTTP link.
"FTPS"	Establishing a FTPS link.
"HTTPS"	Establishing a HTTPS link.

<remote_addr>: a remote object address that indicates either an IP string or a domain name string, with the maximum length of 255 characters, as shown in the example.

<remote_ip>: a string type value that indicates a remote IP address as shown in the example.

<remote_port>: an integer type value that indicates a remote port. The value ranges from 1 to 65535.

<local_port>: an integer type value that indicates a local transceiver port. The value ranges from 1 to 65535. This parameter is optional when the execution

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command is run. If users do not input this parameter, a terminal designates the local port number at random.

<username>: a string type value that indicates the user name used to log in to the FTP server, with the maximum length of 64 characters.

<password>: a string type value that indicates the password used to log in to the FTP server, with the maximum length of 64 characters.

<SIO_port>: indicates the physical port number bound with this link (the port for communication between a host-computer and the terminal). The value ranges from 0 to 10.

0	Reserved
1	Reserved
3	PCUI
4	UART 0
5	UART 1
6	CMUX1
7	CMUX2
8	CMUX3
9	CMUX4
10	Reserved

<MSS>: a TCP-type link that indicates the maximum length of the TCP packet segment negotiated with the peer end.

13.2.4 Property Description

Saving upon Power-off	PIN
N	Y

13.2.5 Example

- Establish consecutively three links:

```
Run:        AT^IPOPEN=1,"TCP","192.168.18.8",10000,9000
Response:   OK
Run:        AT^IPOPEN=2,"TCP","192.168.18.8",10000,8000
Response:   OK
Run:        AT^IPOPEN=3,"UDP","192.168.18.8",7000,6000
Response:   OK
```


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Run: AT^IPOPEN?

Response:
```
^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
```

- Establish one link using the URL mode:

Run: AT^IPOPEN=1,"TCP","www.huawei.com",80,3081

Response: OK

Run: AT^IPOPEN?

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

OK
```

13.3 AT^IPLISTEN–Configure TCP/UDP as a Server

13.3.1 Command Syntax

AT^IPLISTEN=<type>,<listen_port>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPLISTEN?
Possible Response(s)
<CR><LF>^IPLISTEN: <type>,<listen_port>,<idle_num><CR><LF><CR><LF>OK<CR><LF>
AT^IPLISTEN=?
Possible Response(s)
<CR><LF>^IPLISTEN: (list of supported <type>s),(list of supported <listen_port>s),(list of supported <idle_num>s)<CR><LF><CR><LF>OK<CR><LF>

13.3.2 Interface Description

This command enables listening function. At most 5 clients are supported.

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13.3.3 Parameter Description

<type>: a string type value with quotation marks that indicates the type of the link.

"TCP"	Establish a TCP link.
"UDP"	Establish a UDP link.

NOTE

If the listening function is not enabled, <type> in the read command response is a null string.

<listen_port>: an integer type value that indicates the local listening port. The value ranges from 1 to 65535.

NOTE

If the listening function is not enabled, <listen_port> in the read command response is 0.

<idle_num>: an integer type value that indicates the number of current idle links. The value ranges from 0 to 5.

13.3.4 Property Description

Saving upon Power-off	PIN
N	Y

13.3.5 Example

```
Run:        AT^IPLISTEN?
Response:   ^IPLISTEN: "",0,2

            OK
Run:        AT^IPLISTEN=?
Response:   ^IPLISTEN: ("TCP","UDP"),(1-65535),(0-5)

            OK
Run:        AT^IPLISTEN="TCP",12000
Response:   OK
Run:        AT^IPLISTEN?
Response:   ^IPLISTEN: "TCP",12000,2

            OK
```


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13.4 AT^IPSEND–Send TCP/UDP Data

13.4.1 Command Syntax

AT^IPSEND=<link_id>,<data>
Possible Response(s)
<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>
AT^IPSEND=?
Possible Response(s)
<CR><LF>OK<CR><LF>

13.4.2 Interface Description

This command sends user data based on established links. If the user data is sent to socket, OK is returned. Otherwise, an error message is returned.

13.4.3 Parameter Description

<link_id >: indicates the ID of established links. The value ranges from 1 to 5.

<data>: indicates user data. The maximum length of the user data that can be sent is 1500 bytes. The user data must be put in quotation marks.

NOTE

The content of user data only supports visible characters and quotation marks are not required. Users can use AT^IPSENDEX to obtain more functions.

13.4.4 Property Description

Saving upon Power-off	PIN
N	Y

13.4.5 Example

Run: AT^IPSEND=3,"ASDF"

Response: ^IPSEND: 3

OK

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13.5 ^IPDATA–Notificate Arrival Data

13.5.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^IPDATA: <link_id>,<data_len>,<data><CR><LF>

13.5.2 Interface Description

This command automatically reports data when the data arrives.

13.5.3 Parameter Description

<link_id>: indicates the number of established links. The value ranges from 1 to 5.

<data_len>: an integer type value that indicates the length of data. The value ranges from 1 to 1500.

<data>: a character string value indicates newly received data information, and contains any characters without quotation marks.

13.5.4 Property Description

Saving upon Power-off	PIN
N	NA

13.5.5 Example

Response:
```
^IPDATA:
1,71,12345678123456123456723456723456723467823478
34782345678234678903489034
```

13.6 AT^IPCLOSE–Close TCP/UDP Link

13.6.1 Command Syntax

AT^IPCLOSE=<link_id>
Possible Response(s)
<CR><LF>OK<CR><LF>

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In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPCLOSE?
Possible Response(s)
<CR><LF>^IPCLOSE: <link1_state>,<link2_state>,<link3_state>,<link4_state>,<link5_state><CR><LF><CR><LF>OK<CR><LF>
AT^IPCLOSE=?
Possible Response(s)
<CR><LF>^IPCLOSE: (list of supported <link_id>s)<CR><LF><CR><LF>OK<CR><LF>

13.6.2 Interface Description

This command closes links, disables the server's listening function, or closes radio network connections.

- When <link_id> is any of 1 to 5, the link corresponding to the link ID is closed.
- When <link_id> is 6, the server's listening function is disabled and connections with the server are closed.
- When <link_id> is 7, the radio network connections are closed. If a link's or the server's listening function is available, the function is also disabled.

13.6.3 Parameter Description

<link_id>: indicates link ID. The value ranges from 1 to 7.

1–5	The number of established links.
6	A local server and established links with the server.
7	Closed radio network connections.

<linkx_state>: indicates the state of link x.

0	The link is closed and can be used.
1	The link is open and in use.

13.6.4 Property Description

Saving upon Power-off	PIN
N	Y

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13.6.5 Example

Run: AT^IPCLOSE?

Response: ^IPCLOSE: 1,1,0,0,0

OK

Run: AT^IPCLOSE=1

Response: OK

Run: AT^IPCLOSE?

Response: ^IPCLOSE: 0,1,0,0,0

OK

13.7 AT^IPENTRANS–Enable Transparent Transfer Mode

13.7.1 Command Syntax

AT^IPENTRANS=<link_id>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPENTRANS?
Possible Response(s)
<CR><LF>^IPENTRANS: <link_id><CR><LF><CR><LF>OK<CR><LF> When no transparent transmission link exists: <CR><LF>OK<CR><LF>

13.7.2 Interface Description

This command transfers the command mode of a physical port where a link locates to data mode. In data mode, all the data input except the +++ command for exiting the data mode is transmitted as user data. This command returns OK if it runs successfully, and then the user can receive and send data in data mode.

If a user enters three consecutive signs (+++), the physical port exists the transparent transmission mode.

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Requirements of the three consecutive plus signs are detected as follows: No data is input 900 ms before the three consecutive plus signs are entered. The time interval between two '+' input must be less than 900 ms. No other data is required 900 ms after the third plus sign is entered.

The twelfth parameter of the `AT^IPCFL` command sets the transparent transmission mode of a UDP link to mode 0 or mode 1.

In mode 0, the module sends any data from the host computer to socket as user data, and determines delay and timing of the assembled data packets and data packet sending length based on parameters 5 and 11 of IPCFL.

In mode 0, data is sent as follows:

- If the length of the data received from the host computer reaches the data packet sending length, the module sends the data to socket and continues to process the data.
- If the length of the rest data received from the host computer does not reach the data packet sending length, the module starts or resets the packet delay timer.
- If the timer expires, the module sends the rest data to socket.
- If the module receives new data from the host computer when the packet delay timer is running, repeat steps 1 to 3.

In mode 1, the host computer needs to add the 0x7E end character for each data packet of the user data. If the module detects 0x7E, the module considers that a data packet ends and then sends it to socket. Therefore, end characters of the user data need to be escaped. That is, the host computer needs to check all the user data and convert their end characters. The module then escapes the converted end characters to the original characters and sends the original characters to socket.

The escape rule of the user data to be sent is as follows: The 0x7E end characters contained in the user data are escaped as the 0x7D 0x5E end characters. The 0x7D end characters contained in the user data are escaped as the 0x7D 0x5D end characters.

At the same time, the host computer needs to process the data received from the module. The host computer escapes the 0x7D 0x5E end characters to the 0x7E end characters, and escapes the 0x7D 0x5D end characters to the 0x7D end characters. The 0x7E end characters indicate the end of a UDP packet and are not the actual user data. Mode 0 is applicable to sending and receiving data packets with an invariable length over a UDP link. Mode 1 is applicable to sending and receiving data packets with a variable length.

13.7.3 Parameter Description

`<link_id>`: indicates link number for entering the transparent transmission mode.

13.7.4 Property Description

Saving upon Power-off	PIN
N	Y

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13.7.5 Example

Run:	AT^IPENTRANS=1	
Response:	OK	Now the remote end receives any characters entered by the user.

13.8 AT^IPSENDEX–Send and Expand TCP/UDP Data

13.8.1 Command Syntax

If <mode>=0 or <mode>=1: AT^IPSENDEX=<link_id>,<mode>,<data> If <mode>=2: AT^IPSENDEX=<link_id>,<mode>,<len>[,<eof>]<CR>entered data
Possible Response(s)
<CR><LF>^IPSENDEX: <link_id><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPSENDEX=?
Possible Response(s)
<CR><LF>^IPSENDEX: (list of supported <link_id>s),(list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

13.8.2 Interface Description

This command sends the user data based on established links. Among three data sending modes available, mode 2 is recommended.

- Mode 0 is compatible with the AT^IPSEND functions backwards.
- Mode 1 is a mandatory data conversion mode. In this mode, the original data requested by a user to be sent must be converted from hexadecimal digits to character strings. After the character strings are converted to the original data, the module sends the original data to the peer. For example, the user can enter the AT^IPSENDEX=1,1,"01081B2C" command to send the quartet data: 0x01, 0x08, 0x1B, and 0x2C. The receiving end will receive the quartet data.
- Mode 2 is a length-limited full-character mode. In this mode, the user sends a command to notify the module of the length of the data to be sent first. After the module returns OK, the user enters data until the data length reaches the requested length.

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NOTE

- If the length of the input data is less than the expected length, the module waits for the user to enter the rest data.
- If the length of the input data is greater than the requested length, an error is returned.

13.8.3 Parameter Description

<link_id>: indicates the ID of established links. The value ranges from 1 to 5.

<mode>:

0	Compatible with AT^IPSEND
1	Mandatory data conversion mode
2	Length-limited full-character mode

<data>: indicates user data with quotation marks. The maximum length of the user data is 1500 characters in both mode 0 and mode 1.

<len>: indicates the maximum length of the data requested by a user to be sent, which cannot exceed 1500 characters.

<eof>: indicates the end of the user data during FTP put.

0	Data is pending.
1	End of file or data.

NOTE

It is suggested that the user data be sent over a TCP link with the <MSS> value being the maximum length. Otherwise extra packets are generated, affecting the transmission rate. For example, if the <MSS> value is 1460, 1460 characters are recommended for the maximum length of <len>.

13.8.4 Property Description

Saving upon Power-off	PIN
N	Y

13.8.5 Example

Run: AT^IPSENDEX=1,1,"393830"

Response: ^IPSENDEX: 1

OK

Run: AT^IPSENDEX=1,2,3

Response: OK

Input: input user data

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Response: ^IPSENDEX: 1

OK

Run: AT^IPSENDEX=1,2,1500,0

Response: OK

Input: input user data

Response: ^IPSENDEX: 1

OK

Run: AT^IPSENDEX=1,2,500,1

Response: OK

Input: input user data

Response: ^IPSENDEX: 1

OK

13.9 AT^IPFLOWQ–Request and Clear TCP/UDP Link Data Packet Statistics

13.9.1 Command Syntax

AT^IPFLOWQ[=<link_id>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPFLOWQ?
Possible Response(s)
<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>
AT^IPFLOWQ=?
Possible Response(s)

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```
<CR><LF>^IPFLOWQ: (list of supported
<link_id>s)<CR><LF><CR><LF>OK<CR><LF>
```

13.9.2 Interface Description

When data is sent over a TCP link, the peer end, if it receives the data, sends ACK to the sending end. After the ME receives the ACK from the peer end, the ME confirms that the data is successfully sent.

No ACK is required when data is received or sent over a UDP link. Only the sums of the data packets sent to and received from the peer end are recorded.

The set command clears the data packet statistics of the designated TCP/UDP link, including:

- Uplink: the sum of the data packets received from the host computer, and the sum of the data packets sent to socket, the sum of the confirmed data packets.
- Downlink: the sum of data packets received from socket and the sum of data packets sent to the host computer

The read command queries the data packet statistics of all current TCP/UDP links.

The test command returns the sequence number of the supported TCP/UDP link.

13.9.3 Parameter Description

<link_id>: an integer type value that indicates the TCP/UDP sequence number.

0	Indicate clearing the statistics of all TCP links.
1–5	Indicate the link number of the statistics to be cleared.

<TX_FROM_USER>: indicates the sum of the statistics received from the host computer. The maximum value is 2^{32}-1 bytes.

<TX_TO_SOCKET>: indicates the sum of the statistics sent to socket. The maximum value is 2^{32}-1 bytes.

<TX_ACK_SUM>: indicates the sum of statistics that is acknowledged to be received over a TCP link. This value should not exceed the current <send_sum>. This parameter is not supported in the UDP protocol, and an invariable value 0 is reported. The maximum value is 2^{32}-1 bytes.

<RX_FROM_SOCKET>: indicates the sum of the statistics received from socket. The maximum value is 2^{32}-1 bytes.

<RX_TO_USER>: indicates the sum of the statistics sent to the host computer. The maximum value is 2^{32}-1 bytes.

13.9.4 Property Description

Saving upon Power-off	PIN
N	Y

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13.9.5 Example

None

13.10 ^IPSTATE–Indicate TCP/UDP Data Link State

13.10.1 Command Syntax

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

13.10.2 Interface Description

This command is used by the module to notify the host computer of the current link information and state when the TCP/UDP link state changes.

13.10.3 Parameter Description

<link_id>: indicates TCP/UDP link ID.

0	An illegal ID
1–5	ID of established links
6	Local server
7	Network connection

<state>: indicates link state.

0	The link is closed.
1	The link is established.
2–255:	Reserved

<errcode>: indicates error message.

0	The peer end closes the link.
1	The server receives a new link.
2	A network error occurs.
3	The supported link reaches the threshold.
4	The server rejects new connections in the transparent transmission mode.

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5–254	Reserved
255	No error

13.10.4 Property Description

Saving upon Power-off	PIN
N	NA

13.10.5 Example

After the ME establishes the 1 TCP link, the server delivers a normal command to disconnect the link, and the module notifies the host computer of the disconnection.

Response: `^IPSTATE: 1,0,0`

13.11 AT^IPCFL–Configure TCP/UDP Static Parameters

13.11.1 Command Syntax

`AT^IPCFL=<parameter_id>,<value>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT^IPCFL?`
Possible Response(s)
<CR><LF>`^IPCFL: <parameter_id>,<value>`[<CR><LF>`^IPCFL: <parameter_id>,<value>`[...]]<CR><LF><CR><LF>`OK`<CR><LF>
`AT^IPCFL=?`
Possible Response(s)
<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>

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13.11.2 Interface Description

This command configures static parameters related to IPStack, including the sending delay timer, the maximum packet length during transparent transmission, and the selection of the transparent transmission mode.

The set command sets one parameter at a time. The user needs to enter parameter ID and the corresponding value.

The read command queries the supported parameters and their corresponding values. Parameters that are not supported by the terminal are not returned.

The test command returns the value range corresponding to the supported parameters.

13.11.3 Parameter Description

<parameter_id>	Range of <value> (Unit)	Description
5	1–100 (0.1s) (10 by default)	Specifies the value of the timer for the transparent transmission.
10	1–1472 (byte) (1024 by default)	Specifies the length of the TCP/UDP data packet for packet sending.
12	0–1 (0 by default)	For selecting the transparent transmission mode, see the description of `AT^IPENTRANS`.
13	0–1 (0 by default)	0: The FTP/HTTP file data obtained from the server is transparently reported and forwarded to the user. 1: The FTP/HTTP file data obtained from the server adds the 0x7E end character and forwards to the user. (not supported currently)
14	0–2 (0 by default)	0: the transparent transmission mode 1: the command mode 2: the get buffer transmission mode

13.11.4 Property Description

Saving upon Power-off	PIN
N	Y

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13.11.5 Example

Set the time of the assembled data packet timer to 0.2s during the transparent transmission.

Run: `AT^IPCFL=5,2`

Response: `OK`

13.12 AT^FTPCMD–Create File Transfer Service

13.12.1 Command Syntax

`AT^FTPCMD=<link_id>,<ftp_cmd>[,<filename>]`
Possible Response(s)
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>
`AT^FTPCMD=?`
Possible Response(s)
<CR><LF>`^FTPCMD:` (list of supported `<link_id>`s),(list of supported `<ftp_cmd>`s)<CR><LF><CR><LF>`OK`<CR><LF>

13.12.2 Interface 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.

13.12.3 Parameter Description

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

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<ftp_cmd>: indicates the type of the FTP service. The value is a character string without quotation marks ("").

GET	FTP downloads data
PUT	FTP uploads data
PASV	Establish data connection in PASV mode. (default value)
PORT	Establish data connection in PORT mode.
FILESIZE	Gets the specified file size.

<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.

13.12.4 Property Description

Saving upon Power-off	PIN
N	Y

13.12.5 Example

- Configure the connection mode for downloading data. (In the following examples, the link ID of the FTP link is 1).

Run: `AT^FTPCMD=1,PORT`

Response: `OK`

- Download the file (test.txt). The content of the file is "ftp test".

Run: `AT^FTPCMD=1,GET,"test.txt"`

Response:
```
CONNECT
ftp test!

OK
```

- Query the range of the parameters supported by AT^FTPCMD.

Run: `AT^FTPCMD=?`

Response:
```
^FTPCMD:
(1-5),("GET","PUT","PORT","PASV","FILESIZE")

OK
```


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13.13 AT^HTTPCMD–Command for HTTP Data Service

13.13.1 Command Syntax

AT^HTTPCMD=<http_linkID>,<http_cmd>,<http_data_path>[,<http_data_length>[,<http_data_type>]]
Possible Response(s)
If in the transparent transmission mode: <CR><LF>CONNECT<CR><LF><http data content><CR><LF>OK<CR><LF> If in the command transmission mode: <CR><LF>OK<CR><LF> In the case of an error during command execution: <CR><LF>ERROR<CR><LF> or <CR><LF>CONNECT<CR><LF><http data content><CR><LF>ERROR<CR><LF>
AT^HTTPCMD=?
Possible Response(s)
<CR><LF>^HTTPCMD: (list of supported <http_linkID>s),(list of supported <http_cmd>s)<CR><LF><CR><LF>OK<CR><LF>

13.13.2 Interface Description

After HTTP service is established, this command is used for data services using HTTP protocol.

13.13.3 Parameter Description

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

<http_cmd>: a character string without quotation marks that indicates HTTP service types.

GET	HTTP GET request
POST	HTTP POST request

<http_data_path>: a character string. The parameter consists of a URL, whose format is as follows: <protocol>://<host>:<port>/<path>.

<http_data_length>: indicates the length of HTTP POST data.

<http_data_type>: indicate the type of HTTP POST data. If <http_data_type> is not specified, the default value is "text/plain".

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NOTE

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

13.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

13.13.5 Example

Run: AT^HTTPCMD=?

Response: ^HTTPCMD: (1-5),("GET","POST")

OK

13.14 ^IPSRVST–Unsolicitedly Report the Socket Service State

13.14.1 Command Syntax

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

13.14.2 Interface Description

This command reports 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.

13.14.3 Parameter Description

<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	FTP service, indicating the data transmission state.

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12	HTTP service event
13–255	Reserved

<state_code>: indicates the state information.

<state_type>	<state_code>	Meaning
0–9	Reserved	Reserved.
10	100	The server does not respond.
	110	Restart the marker reply.
	120	Get prepared in n minutes.
	125	The connection is open. Prepare to transmit data.
	150	Open data connection.
	200	The command succeeds.
	202	The command fails.
	211	System status.
	212	Directory status.
	213	File status.
	214	Help information.
	215	Name system type.
	220	The new user service is ready.
	221	Close the control connection of a specified service. The user can log out.
	225	The data connection is open, and no transmission is in process.
	226	Lose 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.

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<state_type>	<state_code>	Meaning
	421	Services cannot be provided. Close the control connection.
	425	Fail to open the data connection.
	426	Close the connection and terminate the transmission.
	450	The requested file operation is not executed.
	451	Terminate the requested operation: a local error occurs.
	452	The requested operation is not executed: insufficient system storage space.
	500	The command is unable to identify because of incorrect format.
	501	Syntax error.
	502	Command not executed.
	503	Command sequence error.
	504	The command specifying the parameter is not executed.
	530	Users do not log in.
	532	Account information is required for file storage.
	550	The requested operation is not executed.
	551	The requested operation is terminated: unknown page type.
	552	The requested file operation is terminated: storage space exceeded.
	553	The requested operation is not executed: invalid file name.
	600	Unknown error.
11	0	Data transmission is failed.
	1	Data transmission is completed.
12	200	The requested operation succeeds.
	400	The requested operation is not understood by the server.
	401	User name and password are required for the requested page.
	-	List the general responses. For the details, you can see HTTP 1.1 protocol.

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<state_type>	<state_code>	Meaning
13–255	Reserved	Reserved

13.14.4 Property Description

Saving upon Power-off	PIN
NA	NA

13.14.5 Example

- An FTP user is successfully logged in to an FTP.

Run: `AT^IPOPEN=1,"FTP","192.168.44.4",21,,"loader","loader"`

Response:
```
OK

^IPSRVST: 1,10,230
```

- FTP data transmission succeeds.

Run: `AT^FTPCMD=1,GET,"test.txt"`

Response:
```
CONNECT
ftp test!

OK

^IPSRVST: 1,11,1
```

13.15 AT^IPRCV–Read Network Service Data

13.15.1 Command Syntax

AT^IPRCV=<link_id>,<reqReceiveLength>
Possible Response(s)

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• 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 MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPRCV=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

13.15.2 Interface Description

This command reads data out from the service buffer.

13.15.3 Parameter Description

<link_id>: link number

1–5	The expression has established link number.

<reqReceiveLength>: an integer type 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.

13.15.4 Property Description

Saving upon Power-off	PIN
N	Y

13.15.5 Example

Precondition: The data service connection has been established and successfully enabled, and there is data in the buffer.

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Run: `AT^IPRCV=1,25`

Response: `^IPRCV: 1,25`
Message is here.

`OK`

13.16 ^IPRCVST–Unsolicitedly Report Data Arrival in Data Receive Buffer

13.16.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^IPRCVST: <link_id>,<urcCauseid><CR><LF>

13.16.2 Interface Description

The command notifies unsolicited reports to the user by indicating the data arrival in data receive buffer.

13.16.3 Parameter Description

<link_id>: link number, the value ranges from 1 to 5.

<urcCauseid>: indicates whether there is data to be read.

1 Indicates that data is available and can be read by sending the AT^IPRCV command.

13.16.4 Property Description

Saving upon Power-off	PIN
N	NA

13.16.5 Example

NOTE

If the buffer is not read or queried by the AT^IPRCV command when data is available, no report will be submitted to the upper layer when new data arrives.

Response: `^IPRCVST: 1,1`

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13.17 AT^SSLEN–Initialize Secure Service

13.17.1 Command Syntax

AT^SSLEN=<SSL_id>,<Enable>[,<encode_ok>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^SSLEN?
Possible Response(s)
<CR><LF>^SSLEN: <SSL_id>,<Enable>,<encode_ok>,<Target_IP_addr><CR><LF><CR><LF>OK<CR><LF>
AT^SSLEN=?
Possible Response(s)
<CR><LF>^SSLEN: (list of supported <SSL_id>s),(list of supported <Enable>s),(list of supported <encode_ok>s)<CR><LF><CR><LF>OK<CR><LF>

13.17.2 Interface Description

This command enables or disables secure or normal socket.

The read command obtains the current values of parameters and the target IP address.

The test command obtains the SSL enable command capabilities.

13.17.3 Parameter Description

<SSL_id>: SSL socket ID.

0	Normal socket connection
1	Secure socket connection

<Enable>: enable flag.

0	Disable socket
1	Enable socket

<encode_ok>: encode type for SSLRX and SSLTX commands.

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0	No encoded (ASCII format) data shall be taken by AT^SSLTX command and plain data shall be displayed on "Tera term" for AT^SSLRX.
1	Base 64 encoded format data shall be taken by AT^SSLTX command and displayed on "Tera term" for AT^SSLRX. (default value)

NOTE

- AT^SSLEN command would also automatically load the existing certificates stored in file system when it is in proper PEM format. But it will not show any error while loading during SSLEN when the certificate is not in proper format.
- Only first 10 certificates will be loaded for CA certificates. If more than one client certificates are available in the file system, then users need to load the corresponding certificate by using AT^SSLMNG command with the <action> as 2 (read/load data) to succeed the hand shake during socket open.

13.17.4 Property Description

Saving upon Power-off	PIN
N	Y

13.17.5 Example

Preconditions:

- The network connection and wireless network connection are supported by the targets.

```
Run:        AT^SSLEN=1,1,1
Response:   OK
Run:        AT^SSLEN?
Response:   ^SSLEN: 1,1,1,"192.168.70.59"

            OK
Run:        AT^SSLEN=?
Response:   ^SSLEN: (0-1),(0-1),(0-1)

            OK
```

- The SSL is not enabled:

```
Run:        AT^SSLEN?
Response:   ^SSLEN: 1,0,1,"0.0.0.0"

            OK
```


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13.18 AT^SSLCFG–Configurate SSL

13.18.1 Command Syntax

AT^SSLCFG=<SSL_id>,<Timeout>[,<cipher_suite>,<scur_level>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^SSLCFG?
Possible Response(s)
<CR><LF>^SSLCFG: <SSL_id>,<Timeout>,<cipher_suite>,<scur_level><CR><LF><CR><LF>OK<CR><LF>
AT^SSLCFG=?
Possible Response(s)
<CR><LF>^SSLCFG: (list of supported <SSL_id>s),(list of supported <Timeout>s),(list of supported <cipher_suite>s),(list of supported <scur_level>s)<CR><LF><CR><LF>OK<CR><LF>

13.18.2 Interface Description

This command configures the properties of secure socket.

The read command obtains the current values of the parameters.

The test command gets the AT^SSLCFG command capabilities.

13.18.3 Parameter Description

<SSL_id>: an integer type value indicates the SSL socket ID.

1 Secure socket connection

<Timeout>: an integer type value indicates the maximum blocking timeout for Rx and Tx operations, unit: seconds. The value ranges from 1 to 60. The default value is 60.

<ciphers_suit>: all the available cipher suites supported by SSL are proposed to the server. It is responsibility of the remote server to select one of them. When all the available cipher suites supported by SSL are proposed to the server, the value of the <ciphers_suit> is 0. The value ranges from 0 to 15.

The table below is the supported Cipher Suite List **(Currently Supported 15 Cipher Suites):**

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Value	Cipher_suites
0	All supported Ciphers (default value)
1	TLS_RSA_WITH_RC4_128_SHA
2	TLS_RSA_WITH_RC4_128_MD5
3	TLS_RSA_WITH_NULL_SHA
4	TLS_RSA_WITH_NULL_SHA256
5	TLS_RSA_WITH_AES_256_CBC_SHA
6	TLS_RSA_WITH_AES_128_CBC_SHA
7	TLS_RSA_WITH_AES_128_CBC_SHA256
8	TLS_RSA_WITH_AES_256_CBC_SHA256
9	TLS_RSA_WITH_3DES_EDE_CBC_SHA
10	TLS_DHE_RSA_WITH_AES_256_CBC_SHA
11	TLS_DHE_RSA_WITH_AES_128_CBC_SHA
12	TLS_DHE_RSA_WITH_AES_128_CBC_SHA256
13	TLS_DHE_RSA_WITH_AES_256_CBC_SHA256
14	SSL_RSA_WITH_RC4_128_SHA
15	SSL_RSA_WITH_RC4_128_MD5

The client sends all supported algorithms to the server, and the server chooses one from them.

<scur_level>: authentication mode.

0 Not authorized (default value)

1 Server side authentication.

2 Server & client both sides are authorized.

NOTE

We can ignore any of the optional parameters by giving only comma ",". In this case, it will take the default values for the corresponding optional parameters.

13.18.4 Property Description

Saving upon Power-off	PIN
N	Y

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13.18.5 Example

Preconditions: The secure socket is enabled by using AT^SSLEN command.

Run: AT^SSLCFG=1,60,1,1

Response: OK

Run: AT^SSLCFG?

Response: ^SSLCFG: 1,60,1,1

OK

Run: AT^SSLCFG=?

Response: ^SSLCFG: (1),(1-60),(0-15),(0-2)

OK

13.19 AT^SSLMNG–Manage Certificate or Key

13.19.1 Command Syntax

AT^SSLMNG=<SSL_id>,<data_type>,<action>,<file_name>[,<package_id>,<total_no_of_packages>,<cert_info>][,<password>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^SSLMNG?
Possible Response(s)
<CR><LF>^SSLMNG: [<data_type>,<file_name>[...]<CR><LF>][<data_type>,<action>,<file_name>[,<package_id>,<total_no_if_packages>]<CR><LF>]<CR><LF>OK<CR><LF> If no certificate is present: <CR><LF>OK<CR><LF>
AT^SSLMNG=?
Possible Response(s)

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<CR><LF>^SSLMNG: (list of supported <SSL_id>s),(list of supported <data_type>s),(list of supported <action>s),,(list of supported <package_id>s),(list of supported <total_no_of_packages>s),,<CR><LF><CR><LF>OK<CR><LF>

13.19.2 Interface Description

This command manages certificates and other security data like private key.

Brief information about AT^SSLMNG command:

- Certificates MUST be in PEM format.
- For large size of certificate (greater than 1024 bytes), we have to break the certificate data into packages and maximum size of each package is 1024 bytes.
- Each package should have the unique identification number (1–10).
- We are supported upto 10 kb (10 * 1024) size.
- We can give the packages by any order in AT^SSLMNG command.

Example:

```
AT^SSLMNG=1,1,0,"ca_cert2.pem",1,1,"SHVhd2VpIFRlY2hub2xvZ2llcy
BDby4sIEx0ZC4="

OK
```

- After giving all the packages, the SSLMNG will integrate all the packages and do the Base 64 decoding and finally store/delete/load the file into/from file system.
- If we face any error in any one of the package, then all previously received packages will be cleared.
- If we start to execute any of the SSLMNG operation with multiple packages, before completing that operation (before giving all the packages), we cannot execute any other operation in AT^SSLMNG.

The read command obtains the name of files (certificates) stored in file system. When the module is powered off and reset, the last operation of SSLMNG will not be saved. When the certificate is not completely stored, the return of AT^SSLMNG? will not contain the file name of certificate and key.

The test command obtains the SSL manage command capability.

NOTE

Only the following encryption types are supported for password protected encrypted certificates.

1. DES-CBC
2. DES-EDE3-CBC
3. AES-128-CBC
4. AES-192-CBC
5. AES-256-CBC

13.19.3 Parameter Description

<SSL_id>: an integer type value indicates SSL socket ID.

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1	Secure socket connection

<data_type>: an integer type value indicates the certificate or key to be stored.

0	Certificate of the client (module). It is needed when the Server or Client authentication mode has been configured.
1	Root CA certificate of the remote server, it is used to authenticate the remote server. It is needed when <scur_level> of AT^SSLCFG is set to 1 or 2.
2	RSA private key of the client (module). It is needed if the Server or Client authentication mode has been configured.

<action>:

0	Store certificate
1	Delete certificate
2	Load certificate

<file_name>: the file name for "". The maximum length of the file name is 254.

<package_id>: package identification number (1–10).

<total_no_of_packages>: total number of packages after splitting the Base 64 encoded format certificate data of each package of size maximum of 1024 bytes (1–10).

<cert_info>: a string type indicates broken certificate package (converted into Base 64 encoded format before splitting the package) data (1–1024 bytes).

<password>: a string type indicates password for Private Key (4–80 bytes) plain text.

NOTE

- <package_id>, <total_no_of_packages> and <cert_info> are optional if <action> is 1 or 2.
- <password> is applicable only if <action> is 2 and when loading the private key with password.
- It is not required to give the password in every package, but the last package must contains the correct password.

<list_of_file_names>: the name of the files stored in file system.

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NOTE

- On "Delete" action, currently we are deleting certificate from file system only. To delete from SSL library context, socket needs to be disabled and re-enabled again.
- Before loading client private key, the users need to load the corresponding certificate by using `AT^SSLMNG` command with the `<action>` as 2 (read data) to succeed the hand shake during socket open.
- `AT^SSLMNG` for action 0 (store data) can store a maximum of 10 certificates (10 each for ca-cert, client cert and client key) in file system beyond which it would display error "Certificate maximum limit reached".
- `AT^SSLMNG` query command would display first 10 certificates stored in file system for each type (CA, Client, Private Key) of certificates.
- Usage of `<password>` parameter is applicable in case of "Load" of "Private Key" during client authentication and it is required to set the password if the private key is encrypted. So this password parameter is an optional parameter.

13.19.4 Property Description

Saving upon Power-off	PIN
N	Y

13.19.5 Example

- Certificate store case (`<package_id>`, `<total_no_of_packages>` and `<cert_info>` are mandatory).

Run: `AT^SSLMNG=1,1,2,"ca_cert2.pem",1,1,"SHVhd2VpIFRlY2hub2xvZ2llcyBDby4sIEx0ZC4="`

Response: `OK`

- Certificate delete case (`<file_name>` is mandatory and [`<package_id>`,`<total_no_of_packages>`,`<cert_info>`] are optional)

Run: `AT^SSLMNG=1,1,1,"ca_cert2.pem"`

Response: `OK`

NOTE

In this example, buffer is not passed. If the file with the specified name exists, certificates are deleted by file name. Otherwise, an error is returned.

- Certificate delete case (`<file_name>` is mandatory and [`<package_id>`,`<total_no_of_packages>`,`<cert_info>`] are optional for delete case)

Run: `AT^SSLMNG=1,1,1,"ca_cert2.pem",1,1,"SHVhd2VpIFRlY2hub2xvZ2llcyBDby4sIEx0ZC4="`

Response: `OK`

NOTE

In this example, both filename and buffer are passed. So we delete the certificate if both file data and buffer matches, else display Error.

Preconditions: the secure socket is enabled by using `AT^SSLEN` command.

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- Certificate load/read case (<file_name> is mandatory and [<package_id>,<total_no_of_packages>,<cert_info>] are optional)

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem"

Response: OK

NOTE

In this example, buffer is not passed. So we load the certificate using the file name passed from file system if present, else display Error.

- Certificate load/read case (<file_name> is mandatory and [<package_id>, <total_no_of_packages>, <cert_info>] are optional)

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",1,1,"sHVhd2VpIFRlY2hub2xvZ2llcyBDby4sIEx0ZC4="

Response: OK

- Private key case (<package_id>,<total_no_of_packages>,<cert_info> are mandatory and <password> is mandatory only if the private key is generated with password).

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",1,1,"sHVhd2VpIFRlY2hub2xvZ2llcyBDby4sIEx0ZC4=","huaweim2m"

Response: OK

NOTE

Error message will be shown on trying to store the private key with password as it's allowed only while loading the private key.

- After device reset or before any SSLMNG operation is done and if no certificates are presented.

Run: AT^SSLMNG?

Response: ^SSLMNG:

OK

- After device reset or before any SSLMNG operation is done and if certificates are presented.

Run: AT^SSLMNG?

Response: ^SSLMNG:
1,ca-cert.pem
0,client-cert.pem
2,client-key.pem

OK

- The SSLMNG operation is performed before.

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",1,1,"sHVhd2VpIFRlY2hub2xvZ2llcyBDby4sIEx0ZC4="

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Response: OK

Run: AT^SSLMNG?

Response:
```
^SSLMNG:
1,ca-cert.pem
0,client-cert.pem
2,client-key.pem
1,2,"ca_cert2.pem",1,2

OK
```

Run: AT^SSLMNG=?

Response:
```
^SSLMNG: (1),(0-2),(0-2),,(1-10),(1-10),,

OK
```

13.20 AT^SSLO–Open Secure or Normal Socket

13.20.1 Command Syntax

AT^SSLO=<SSL_id>,<remote_IP>,<remote_port>[,<mode>,<TimeOut>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^SSLO?
Possible Response(s)
If link has been open: <CR><LF>^SSLO: <SSL_id>,<remote_ip>,<remote_port>,<mode>,<Timeout><CR><LF><CR><LF>OK<CR><LF> If the link hasn't been opened: <CR><LF>OK<CR><LF>
AT^SSLO=?
Possible Response(s)
<CR><LF>^SSLO: (list of supported <SSL_id>s),,(list of supported <remote_port>s),(list of supported <mode>s),(list of supported <Timeout>s)<CR><LF><CR><LF>OK<CR><LF>

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13.20.2 Interface Description

This command creates and opens a secure/normal socket.

The read command obtains the current values of parameters.

The test command obtains the socket open command capability.

13.20.3 Parameter Description

<SSL_id>: an integer type value indicates the SSL socket ID.

0	Normal socket connection
1	Secure socket connection

<remote_ip>: a string type indicates long-distance IP address, IP or hostname of the server. The maximum length is 255 characters.

<remote_port>: long-distance port, the value ranges from 1 to 65535; remote port of the server (usually 443).

<mode>: async mode (optional). The value ranges from 0 to 1.

0	Sync Mode (default value)
1	Async Mode

- For Sync mode, data will be received in synchronous mode. If run AT^SSLRX command, then it will receive the data from server.
- For Async mode, data will be received in asynchronous mode (i.e.) whenever data is available in the server, it will be received automatically.

<TimeOut>: timeout value in seconds and it is optional. The value ranges from 60 to 180 seconds and the default value is 90 seconds.

The timeout mentioned while running AT^SSLO command denotes the time taken for connection of TCP socket. A minimal additional time is also required for handshake and resolving of hostname from DNS server for execution of AT^SSLO command.

13.20.4 Property Description

Saving upon Power-off	PIN
N	Y

13.20.5 Example

Preconditions: the secure socket is enabled by using AT^SSLEN command.

Run: `AT^SSLO=1,"192.168.63.155",443,1,60`

Response: `OK`

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Run: AT^SSLO=1,"www.huawei.com",443,1,90

Response: OK

Run: AT^SSLO?

Response: ^SSLO: 1,"192.168.63.155",443,1,60

OK

Run: AT^SSLO=?

Response: ^SSLO: (0-1),,(1-65535),(0-1),(60-180)

OK

13.21 AT^SSLC–Close Socket

13.21.1 Command Syntax

AT^SSLC=<SSL_id>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^SSLC=?
Possible Response(s)
<CR><LF>^SSLC: (list of supported <SSL_id>s)<CR><LF><CR><LF>OK<CR><LF>

13.21.2 Interface Description

This command turns off a secure socket. It will also turn off the normal socket.

The test command obtains the SSL close command capability.

13.21.3 Parameter Description

<SSL_id>: an integer type value indicates the SSL socket ID.

0	Normal socket connection
1	Secure socket connection

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13.21.4 Property Description

Saving upon Power-off	PIN
N	Y

13.21.5 Example

Preconditions: the connection is opened by using `AT^SSLO` command.

Run: `AT^SSLC=1`

Response: `OK`

Run: `AT^SSLC=0`

Response: `OK`

Run: `AT^SSLC=?`

Response: `^SSLC: (0-1)`

`OK`

13.22 AT^SSLSTAT–Query SSL Status

13.22.1 Command Syntax

`AT^SSLSTAT=<SSL_id>`
Possible Response(s)
<CR><LF>`^SSLSTAT: <conn_state>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT^SSLSTAT=?`
Possible Response(s)
<CR><LF>`^SSLSTAT: (`list of supported `<SSL_id>`s`)`<CR><LF><CR><LF>OK`<CR><LF>

13.22.2 Interface Description

This command queries the status of the secure or normal socket.

The test command gets the current support SSL query capabilities.

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13.22.3 Parameter Description

<SSL_id>: an integer type value indicates the SSL socket ID.

0	Normal socket connection
1	Secure socket connection

<conn_state>:

1	Normal connection is opened
2	Normal connection is closed
3	Secure connection is opened
4	Secure connection is closed

13.22.4 Property Description

Saving upon Power-off	PIN
N	Y

13.22.5 Example

Preconditions: the socket is enabled by using AT^SSLEN command.

- The socket connection is established.

```
Run:        AT^SSLSTAT=1
Response:   ^SSLSTAT: Secure connection opened

            OK
```

- The socket connection is not established.

```
Run:        AT^SSLSTAT=1
Response:   ^SSLSTAT: Secure connection not opened

            OK
Run:        AT^SSLSTAT=?
Response:   ^SSLSTAT: (0-1)

            OK
```


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13.23 AT^SSLRX–Receive Data

13.23.1 Command Syntax

AT^SSLRX=<SSL_id>,<Maxlength>[,<TimeOut>]
Possible Response(s)
<CR><LF>^SSLRX: <LengthOfRec><CR><LF><Received_data><CR><LF><CR><LF>OK<CR><LF> If no data received: <CR><LF>^SSLRX: 0<CR><LF>TIMEOUT<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^SSLRX=?
Possible Response(s)
<CR><LF>^SSLRX: (list of supported <SSL_id>s),(list of supported range <MaxLength>s),(list of supported range <TimeOut>s)<CR><LF><CR><LF>OK<CR><LF>

13.23.2 Interface Description

This command receives the data through the secure or normal socket.

The test command obtains the SSL received command capabilities.

- For Sync mode (if the socket is opened with <mode> value as 0), the AT^SSLRX will work in synchronous mode. If run AT^SSLRX command, then module will receive the data from server.
- For ASync mode (if the socket is opened with <mode> value as 1), the AT^SSLRX will work in asynchronous mode. (i.e) whenever data is available in the server, it will receive the data automatically.
- In Sync mode, if the server sends data that exceed the maximum length, AT^SSLRX is executed to read the entire data.

If the AT^SSLRX operation time exceeds the preset threshold, a timeout occurs.

13.23.3 Parameter Description

<SSL_id>: an integer type value indicates the SSL socket ID.

0	Normal socket connection
1	Secure socket connection

In case of the normal socket connection effect and process will be same as TCP.

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<Maxlength>: may receive processing each time most greatly the data packet; specifies the maximum number of bytes that will read from the socket. The value ranges from 1 to 1024.

<TimeOut>: maximum blocking timeout in seconds. It is optional parameter. It can be omitted, and in this case the default timeout configurable with AT^SSLCFG will be used for both secure socket RX and normal socket RX, the default <TimeOut> value (60) will be used.

<LengthOfRec>: the actual number of bytes received.

<Received_data>: the received data.

NOTE

If <encode_ok> in AT^SSLEN command is 1, then it is Base 64 encoded format data (the length of the <Received_data> is differ from <LengthOfRec>, because the <Received_data> is in Base64 encoded format). Otherwise, the actual plain data will be displayed.

13.23.4 Property Description

Saving upon Power-off	PIN
N	Y

13.23.5 Example

Preconditions: the connection is opened by using AT^SSLO command.

- The <encode_ok> is set to 1 in AT^SSLEN command.

```
Run:        AT^SSLRX=1,5,60
Response:   ^SSLRX: 5
            SGVsbG8=

            OK
```

- The <encode_ok> is set to 0 in AT^SSLEN command.

```
Run:        AT^SSLRX=1,5,60
Response:   ^SSLRX: 5
            Hello

            OK
Run:        AT^SSLRX=?
Response:   ^SSLRX: (0-1),(1-1024),(1-60)

            OK
```


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13.24 ^SSLRX–Notify SSL Arrival Data

13.24.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SSLRX: <LengthOfRec><CR><LF><Received_data><CR><LF>

13.24.2 Interface Description

This command automatically reports the received data when socket is opened in ASync mode.

13.24.3 Parameter Description

<LengthOfRec>: the actual number of bytes received.

<Received_data>: the received data.

NOTE

If <encode_ok> in AT^SSLEN command is 1, then it is Base 64 encoded format data (the length of the <Received_data> is differ from <LengthOfRec>, because the <Received_data> is in Base64 encoded format). Otherwise, the actual plain data will be displayed.

13.24.4 Property Description

Saving upon Power-off	PIN
N	Y

13.24.5 Example

Response:

```
^SSLRX: 5
Hello
^SSLRX: 5
SGVsbG8=
```


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13.25 AT^SSLTX–Send Data

13.25.1 Command Syntax

AT^SSLTX=<SSL_id>,<data_buffer>[,<TimeOut>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^SSLTX=?
Possible Response(s)
<CR><LF>^SSLTX: (list of supported <SSL_id>s),(list of supported <data_buffer>s),(list of supported <TimeOut>s)<CR><LF><CR><LF>OK<CR><LF>

13.25.2 Interface Description

This command sends data through the secure or normal socket.

The test command obtains the SSL transmit data command capability.

13.25.3 Parameter Description

<SSL_id>: an integer type value indicates the SSL socket ID.

0	Normal socket connection
1	Secure socket connection

<data_buffer>: a string type, the data which are needed to transmit [1-1024 bytes].

- If the <encode_ok> is set to 1, then the input buffer should be 768 bytes of raw data.
- If the <encode_ok> is set to 0, then the input buffer should be 1024 bytes of raw data.
- If <encode_ok> in AT^SSLEN command is 1, then it should be Base 64 encoded format data. Otherwise, it should be normal plain data.

<TimeOut>: maximum blocking timeout in seconds. It is optional parameter. It can be omitted, and in this case the default timeout configurable with AT^SSLCFG will be used for secure socket TX and for normal socket TX, the default <Time Out> value (60) will be used.

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13.25.4 Property Description

Saving upon Power-off	PIN
N	Y

13.25.5 Example

Preconditions: a connection is opened using `AT^SSLO` command.

- The `<encode_ok>` is set to 1 in `AT^SSLEN` command

Run: `AT^SSLTX=1,"SGVsbG8=",60`

Response: `OK`

- The `<encode_ok>` is set to 0 in `AT^SSLEN` command

Run: `AT^SSLTX=1,"Hello",60`

Response: `OK`

Run: `AT^SSLTX=?`

Response:
```
^SSLTX: (0-1),,(1-60)

OK
```


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14 Huawei Proprietary Interface: Firmware Update Interfaces

14.1 AT^FOTAMODE–Set FOTA Operation Mode

14.1.1 Command Syntax

AT^FOTAMODE=<dectect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^FOTAMODE?
Possible Response(s)
<CR><LF>^FOTAMODE: <dectect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]<CR><LF><CR><LF>OK<CR><LF>
AT^FOTAMODE=?
Possible Response(s)
<CR><LF>^FOTAMODE: (list of supported <dectect_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>

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14.1.2 Interface Description

The set command sets 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 queries the modes of version detection, download, and update, status of resumable data transfer, and interval between version detections.

The test command returns the supported parameter ranges.

14.1.3 Parameter Description

<dectect_mode>: specifies the version detection mode.

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. (default value)

<download_mode>: specifies the version download mode.

0	Manual download. In this mode, the module starts to download the detected new version only after the user confirms the download operation. (default value)
1	Automatic download. In this mode, the module starts the download process upon detection of a new version.

<update_mode>: specifies the update mode.

0	Manual update. In this mode, the module starts the update only after the user confirms the update operation. (default value)
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.

0	Disable resumable data transfer.
1	Enable resumable data transfer. (default value)

<period>: an integer type value that specifies the interval between version detections. Value unit: day. The value ranges from 1 to 65535. This parameter is available only when <dectect_mode> is 1. The default value is 7. If <dectect_mode> is 1, <period> must be specified.

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NOTE

- When <dectect_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.

14.1.4 Property Description

Saving upon Power-off	PIN
Y	N

14.1.5 Example

Run: AT^FOTAMODE=1,0,1,1,22

Response: OK

Run: AT^FOTAMODE?

Response: ^FOTAMODE: 1,0,1,1,22

OK

Run: AT^FOTAMODE=?

Response: ^FOTAMODE: (0-1),(0-1),(0-1),(0-1),(1-65535)

OK

Run: AT^FOTAMODE=0,0,1,1

Response: OK

Run: AT^FOTAMODE?

Response: ^FOTAMODE: 0,0,1,1,7

OK

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14.2 AT^FOTACFG–Set FOTA Connection Parameters

14.2.1 Command Syntax

AT^FOTACFG=<APN>,<username>,<password>,<auth_type>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^FOTACFG?
Possible Response(s)
<CR><LF>^FOTACFG: <APN>,<username>,<password>,<auth_type><CR><LF><CR><LF>OK<CR><LF>

14.2.2 Interface Description

This command sets the APN, user name, password, and authentication mode for dial-up connections.

14.2.3 Parameter Description

<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 CHAP. This parameter is not supported when 3GPP2 is used. The authentication mode is determined based on the negotiation between the module and network.

0	No authentication
1	PAP
2	CHAP

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14.2.4 Property Description

Saving upon Power-off	PIN
Y	N

14.2.5 Example

When the module is not detecting or downloading a new version or being updated, run AT^FOTACFG to set the APN, user name, password, and authentication mode for dial-up connections.

Run: AT^FOTACFG="1234","12","12",1

Response: OK

Run: AT^FOTACFG?

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

OK

14.3 AT^FOTADET–Manually Detect a New Version

14.3.1 Command Syntax

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

14.3.2 Interface Description

This command detects a new version available for the module.

14.3.3 Parameter Description

None

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14.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

14.3.5 Example

When the module is not detecting or downloading a new version or being updated, run AT^FOTADET to initiate a new version detection.

Each detection attempt consumes 1 KB to 3 KB traffic.

- If the command is executed successfully:

  Run: AT^FOTADET

  Response: OK

- If the module detects a new version:

  Response: ^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:

  Response: ^FOTASTATE: 14

- If the command fails to be executed because the module is processing other service or the FOTA status is incorrect:

  Run: AT^FOTADET

  Response: +CME ERROR: <err>

- If the command fails to be executed because of failure to set up a network connection or connection to the server:

  Response: ^FOTASTATE: 13,18

14.4 AT^FOTADL–Manually Download a New Version

14.4.1 Command Syntax

AT^FOTADL=<n>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

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

14.4.2 Interface Description

The set command starts or stops a version download.

The test command returns the control mode available for version downloads.

14.4.3 Parameter Description

<n>: specifies the control mode for version downloads.

0	Cancel a download, delete the downloaded file, and restore the FOTA status to idle state.
1	Start a download or resumes data transfer.
2	Run this command to download Pause manually.

14.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

14.4.5 Example

When the module is downloading a new version, run AT^FOTADL=0 to stop the download.

If no download or update is undergoing on the module, and the module has detected a new version available, run AT^FOTADL=1 to download the new version.

```
Run:        AT^FOTADL=?
Response:   ^FOTADL: (0-2)

            OK
Run:        AT^FOTADL=1
```


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Response: `OK`

`^FOTASTATE: 30`

`^FOTASTATE: 40`

14.5 AT^FWUP–Start a FOTA Update

14.5.1 Command Syntax

`AT^FWUP`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>

14.5.2 Interface Description

This command starts a FOTA update.

14.5.3 Property Description

Saving upon Power-off	PIN
NA	N

14.5.4 Example

- If a new version has been downloaded to the module, run `AT^FWUP` to start the update. The module then reports an `OK` message and starts the update.

Run: `AT^FWUP`

Response: `OK`

`^FOTASTATE: 50`

- If the update succeeds:

Response: `^FOTASTATE: 90`

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- If the update fails:

Response: ^FOTASTATE: 80,155

14.6 AT^FOTASTATE–Unsolicitedly Report the FOTA Status

14.6.1 Command Syntax

AT^FOTASTATE?
Possible Response(s)
<CR><LF>^FOTASTATE: <status><CR><LF><CR><LF>OK<CR><LF>
URC
Possible Response(s) 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>

14.6.2 Interface Description

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

14.6.3 Parameter Description

<status>: indicates the current status. Its value is an integer.

10	Idle
11	Querying
12	New version found
13	New version query failed
14	No version found
20	Download failed
30	Download progressing

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31	Download Pending. This value indicates that the module has a download task that is not yet complete after the module restarts. If resumable data transfer has been enabled, the module resumes the download
40	Download Complete
50	Ready to update
60	Update Progressing
80	Update failed
90	Update successful

<version>: indicates the software version number. Its value is a string containing a maximum of 31 characters, which exclude 0<CR> or OK<CR>.

<description>: indicates the software description. Its value is a string with a valid character in English and a maximum of five entries. The entries are separated by semicolon, and each contains 255 characters or less.

<packet_size>: indicates the number of bytes in the update package.

Valid values of <version>, <description>, and <packet_size> are unsolicitedly reported when <status> is 12. If <status> is not 12, empty values are returned.

<error_code>: indicates the reason for a version query failure. Its value is an integer. This parameter is available only when <status> is 13, 20, or 80.

<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
19	Invalid domain name

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<error_code>	Description
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
107	Fail to send data because file CRC or subfile CRC is error
108	Fail to send data because update type is error
109	Fail to send data because model product is error
110	Fail to send data because source version is error
111	Fail to send data because some tag length is error
112	Fail to send data because file num error
113	Fail to send data because open subfile failed
114	Fail to send data because write subfile to flash error
151	Fail to write flag
152	Fail to read flag
153	Fail to erase region
154	Fail to copy osbl
155	Fail to replace image
156	Fail to copy xnv
157	Fail to write xnv
158	Fail to backup nv
159	Fail to restore nv

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14.6.4 Property Description

Saving upon Power-off	PIN
Y	N

14.6.5 Example

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.

- If the download succeeds:

Run: AT^FOTADL=1

Response: OK

^FOTASTATE: 30

^FOTASTATE: 40

- If the download fails:

Run: AT^FOTADL=1

Response: OK

^FOTASTATE: 30

^FOTASTATE: 20,18

Run: AT^FOTASTATE?

Response: ^FOTASTATE: 10

OK

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14.7 AT^FOTADLQ–Query Download Status of Update Files

14.7.1 Command Syntax

AT^FOTADLQ
Possible Response(s)
[<CR><LF>^FOTADLQ: <index>,<file_type>,<dl_size>,<file_size>[<CR><LF>^FOTADLQ: <index>,<file_type>,<dl_size>,<file_size>[...]]<CR><LF>]<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

14.7.2 Interface Description

This command queries the download progress of update files.

14.7.3 Parameter Description

<index>: indicates the file sequence number. The 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 (not supported currently)
"FIRMWARE1"	Firmware differential file
"XNV"	NV configuration file

<dl_size>: an integer type value that indicates the number of downloaded bytes.

<file_size>: an integer type value that indicates the number of total bytes.

14.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

14.7.5 Example

During an update (when <status> is 30 or 31), run AT^FOTADLQ to query the list of update files to download, the size of downloaded files, and the total size of update files to download.

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Run: `AT^FOTADLQ`

Response:
```
^FOTADLQ: 1,"FIRMWARE1",0,255638

OK
```

14.8 AT^FWLOAD–Perform a Local Upgrade

14.8.1 Command Syntax

AT^FWLOAD=<update_type>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

14.8.2 Interface Description

This command specifies the upgrade type, transmits the upgrade file into the module using 1K-Xmodem, and starts the upgrade. The following table lists the ports supported by the full and differential upgrades.

Upgrade type	UART port	MODEM port	PCUI port
Full upgrade	√	√	√
Differential upgrade	√	√	√

You can run `AT+IPR?` to query the baud rates supported by the current module. To set the baud rates for a module, run the `AT+IPR` set command.

If you use PCUI or MODEM port to start local upgrade, ignore the baud rates setting.

NOTE

- During a local update, if the module restarts, the host needs re-open the port to receive the data sent by the module. Meanwhile, in order to avoid some adverse impact, other ports cannot perform other operations, and the host cannot transmit data through PCUI port and UART port in the full updates.
- It is recommended to use a higher baud rate before the upgrade.
- When the module receives the command, it will reboot and enter the 1K-Xmodem update transfer mode.

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14.8.3 Parameter Description

<update_type>: an integer type value that specifies the upgrade type.

0	Full upgrade
1	Differential upgrade

The 1K-Xmodem protocol is used to transmit update files.

14.8.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.8.5 Example

- Local Differential upgrade:

Run: `AT^FWLOAD=1`

Response: `OK`

The module restarts and reports '>' and 'C' char, then TE starts the 1K-Xmodem data transfer.

Response: `^FWLSTATE: 90`

- Local full upgrade:

Run: `AT^FWLOAD=0`

Response: `OK`

The module restarts and reports '>' and 'C' char, then TE starts the 1K-Xmodem data transfer.

Response: `^FWLSTATE: 90`

14.9 ^FWLSTATE–Unsolicitedly Report the Upgrade Status

14.9.1 Command Syntax

URC
Possible Response(s)

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<CR><LF>^FWLSTATE: <state>[,<error_code>]<CR><LF>

14.9.2 Interface Description

During an update, the board unsolicitedly reports the current update status after ^FWLSTATE is executed.

14.9.3 Parameter Description

<state>: an integer type value that specifies the current upgrade status.

80	Update failed
90	Update succeeded

<error_code>: an integer type value that specifies the cause of the upgrade failure. See the error list in AT^FOTASTATE–Unsolicitedly Report the FOTA Status.

14.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.9.5 Example

- Local differential upgrade

Run: AT^FWLOAD=1

Response: OK

The module restarts and reports '>' and 'C' char, then TE starts the 1K-Xmodem data transfer.

Response: ^FWLSTATE: 90

14.10 ^FOTASMS–Notify Users to Decide on FOTA Upgrade

14.10.1 Command Syntax

URC
Possible Response(s)

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<CR><LF>^FOTASMS<CR><LF>

14.10.2 Interface 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.

NOTE

- 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.

14.10.3 Parameter Description

None

14.10.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.10.5 Example

None

14.11 AT^FOTASMSCFG–Set FOTA SMS Auto-Upgrade

14.11.1 Command Syntax

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

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AT^FOTASMSCFG=?
Possible Response(s)
<CR><LF>^FOTASMSCFG: (list of supported <operation>s)<CR><LF><CR><LF>OK<CR><LF>

14.11.2 Interface 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.

14.11.3 Parameter Description

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

0	Disable
1	Enable (default value)

14.11.4 Property Description

Saving upon Power-off	PIN
Y	N

14.11.5 Example

Run: AT^FOTASMSCFG=1

Response: OK

Run: AT^FOTASMSCFG?

Response: ^FOTASMSCFG: 1

OK

Run: AT^FOTASMSCFG=?

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Response: ^FOTASMSCFG: (0-1)

OK

14.12 AT^FOTAP–Confirm FOTA Upgrade

14.12.1 Command Syntax

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

14.12.2 Interface Description

Once FOTA SMS notification comes, users can confirm the FOTA upgrade using this command. If users do not give any confirmation by default, it will go for force upgrade. 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.

14.12.3 Parameter Description

<n>:

0	Do not do FOTA upgrade.
1	Go for FOTA upgrade.

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14.12.4 Property Description

Saving upon Power-off	PIN
N	Y

14.12.5 Example

Response: ^FOTASMS

Run: AT^FOTAP=1

Response: OK

^FOTASTATE: 11

Run: AT^FOTAP?

Response: ^FOTAP: 1

OK

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15 Huawei Proprietary Interface: ECM Interfaces

15.1 AT^NDISDUP–NDIS-Based Dialing

15.1.1 Command Syntax

AT^NDISDUP=<cid>,<connect>[,<APN>[,<username>[,<passwd>[,<auth_type>]]]]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^NDISDUP?
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^NDISDUP=?
Possible Response(s)
<CR><LF>^NDISDUP: (list of supported <cid>s),(list of supported <connect>s)<CR><LF><CR><LF>OK<CR><LF>

15.1.2 Interface Description

This command implements NDIS-based dialing.

- AT^NDISDUP=1,1 indicates that other parameters are not required.
- AT^NDISDUP=1,0 indicates that the network connection must be disabled.

This command can be used only when an NDIS port is available.

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15.1.3 Parameter Description

<cid>:

1–16	Index of a PDP context.

<connect>:

0	The connection is disabled
1	The connection is set up

<APN>: indicates access point name in the format of character strings (0 to 99 bytes).

<username>: indicates user name in the format of character strings (0 to 255 bytes).

<passwd>: indicates password in the format of character strings (0 to 255 bytes).

<auth_type>: indicates authentication reference.

0	No authentication
1	PAP authentication
2	CHAP authentication
3	CHAP authentication and PAP authentication

15.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

15.1.5 Example

```
Run:        AT^NDISDUP=1,1,"1234"
Response:   OK
Run:        AT^NDISDUP?
Response:   OK
Run:        AT^NDISDUP=?
Response:   ^NDISDUP: (1-16),(0-1)

            OK
```

NOTE

When there are no APN/USERNAME/PASSWORD/AUTH TYPE input, it will use the profile cid to connect. Otherwise, it will use the parameter of this command to connect. For example, AT^NDISDUP=1,1 command will use profile 1 which is defined by AT+CGDCONT to connect.

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15.2 ^NDISSTAT–Unsolicitedly Report of Connection Status

15.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^NDISSTAT: <stat>[,<err_code>[,<wx_state>[,<PDP_type>]]]<CR><LF>

15.2.2 Interface Description

When the device connection status changes, the MT proactively indicates this to the TE.

15.2.3 Parameter Description

<stat>: indicates connection status.

0	Disconnected
1	Connected
2	In connection (reported only when the device is automatically connected)
3	Disconnected (reported only when the device is automatically connected)

<err_code>:

0	Unknown error or unspecified error
other error codes	Defined in accordance with section 10.5.6.6 "SM Cause" in the 3GPP TS 24.008 V5.5.0 (2002-09) and later versions.

<wx_state>: indicates sub-state of the WiMAX data card. It is applicable only to the WiMAX data card. (not supported currently)

1	DL synchronization
2	Handover DL acquisition
3	UL acquisition
4	Ranging
5	Handover ranging
6	Capabilities negotiation
7	Authorization

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8 Registration

<PDP_type>: indicates character string value.

"IPV4" IPV4 Protocol

"IPV6" IPV6 Protocol

15.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

15.2.5 Example

- IPv4 changes from the connected state to the disconnected state:

Response: ^NDISSTAT: 0,0,,"IPV4"

- IPv4 changes from the disconnected state to the connected state:

Response: ^NDISSTAT: 1,,,"IPV4"

15.3 AT^NDISSTATQRY–Query the Connection Status

15.3.1 Command Syntax

AT^NDISSTATQRY?
Possible Response(s)
<CR><LF>^NDISSTATQRY: <stat>[,<err_code>[,<wx_state>[,<PDP_type>]]][,<stat>,<err_code>,<wx_state>,<PDP_type>]<CR><LF><CR><LF>OK<CR><LF>

15.3.2 Interface Description

The TE delivers this command to query the ECM (NDIS/WWAN) connection status of the MT.

15.3.3 Parameter Description

<stat>: indicates connection status.

0 Disconnected

1 Connected

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2	In connection (reported only when the device is automatically connected)
3	Disconnected (reported only when the device is automatically connected)

<err_code>:

0	Unknown error/unspecified error
other error codes	Defined in accordance with section 10.5.6.6 "SM Cause" in the 3GPP TS 24.008 V5.5.0 (2002-09) and later versions

<wx_state>: indicates sub-state of the WiMAX data card. It is applicable only to the WiMAX data card. (not supported currently)

1	DL synchronization
2	Handover DL acquisition
3	UL acquisition
4	Ranging
5	Handover ranging
6	Capabilities negotiation
7	Authorization
8	Registration

<PDP_type>: indicates character string value.

"IPV4"	IPV4 Protocol
"IPV6"	IPV6 Protocol

15.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

15.3.5 Example

Report one or two group of connection status based on the IPv6 capability of the MT:

- If the MT supports IPv4 only, the IPv4 connection is in the connected state. In this case, only one group of connection status is reported:

Run: AT^NDISSTATQRY?

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Response: `^NDISSTATQRY: 1,,,"IPV4"`

`OK`

- If the MT supports both IPv6 and IPv4, and IPv6 is in the disconnected state and IPv4 is in the connected state, two groups of connection status (regardless of before or after the dialing) are reported:

Run: `AT^NDISSTATQRY?`

Response: `^NDISSTATQRY: 1,,,"IPV4",0,0,,"IPV6"`

`OK`

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16 Huawei Proprietary Interface: Temperature Protection

16.1 AT^CHIPTEMP–Query the Temperature of the PA/SIM/Battery/Crystal Oscillator Command

16.1.1 Command Syntax

AT^CHIPTEMP?
Possible Response(s)
<CR><LF>^CHIPTEMP: <G PAtemp>,<W PAtemp>,<L PAtemp>,<SIMtemp>,<BATTERYtemp>,<CRYSTALtemp><CR><LF><CR><LF>OK<CR><LF>
AT^CHIPTEMP=?
Possible Response(s)
<CR><LF>^CHIPTEMP: <G PAtemp Range>,<W PAtemp Range>,<L PAtemp Range>,<SIMtemp Range>,<BATTERYtemp Range>,<CRYSTALtemp Range><CR><LF><CR><LF>OK<CR><LF>

16.1.2 Interface Description

This command queries temperature on hardware spots, such as GSM PA, WCDMA PA, LTE PA, SIM card slot, battery and crystal oscillator.

16.1.3 Parameter Description

<G PAtemp>: an integer type value indicates the GSM PA chip's current temperature.

65535 (not supported currently)

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<W PAtemp>: an integer type value indicates the WCDMA PA chip's current temperature.

65535 (not supported currently)

<L PAtemp>: an integer type value indicates the LTE PA chip's current temperature.

65535 (not supported currently)

<SIMtemp>: an integer type value indicates the current temperature of the SIM card.

65535 (not supported currently)

<BATTERYtemp>: an integer type value indicates the current temperature of the battery.

65535 (not supported currently)

<CRYSTALtemp>: an integer type value indicates the crystal's current temperature..

(-400-1200) The crystal's current temperature in the unit of 0.1℃.

<G PAtemp Range>: an integer type value indicates the temperature range of the GSM PA chip in the unit of 0.1℃.

(65535-65535) (not supported currently)

<W PAtemp Range>: an integer type value indicates the temperature range of the WCDMA PA chip in the unit of 0.1℃.

(65535-65535) (not supported currently)

<L PAtemp Range>: an integer type value indicates the temperature range of the LTE PA chip in the unit of 0.1℃.

(65535-65535) (not supported currently)

<SIMtemp Range>: an integer type value indicates the temperature range of the SIM card slot in the unit of 0.1℃.

(65535-65535) (not supported currently)

<BATTERYtemp Range>: an integer type value indicates the temperature range of the battery in the unit of 0.1℃.

(65535-65535) (not supported currently)

<CRYSTALtemp Range>: an integer type value indicates the temperature range of the crystal oscillator in the unit of 0.1℃.

(–400-1200) The crystal oscillator temperature range.

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NOTE

- If the query of a component's temperature fails, 65535 is returned.
- The temperature unit is 0.1℃. For example, if the returned value range is (–200,1000), the temperature ranges from –20℃ to 100℃.
- When actual temperature of the spots exceeds its range, the query command will not return the accurate temperature value. In this case, the queried temperature is not correct and physical protection must be adapted to avoid device damaged.

16.1.4 Property Description

Saving upon Power-off	PIN
NA	N

16.1.5 Example

Run:	AT^CHIPTEMP?	
Response:	^CHIPTEMP: 65535,65535,65535,65535,65535,300 OK	The response indicates the current temperature on hardware spots.
Run:	AT^CHIPTEMP=?	
Response:	^CHIPTEMP: (65535-65535),(65535-65535),(65535-65535),(65535-65535),(-400-1200) OK	The response indicates the temperature ranges on hardware spots.

16.2 AT^THERMFUN–Enable or Disable the Temperature Protection Function Command

16.2.1 Command Syntax

AT^THERMFUN=<switch>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^THERMFUN?
Possible Response(s)
<CR><LF>^THERMFUN: <switch><CR><LF><CR><LF>OK<CR><LF>

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AT^THERMFUN=?
Possible Response(s)
<CR><LF>^THERMFUN: (list of supported <switch>s)<CR><LF><CR><LF>OK<CR><LF>

16.2.2 Interface Description

This command enables or disables the temperature protection function.

- If the temperature protection function is enabled, the module performs the protection operation to disable the PA or shut down the system when the temperature reaches the threshold.
- If the temperature protection function is disabled, the module does not perform the protection operation to disable the PA or shut down the system when the temperature reaches the threshold.
- If the module is being in the state that the temperature protection function has been enabled, at this point, to disable the temperature protection function, the module performs the operation to enable the PA.
- The protection operation (to disable the PA or shut down the system) varies with the module's features.

16.2.3 Parameter Description

<switch>: an integer type value that indicates the switch for enabling or disabling the temperature protection function.

0	Disable the temperature protection function.
1	Enable the temperature protection function. (default value)

NOTE

- The parameter value changes to 1 upon power-off.
- A parameter value takes effect immediately after setting.

16.2.4 Property Description

Saving upon Power-off	PIN
N	N

16.2.5 Example

Run: AT^THERMFUN=?

Response: ^THERMFUN: (0-1)

OK

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Run: AT^THERMFUN?

Response: ^THERMFUN: 1

OK

Run: AT^THERMFUN=1

Response: OK

16.3 ^THERM–Thermal Protection Activated Unsolicited Report

16.3.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^THERM: <ACTION><CR><LF>

16.3.2 Interface Description

This command sends an unsolicited report to the host when thermal protection is activated/inactivated according to the temperature.

16.3.3 Parameter Description

<ACTION>: indicates whether thermal protection takes effect.

0	The thermal protection is inactive.
1	That the thermal protection is active.

16.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

16.3.5 Example

- The thermal protection is inactive:

  Response: ^THERM: 0

- The thermal protection is active:

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Response: `^THERM: 1`

16.4 ^THERMEX–Thermal Protection State Changed Unsolicited Report

16.4.1 Command Syntax

URC
<CR><LF>`^THERMEX: <pre_state>,<cur_state>`<CR><LF>

16.4.2 Interface Description

This command sends an unsolicited report to the host when thermal protection state changes according to the temperatures.

16.4.3 Parameter Description

`<pre_state>`: value that indicates thermal protection previous state.

`<cur_state>`: value that indicates thermal protection current state.

The possible values of `<pre_state>` or `<cur_state>` are defined as below:

0	NORMAL
1	WARNING
2	EMERGENCY
3	MODULE_SHUTDOWN

16.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

16.4.5 Example

- Indicates that the thermal protection is changed from NORMAL to WARNING:

Response: `^THERMEX: 0,1`

- Indicates that the thermal protection is changed from WARNING to EMERGENCY:

Response: `^THERMEX: 1,2`

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17 Appendix

17.1 List of URC Commands

NOTE
URC commands listed in the following table are provided only for your reference. Some URC commands may be not supported by the module.

URC	Function
+CBM	New CBM directly deliver indication
+CBMI	New CBM indication
+CCWA	Call waiting notifications
+CDS	SMS status report indication directly displayed
+CDSI	New SMS status report indication
+CEREG	Notify the current LTE registration status
+CGREG	Notify PS Domain Registration Status
+CLIP	CLIP notifications
+CMT	New message directly deliver indication
+CMTI	New SMS-DELIVER indication
+CREG	Notify the current registration status
+CRING	Indicate incoming call
+CSSI	Supplementary service notifications
+CSSU	Supplementary service notifications
+CTZV	Notify the time zone is changed
+CUSATEND	Unsolicitedly report of terminating a UICC proactive command session
+CUSATP	Unsolicitedly report a UICC proactive command
+CUSD	Unsolicitedly report USSD of network

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URC	Function
+XADPCLKFREQINFO	Unsolicitedly Present of Adaptive Clock Frequency Info
+XTS	Unsolicitedly Present of the Threshold Reached
RING	Call Indication
^ACTIVEBAND	(Only for the HUAWEI specified client)
^ANLEVEL	(Only for the HUAWEI specified client)
^AUDEND	Unsolicitedly Report the End of Audio Playback
^BOOT	(Only for the HUAWEI specified client)
^CEND	Call end indication
^CONF	Ringback tone indication
^CONN	Call connection indication
^CPBREADY	Unsolicitedly Report CPB Ready
^CRSSI	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^CSNR	(Only for the HUAWEI specified client)
^DATASETRULT	Notify XTRA data injection
^DATAVALIDITY	(Only for the HUAWEI specified client)
^DDTMF	Report DTMF Reserved Event
^DSDORMANT	Dormant State Indication
^DSFLOWRPT	(Only for the HUAWEI specified client)
^EARST	(Only for the HUAWEI specified client)
^ECCLIST	(Only for the HUAWEI specified client)
^ECLREC	Unsolicitedly Report AL_ACK and Timestamp Information
^ECLREDIAL	Unsolicitedly Report eCall Redialing
^ECLSTAT	Unsolicitedly Present eCall Session Status(Only for the HUAWEI specified client)
^EFSSTATE	Unsolicitedly Report EFS Backup or Resume
^ERRRPT	Specified error code indication (Only for the HUAWEI specified client)
^FOTASMS	Notify Users to Decide on FOTA Upgrade
^FOTASTATE	Report the FOTA Status
^FWLSTATE	Report the Upgrade Status

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URC	Function
^HCDS	Report a New Status Report Short Message
^HCMGS	Unsolicitedly Present of Successfully Sending a Short Message (PDU mode)
^HCMGSF	Report Short Message Sending Failure
^HCMGSS	Report Successful Short Message Sending (Text Mode)
^HCMT	Report a New Short Message
^HCMTI	Report the Arrival of CDMA Messages
^HCSQ	Report system mode and Signal Strength
^HDRRSSI	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^HRSSILVL	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^HWNAT	Indicate Network Mode Change
^IPDATA	Notificate Arrival Data
^IPRCVST	Unsolicitedly Report Data Arrival in Data Receive Buffer
^IPSRVST	Unsolicitedly Report the Socket Service State
^IPSTATE	Indicate TCP/UDP data link state
^JDET	Jammer Report
^LOCCHD	Unsolicited Report of Connection Status (Only for the HUAWEI specified client)
^MODE	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^NDISEND	(Only for the HUAWEI specified client)
^NDISSTAT	Unsolicited Report of Connection Status
^NDISSTATEX	Extended Unsolicited Report of Connection
^NISMSFWD	Unsolicitedly Report Short Messages with Specified Destination Port Numbers
^NWNAME	Unsolicitedly Report NITZ Operator Name
^NWTIME	Unsolicitedly report network system time
^ORIG	Indicate the origination of a call
^OTACMSG	(Only for the HUAWEI specified client)
^PDPSTATUS	Unsolicitedly Report Deactivation Reason
^POSEND	Report positioning end information

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URC	Function
^POSITION	Notify positioning result
^RFSWITCH	Report the RFSWITCH State
^RSSI	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^RSSILVL	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^SIMFILEREFRESH	(Only for the HUAWEI specified client)
^SIMRESET	Unsolicitedly Report SIM Reset Event
^SIMST	SIM Card State Change Indication
^SMMEMFULL	Message memory full
^SRVST	Service State Change Indication
^SSLRX	Notify SSL Arrival Data
^STIN	(Only for the HUAWEI specified client)
^SUPLCONN	Report a Successful Connection to the SUPL Server
^SYSSTART	Unsolicitedly report module startup
^THERM	Thermal Protection Activated Unsolicited Report
^THERMEX	Unsolicitedly Report Thermal Protection State Change
^TIMESETRULT	Notify XTRA time injection
^WAKEUPIN	WAKEUP_IN PIN Input Change Indication
^WNINV	Notify NI positioning
^WPDCP	(Only for the HUAWEI specified client)
^WPDDL	(Only for the HUAWEI specified client)
^WPDOP	(Only for the HUAWEI specified client)
^XDSTATUS	Notify XTRA data status
^SUPLCONN	Report a Successful Connection to the SUPL Server

17.2 General CME Error List

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

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Table 17-1 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
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

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Numeric mode	Verbose mode
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
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

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Numeric mode	Verbose mode
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 17-2 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

Table 17-3 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

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Numeric mode	Verbose mode
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

Table 17-4 SSL related CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
2101	Operations failed due to system error
2102	Socket not enabled
2103	Socket not connected
2104	Socket already enabled
2105	Socket already connected
2106	Invalid socket ID
2107	SSL error during handshake
2108	Fail to establish connection

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Numeric mode	Verbose mode
2109	Fail to connect specified address
2110	Invalid arguments
2111	Certification error
2112	Invalid Operation
2113	Certificate maximum limit reached
2114	Network timeout
2115	SSL read failed
2116	SSL write failed
2117	Normal Connecton Opened
2118	Normal Connection Not Opened
2119	Secure Connection Opened
2120	Secure Connection Not Opened

Table 17-5 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
1512	The network has not been opened yet
1513	The network has been opened already
1514	Fail to open network
1515	The link has not been established yet
1517	Fail to establish link
1518	Fail to bind the specified port
1519	Fail to connect to the specified address
1520	Invalid domain name
1521	Fail to resolve DNS
1523	File type is not correct
1524	File source is not correct

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Numeric mode	Verbose mode
1555	FOTA is in collision state
1602	Fail to send data because TE cancel
1603	Fail to send data because retry times are bigger than 10
1604	Fail to send data because file tag is error
1605	Fail to send data because packet number is error
1606	Fail to send data because the protocol is not 1K-Xmodem
1607	Invalid port for fwload mode
1608	Fail to send data because file crc or subfile crc is error
1609	Fail to send data because update type is error
1610	Fail to send data because model product is error
1611	Fail to send data because source version is error
1612	Fail to send data because some tag length is error
1613	Fail to send data because file num error
1614	Fail to send data because open subfile failed
1615	Fail to send data because write subfile to flash error

17.3 CMS Error List

The following lists the <err> value of CMS ERROR that may be returned by all AT commands of short messages.

<err> values used by common messaging commands:

Numeric mode	Verbose mode
0–127	3GPP TS 24.011 clause E.2 values
128–255	3GPP TS 23.040 clause 9.2.3.22 values.
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter

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Numeric mode	Verbose mode
310	(U)SIM not inserted
311	(U)SIM PIN required
312	PH-(U)SIM PIN required
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong
316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service
332	network timeout
340	no +CNMA acknowledgement expected
500	unknown error
...511	other values in range 256...511 are reserved
512...	manufacturer specific

17.4 Final Result Code

Final Result Code	No.	Description
OK	0	A command is executed, and there is no error.
CONNECT	1	A connection is established.
RING	2	An incoming call is originated.
NO CARRIER	3	A connection is terminated.
ERROR	4	There is a common error.
NO DIALTONE	6	There is no dialing tone.
BUSY	7	The peer is busy.

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Final Result Code	No.	Description
NO ANSWER	8	Timeout occurs when the connection is complete, and there is no reply.
+CME ERROR: <err>		The error type is specified by <err>.
+CMS ERROR: <err>		It is a short message-related error.
COMMAND NOT SUPPORT	numeric is not supported	The command is not supported.
TOO MANY PARAMETERS	numeric is not supported	Too many parameters in the issued command

NOTE
The final result code is the termination flag of an AT command.

17.5 References

The following list is most of the references for this document.

[1] 3GPP TS 22.067

[2] 3GPP TS 22.071

[3] 3GPP TS 22.082

[4] 3GPP TS 22.101

[5] 3GPP TS 22.173

[6] 3GPP TS 23.003

[7] 3GPP TS 23.038

[8] 3GPP TS 23.040

[9] 3GPP TS 23.041

[10] 3GPP TS 23.107

[11] 3GPP TS 23.228

[12] 3GPP TS 23.271

[13] 3GPP TS 24.008

[14] 3GPP TS 24.011

[15] 3GPP TS 25.101

[16] 3GPP TS 25.331

[17] 3GPP TS 27.005

[18] 3GPP TS 27.007

[19] 3GPP TS 27.060

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[20] 3GPP TS 29.061

[21] 3GPP TS 31.102

[22] 3GPP TS 31.111

[23] 3GPP TS 36.101

[24] 3GPP TS 36.306

[25] 3GPP TS 44.060

[26] ETSI TS 102.221

[27] ETSI TS 102.223

[28] GSM 07.05

[29] GSM 11.11

[30] GSM MoU SE.13

[31] ITU-T E.212 Annex A

[32] ITU-T Recommendation V.250

[33] ITU-T Recommendation V.42

[34] ITU-T T.50: International Reference Alphabet (IRA)

[35] ITU-T V.25 ter

[36] HUAWEI Terminal AT Command Interface Specifications

17.6 Acronyms and Abbreviations

Acronym Or Abbreviation	Full Spelling
3GPP	Third Generation Partnership Project
ACK	Acknowledgement
ADB	Android Debug Bridge
ADC	Analog To Digital Converter
AGNSS	Assisted Global Navigation Satellite System
AGPS	Assisted Global Positioning Systems
AP	Access Point
APN	Access Point Name
ASCII	American Standard Code For Information Interchange
AT	Attention
AUX	Auxiliary
BCD	Binary Coded Decimal

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Acronym Or Abbreviation	Full Spelling
BER	Bit Error Rate
BS	Base Station
CBM	Cell Broadcast Message
CDMA	Code Division Multiple Access
CHAP	Challenge Handshake Authentication Protocol
CLI	Calling Line Identification
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CP	Content Provider
CPT	Cellular Paging Teleservice
CS	Circuit Switched
CUG	Closed User Group
DCD	Data Carrier Detection
DCE	Data Circuit-Terminating Equipment
DC-HSPA+	Dual Carrier High Speed Packet Access Plus
DCS	Digital Cellular System
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multiple Frequency
DTR	DTE Ready
ECM	Ethernet Networking Control Model
EDGE	Enhanced Data Rates For GSM Evolution
EFS	Encrypting File System
EGPRS	Enhanced General Packet Radio Service
EHRPD	Evolved High Rate Packet Data
EMM	EPS Mobility Management
EPS	Evolved Packet System
ERMES	European Radio Messaging System
ESN	Equipment Serial Number

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Acronym Or Abbreviation	Full Spelling
ETSI	European Telecommunication Standards Institute
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
EVDO	Evolution-Data Optimized
EVPF	Enhanced Validity Period Format
FDN	Fixed Dialing Number
FOTA	Firmware Over-The-Air
FTM	Factory Test Mode
FTP	File Transfer Protocol
GBK	Chinese Internal Code Specification
GERAN	GSM/EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GLONASS	Global Navigation Satellite System
GMM	GPRS Mobility Management
GMT	Greenwich Mean Time
GNSS	Global Navigation Satellite System
GPGGA	Global Positioning System Fix Data
GPGSA	GPS DOP And Active Satellites
GPGSV	GPS Satellites In View
GPIO	General-Purpose Input/Output
GPRMC	Recommended Minimum Specific GPS
GPRS	General Packet Radio Service
GPS	Global Position System
GPVTG	GPS Trackmade Good And Ground Speed
GSM	Global System For Mobile Communications
HDR	High Data Rate
HSDPA	High Speed Downlink Packet Access
HSPA	High Speed Packet Access
HSPA+	High Speed Packet Access Plus
HSUPA	High Speed Uplink Packet Access
HTTP	Hypertext Transfer Protocol
IC	Circuit Card

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Acronym Or Abbreviation	Full Spelling
ICCID	Integrated Circuit Card Identity
IMEI	International Mobile Equipment Identity
IMEISV	International Mobile Station Equipment Identity And Software Version
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identity
IMT	International Mobile Telecommunications
IP	Internet Protocol
IRA	International Reference Alphabet
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
IVS	In Vehicle System
IWF	Interworking Function
LCS	Location Service
LED	Light Emitting Diode
LGA	Land Grid Array
LTE	Long Term Evolution
MBIM	Mobile Broadband Interface Model
MCC	Mobile Country Code
MDM	Mobile Device Management
MDN	Mobile Directory Number
ME	Mobile Equipment
MEID	Mobile Equipment Identifier
MIN	Mobile Identification Number
MM	Mobility Management
MNC	Mobile Network Code
MS	Mobile Station
MSC	Mobile Switching Center
MSD	Minimum Set Of Data
MSIN	Mobile Station Identification Number
MSISDN	Mobile Station International ISDN Number

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Acronym Or Abbreviation	Full Spelling
MT	Mobile Terminal
NCM	Network Control Model
NDIS	Network Driver Interface Specification
NDSS	Network Directed System Selection
NI	Network Indicator
NMEA	National Marine Electronics Association
NV	Non-Volatile
OTA	Over The Air
OTASP	Over-The-Air Service Provisioning
PA	Power Amplifier
PAP	Password Authentication Protocol
PC	Personal Computer
PCCA	Portable Computer And Communications Association
PCM	Pulse-Coded Modulation
PCS	Personal Communication System
PD	Position Determination
PDCP	Packet Data Convergence Protocol
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PH-FSIM	Phone To The Very First Inserted SIM
PIN	Personal Identification Number
PLMN	Public Land Mobile Network
PPP	Point-To-Point Protocol
PS	Packet Switched
PSAP	Public Safety Answering Point
PUK	PIN Unblocking Key
QoS	Quality Of Service
RF	Radio Frequency
RFC	Request For Comments
RI	Ring Indicator
RLP	Radio Link Protocol

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Acronym Or Abbreviation	Full Spelling
RNDIS	Remote Network Driver Interface Specification
ROM	Read Only Memory
RPLMN	Registered Public Land Mobile Network
RRC	Radio Resource Control
RSCP	Received Signal Code Power
RSRP	Reference Signal Received Power
RSRQ	Reference Signal Received Quality
RSSI	Receive Signal Strength Indicator
RUIM	Removable User Identity Module
SAP	Service Access Point
SAR	Specific Absorption Rate
SC	Service Center
SCA	Service Center Address
SDN	Service Dialing Number
SDU	Service Data Unit
SID	Service Identifier
SIM	Subscriber Identity Module
SINR	Signal To Interference Plus Noise Ratio
SIP	Session Initiation Protocol
SM	Short Message
SMS	Short Message Service
SMSC	Short Message Service Center
SNDCP	Subnetwork Dependent Convergence Protocol
SNR	Serial Number
SNTP	Simple Network Time Protocol
SPN	Service Principal Name
SS	Selective Suspend
STK	SIM Toolkit
SUPL	Secure User Plane Location
SVN	Software Version Number
TA	Terminal Adapter

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Acronym Or Abbreviation	Full Spelling
TAC	Type Approval Code
TCP	Transmission Control Protocol
TD-SCDMA	Time Division Synchronous Code Division Multiple Access
TE	Terminal Equipment
TLS	Transport Layer Security
TPDU	Transfer Protocol Data Unit
TS	Technical Specification
TTS	Text To Speech
UART	Universal Asynchronous Receiver/Transmitter
UCS	Universal Character Set
UDP	User Datagram Protocol
UDUB	User Determined User Busy
UE	User Equipment
UICC	Universal Integrated Circuit Card
UIM	User Identity Module
UMTS	Universal Mobile Telecommunications System
URC	Unsolicited Result Code
URL	Uniform Resource Locator
USAT	USIM Application Toolkit
USB	Universal Serial Bus
USIM	Universal Subscriber Identity Module
USSD	Unstructured Supplementary Service Data
UTC	Coordinated Universal Time
UTRAN	Universal Terrestrial Radio Access Network
VP	Validity Period
WCDMA	Wideband Code Division Multiple Access
Wimax	Worldwide Interoperability For Microwave Access
WWAN	Wireless Wide Area Network
XTRA	Extended Receiver Assistance

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